KOMA ELEKTRONIK FIELD KIT SENSORS USER MANUAL

Thank you for purchasing our Field Kit Sensors! Ever since its release, the KOMA Elektronik Field Kit has been used to play, teach and experiment with electro-acoustic techniques in music, but now we are taking it one step further: it's sensor time! Use the Button/Jack, Light Sensor, Accelerometer, Electret Microphone, Ball Switch, Temperature Sensor, Linear Softpot, Sequential Voltage Source and Capacitive Touch Sensor to make your music more organic, to try new ways of triggering sounds and to experiment with your environment.

We sell our sensors in PACK A (Button/Jack, Light Sensor, Electret Microphone, Ball Switch, Temperature Sensor) and PACK B (Accelerometer, Sequential Voltage Source and Capacitive Touch Sensor). The Linear Softpot is a sensor we sell on its own. This manual is a resource for all sensors.

All the best from Berlin,
The KOMA Team

Made with love in Berlin, Germany.

Our warranty period is 2 years for issues KOMA determines are production or shipping related.

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Questions? Need help?

Please contact us at:
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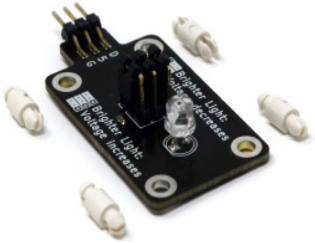
Assemble your Sensors

1.



2.

3.

All sensors come in full working condition and can be used out of the box, but like with certain furniture products, you will need to assemble the final parts yourself. To make sure the sensors don't make unnecessary signals or create shorts, we recommend you add the bottom panels to the sensors, which is a simple job: Take 4 plastic standoffs from the packaging (Step 1). Then push the standoffs into the four holes in the sensor board (Step 2). Set the sensor straight up, with the standoffs attached and push the standoffs into the bottom panel (Step 3).

How to connect the Sensors to the Field Kit.

The **Signal Interface** provides everything neccessary to use a wide variety of analog sensors and switches with the Field Kit. It transforms the signals of sensors and switches to control voltages which can be used with other parts of the Field Kit or other pieces of CV-capable equipment.

The upper part is the Switch interface and the bottom part is the Sensor Interface, both have very distinct functions, which you can read more about in the following sections:

The Switch Interface

The Switch Interface transforms signals from different switches into four different types of signals on two outputs. It can output gates, inverted gates, ramp or sawtooth signals of adjustable length. The two outputs can be used at the same time. Connect a switch to the pins marked "SWITCH IN" (D – Data input, 5 – 5V output, G – Ground).

Use the Length control to adjust the length of the trigger that is present at the outputs when the switch at the input is connected to 5V. This setting applies to both signal outputs: gate and ramp. Use the Range control to set the output range. Short: minimum 1ms, maximum 33ms, Long: minimum 33ms, maximum 1s. Use the Gate/Inverted Gate Switch to choose which type of gate signal should be present at the corresponding output.

Use the Ramp/Sawtooth Switch to choose which type of gate signal should be present at the corresponding output. The Switch Interface Range is : 0 – 7.8 V.

Sensor Interface

The Sensor Interface is capable of manipulating the output of analog sensors to be used with the CV-controllable functions of the Field Kit or other CV-capable gear.

To use the Sensor Interface, connect an analog sensor to the Pins marked "ANALOG IN" where D is the Data input, 5 stands for 5V output and G is Ground. Use the Level control to amplify or attenuate the voltage present at the ANALOG IN (Pin D). The middle position of the knob represents unity gain. Clockwise rotation amplifies the signal and counter-clockwise rotation will attenuate the incoming signal. The maximum amplifcation factor is 2 and the maximum attenuation factor is ∞.

Use the Offset control to add a positive or negative DC offset to the incoming signal. Middle position of the knob has no effect. Clockwise rotation adds positive offset and counter-clockwise rotation adds a negative offset.

The Maximum DC offset for the Sensor Interface is ± 4.5 V. The Signal jack outputs the processed signal of the sensor, the output voltage range is 0 – 7.8 V.

