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  - Air quality sensor combo board (VMA342) (https://manuals.whadda.com/category.php?id=388)
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  - Sensor shield for Arduino® ATMEGA (VMA212) (https://manuals.whadda.com/category.php?id=387)
  - STEM Shield (KAEDU) (https://manuals.whadda.com/category.php?id=241)
    - 1. Pinout and schematic (https://manuals.whadda.com/article.php?id=681)
    - 2. Component list (https://manuals.whadda.com/article.php?id=703)
    - **3. Assembly manual (https://manuals.whadda.com/article.php?id=680)**
  - Stereo FM radio shield for Arduino (VMA11) (https://manuals.whadda.com/category.php?id=129)
  - Velleman Nibble (VMA0) (https://manuals.whadda.com/category.php?id=253)
  - Velleman Nibble kit (KA0) (https://manuals.whadda.com/category.php?id=247)
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- Mini Modules (https://manuals.whadda.com/category.php?id=105)
- Modules (https://manuals.whadda.com/category.php?id=63)
- Robotics & ALLBOTs (https://manuals.whadda.com/category.php?id=85)
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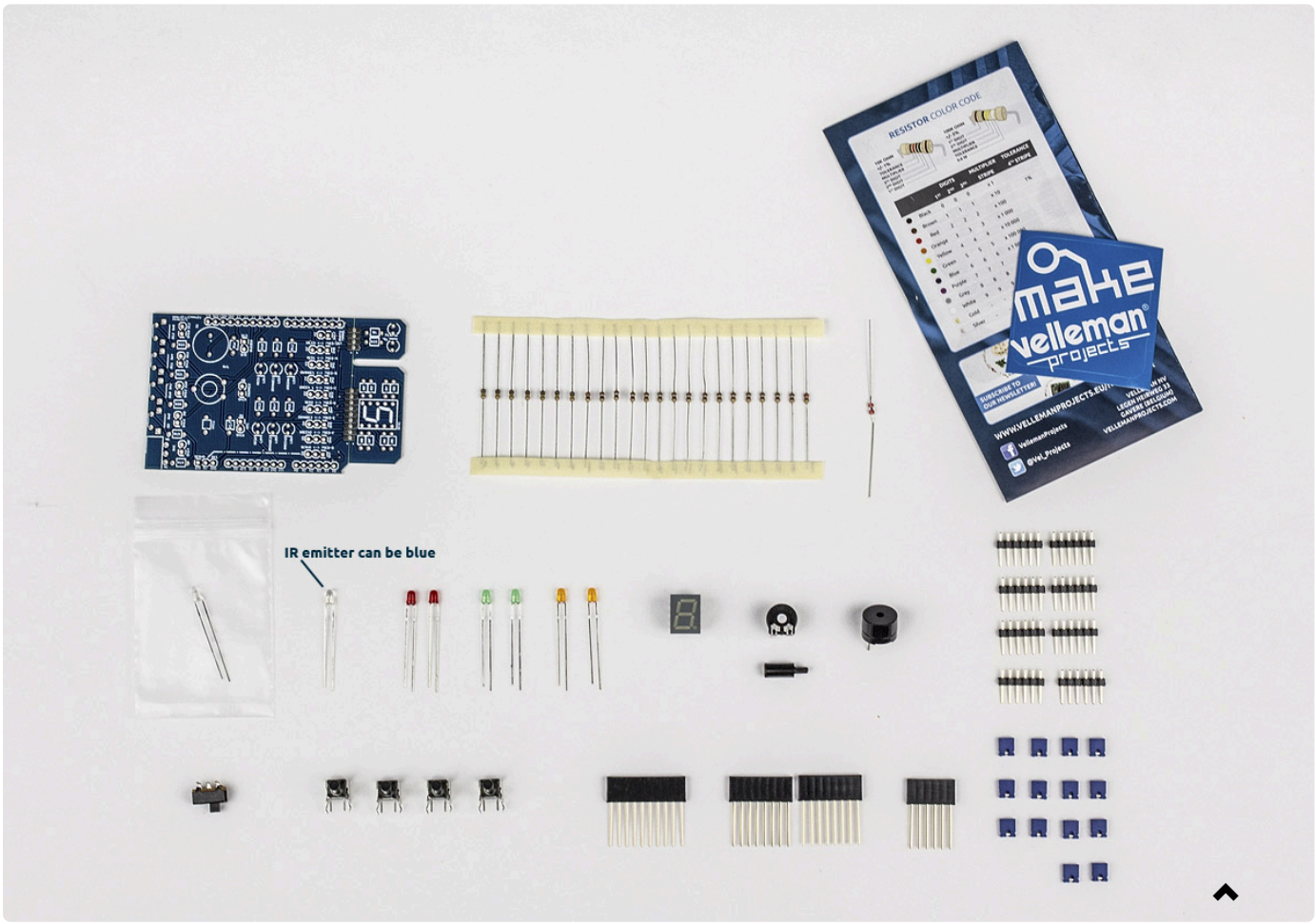
- Tutorials & blogposts (https://manuals.whadda.com/category.php?id=218)
- Wearables (https://manuals.whadda.com/category.php?id=366)
- Whadda XL kits (https://manuals.whadda.com/category.php?id=404)