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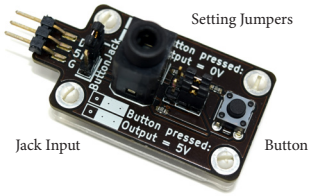
SENSOR OVERVIEW

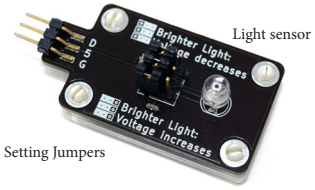
Button & Jack



This is rather an utility tool than an actual sensor. It allows you to either use a pushbutton or any CV-Signal (0- 5V) as a signal source. You can select to either use the button or any signal connected to the jack input with the jumper located right next to the pin-header.

The voltage present at the output upon a button press can be selected with the two jumpers next to the button. The button and jack can be used with both the ANALOG IN and the DIGITAL IN of the Field Kit's Sensor Interface.

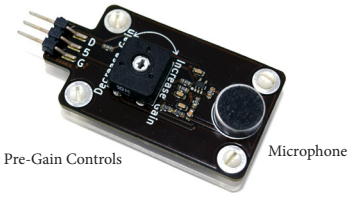
Light Sensor



The light sensor will change the output voltage depending on the light intensity. The spectral sensitivity is similar to the human eye, covering the full spectrum of visible light, with a peak at 570nm (green/yellow).

The change of the voltage according to the light intensity can be set with the three jumpers on the board. Set those jumpers according to printing on the board. The light sensor can be used with the ANALOG IN and the DIGITAL IN of the Field Kit's Sensor Interface.

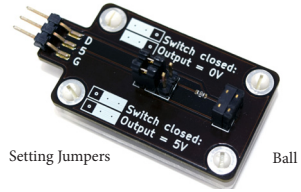
Electret Microphone



The electret microphone provides a simple solution to use your surroundings as a sample source. The board features a little trimmer to adjust the gain of the microphone pre-amplifier. Use a little screwdriver to adjust the gain according to the printing on the sensor board.

It's preferable to adjust the signal level with the trimmer first and only use the level pot of the analog signal interface as a second adjustment stage. The electret microphone has an omnidirectional directivity and is capable of capturing the whole frequency spectrum from 20 to 20000 Hz. The electret microphone is best used with the ANALOG IN of the Field Kit's Sensor Interface.

Ball Switch

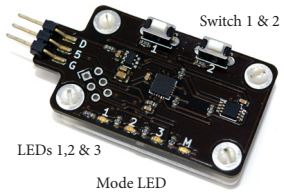


The ball switch consists of a little bouncy ball jumping around in a container connecting two contacts and thus acts like a switch. In contrary to a normal push button, which has very well defined states, the nature of a ball switch is more similar to a percussion shaker.

There are two resting-positions which define a certain state of the switch: when the board is lying flat on the table with its bottom facing the table: the switch is open. When the board is lying flat on the table with its top facing the table: the switch is closed. The voltage assigned to those states can be set with the two jumpers on the board.

The ball switch can be used with the ANALOG IN and the DIGITAL IN of the Field Kit's Sensor Interface.

Temperature Sensor



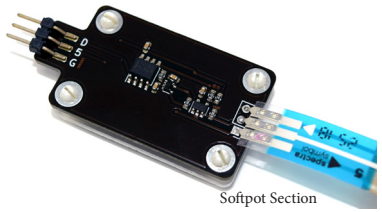
This sensor is used to translate the air temperature to a CV signal. The temperature board features two output modes: a continuous CV output or a trigger.

CV Mode: The board will output a continuous voltage between 0 - 5V depending on the measured temperature and scaled to the set lower and upper temperature limit. The default value of the lower temperature is 20°C and the upper limit is 36°C. Press switch 1 for about 3 seconds *to set the lower limit to the currently measured temperature*. LED 2 will blink three times to confirm the setting. Press switch 2 for about 3 seconds *to set the upper limit to the currently measured temperature*. LED 3 will blink three times to confirm the setting. LED 1 will blink whenever the measured temperature is below the lower limit or above the upper limit.

Trigger Mode: The board will generate a trigger whenever the measured temperature rises above the set upper limit temperature. LED 1 will blink whenever a trigger is generated. Press switch 2 for about 3 seconds *to set the upper limit to the currently measured temperature*. LED 3 will blink 3 times to confirm the setting.

The sensor itself covers a temperature range from -55°C to +125°C. To change between modes, hold the 2 switches simultaneously for 3 seconds. You can use this sensor with the ANALOG IN and the DIGITAL IN of the Field Kit's Sensor Interface.

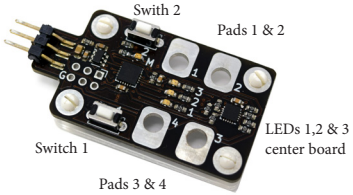
Linear Softpot



The linear softpot can be used like a fader on a mixer. Each position represents a voltage, the end of the softpot close to the sensor board represents the GND level, while the position on the other end will give out 5V.

Just like a fader on a mixer, the linear softpot will keep the voltage after you touched it. Due to the mechanical construction of the softpot, it could jump back to a lower value than pressed, just be gentle ;). To use the Linear Softpot to the fullest, make sure you use it with the ANALOG IN of the Field Kit's Signal Interface.

Capacitive Touch



This board allows you to use everyday objects (as long as they are conductive) as CV generators.

The board features four pads, each of them has a voltage assigned to them. This voltage can be changed by touching the respective pad, the red LED will light up to indicate a detected touch. Hold the pad and press switch 1 to *increase* or switch 2 to *decrease* the voltage.

By default the output voltage will not change when you let go of a pad, only once a new pad is touched. This behaviour is described by the term latching. You can *change this behaviour to non-latching*, meaning the assigned voltage is only present at the output when the corresponding pad is touched, by pressing switch 1 for about 3 seconds. The LED 2 will blink three times to confirm the change. Switch back to latching-behaviour by pressing switch 1 for 3 seconds again.

Once you have all voltages assigned to your liking it's time to attach other objects, a cucumber for example.

The Sensor descriptions continue on the next page...

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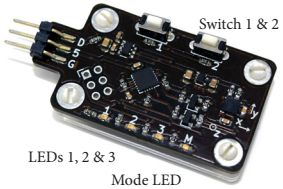
You will realise that a pad will be recognized as touched as soon as a new object is attached. The sensor needs to be recalibrated to adjust to the attached object. Press switch 2 for 3 seconds to start the calibration. LED 3 will blink three times to confirm the calibration.

Identify which mode you are in by checking the Mode LED: when the LED is off you are in latching output mode. On means you're in non-latching output mode. You can use this sensor with the ANALOG IN and the DIGITAL IN of the Field Kit's Sensor Interface.

Accelerometer



This board measures acceleration along three axis. Those measurements are used to generate CV signals or triggers. The accelerometer board features three modes:

- Tap Detector with continous CV output,
- Tap Detector with trigger output
- The 'motorcycle mode'.

The board powers up in the "Tap Detector with continous CV output" mode. To switch the modes, hold both switches for about 3 seconds. All three LEDs will blink three times when the mode is changed. Identify which mode you are in by checking the Mode LED: when the LED is off, the board is in tap detector with continous cv output mode. When dimmed the board is in tap detector with trigger output. A bright LED means your have entered motorcycle mode!

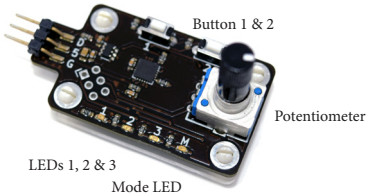
Make sure to have the board laying flat on the table when connecting it to power. It will do some initial measurements to calibrate the tap detector. The functionality of the two switches depends on the active mode:

Tap Detector with continous CV output / Tap Detector with with trigger output: The board will output a continuous voltage in the range 0 - 5V or a trigger signal depending on the intensity of the last detected tap.

To **adjust the lower detection limit**, press switch 1 for 3 seconds, LED 2 will blink 3 times to confirm the adjustment mode. To *decrease the lower detection limit*, Press switch 1. The adjustment is confirmed by LED 2 blinking once. To *increase the lower detection limit*, press switch 2, which is confirmed by LED 3 blinking once. Press switch 1 for 3 seconds to exit the adjustment mode, LED 2 will blink 3 times to confirm the exit.
To **adjust the upper detection limit**, press switch 2 for 3 seconds. LED 2 will blink 3 times to confirm the adjustment mode. To *decrease the upper detection limit*, press switch 1. The adjustment is confirmed by LED 2 blinking once. To *increase the upper detection limit*, Press switch 2 which is confirmed by LED 3 blinking once. Press switch 1 for 3 seconds to exit the adjustment mode, LED 2 will blink 3 times to confirm the exit. In both cases LED 1 will blink whenever a tap is detected.

Motorcycle Mode: The board will output a continuous voltage proportional to its roll angle. Imagine that the board is a motorcycle throttlehandle. Turn the board towards you like you would to open the motorbike's throttle and the ouput voltage will increase. Turn it the other way around and the output voltage will decrease. The output voltage is scaled according to the current angle in respect to the set minimum and maximum angles. Press switch 1 to assign the current angle of the board to the minimum angle. LED 2 will blink once to confirm the adjustment. Press switch 2 to assign the current angle of the board to the maximum angle. LED 3 will blink once to confirm the adjustment.

Sequential Voltage Source



Use this board to generate CV signals sequencer-style! This board has three different modes:

- Stepped Random Voltage,
- Step Sequencer
- Eucledian Trigger Sequencer

The Board powers up in the "Stepped Random Voltage" mode. To switch between the different modes, hold both buttons for about 3 seconds. All three LEDs will blink three times when the mode is changed. The funcionality of the two switches and the potentiometer depends on the active mode:

Stepped Random Voltage: The potentiometer controls the length of each random step, LED 1 (the red LED) will blink according to the set speed. To **adjust the lower limit of the random voltage**, press switch 1 for 3 seconds. LED 2 will blink 3 times to confirm the adjustment mode. To *decrease the lower limit of the random voltage* press switch 1, the adjustment is confirmed by LED 2 blinking once. To *increase the lower limit of the random voltage*, press switch 2, the adjustment is confirmed by LED 3 blinking once. Press switch 1 for 3 seconds to exit the adjustment mode, LED 2 will blink 3 times to confirm the exit.

To **adjust the upper limit of the random voltage**, press switch 2 for 3 seconds. LED 3 will blink 3 times to confirm the adjustment mode. To *decrease the upper limit of the random voltage* press switch 1, the adjustment is confirmed by LED 2 blinking once. To *increase the upper limit of the random voltage*, press switch 2, the adjustment is confirmed by LED 3 blinking once. Press switch 2 for 3 seconds to exit the adjustment mode, LED 3 will blink 3 times to confirm the exit.

SENSOR OVERVIEW

Step Sequencer: The potentiometer controls the speed of the step sequencer, LED 1 (the red LED) will blink according to the set speed. To **enter the record-mode,** press switch 1 for 3 seconds, LED 2 will blink 3 times to confirm the record mode. Use the potentiometer to set the desired voltage of the step. To *record the set voltage into the step* press switch 2, the recording is confirmed by LED 3 blinking once - repeat to record more steps. When LED 1 blinks upon pressing, you've reached the maximum number of 16 steps. Press switch 1 for 3 seconds to exit the record mode, LED 2 will blink 3 times to confirm the exit.

Euclidean Trigger Sequencer: The potentiometer controls the speed of the trigger sequencer, LED 1 (the red LED) will blink according to the set speed. To **adjust the overall length of the sequence**, press switch 1 for 3 seconds. LED 2 will blink 3 times to confirm the adjustment mode. To *decrease the length of the sequence by one step* press switch 1, the adjustment is confirmed by LED 2 blinking once. To *increase the length of the sequence by one step*, press switch 2. The adjustment is confirmed by LED 3 blinking once. Press switch 1 for about 3 seconds to exit the adjustment mode, LED 2 will blink 3 times to confirm the exit.

To **adjust the number of pulses per sequence** press switch 2 for about 3 seconds, LED 3 will blink 3 times to confirm the adjustment mode, press switch 1 to *decrease the number of pulses by one pulse*, an adjustment is confirmed by LED 2 blinking once. To *increase the number of pulses by one pulse* press switch 2, the adjustment is confirmed by LED 3 blinking once. Press switch 2 for about 3 seconds to exit the adjustment mode, LED 3 will blink 3 times to confirm the exit. To know which mode you are in check the Mode LED: When the LED is off, the board is in stepped random voltage mode, when it is dimmed it's in step sequencer mode and when it's normally on (bright), it's in euclidean trigger sequencer mode.