3. ASSEMBLY MANUAL

WHAT'S IN THE BOX

- 1 x PCB
- tape:
    - 1 x resistor 2K2
    - 14 x resistor 180Ohm
    - 1 x resistor 220E
    - 6 x resistor 100K
    - 1 x resistor 100Ohm
- 1 x NTC 100K (NTC104LAF)
- 2 x red 3mm LED
- 2 x green 3mm LED
- 2 x orange 3mm LED
- 1 x 3mm photo transistor (L-32ROPT1C)
- 1 x 3mm IR emitter (L-934F3C)
- 1 x slide switch (TS-13PLC)
- 1 x trimmer 100K with 1 x spindle (5mm)
- 4 x tactile switch (TS-04PV)
- 1 x single digit display (SA39-11SRWA)
- 2 x 8-pin female header
- 1 x 10-pin female header
- 8 x 6-pin header
- 1 x sounder
- 17 x programming shunt



(https://cdn.velleman.eu/images/manuals/kaedu/02/001.jpg)

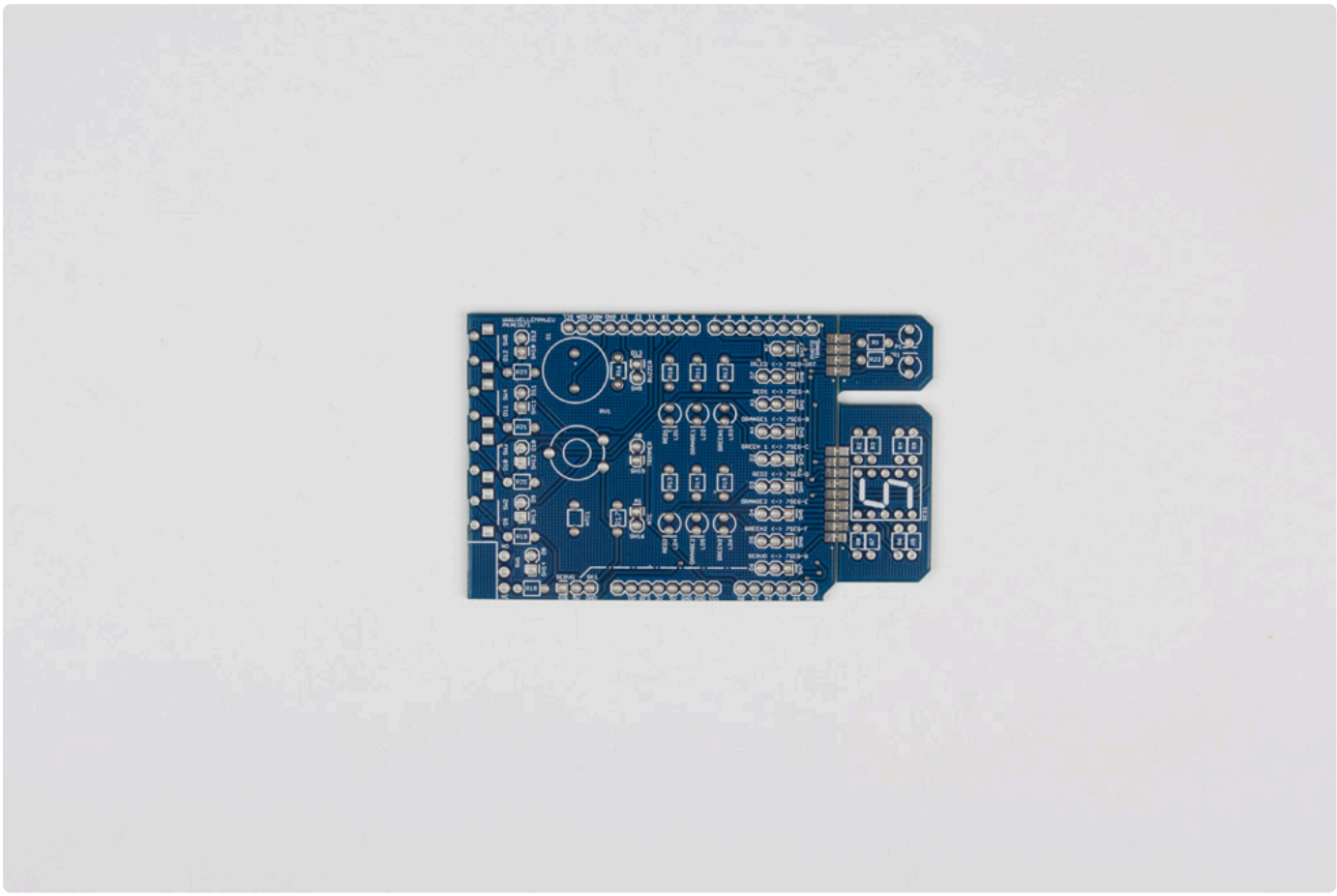
ASSEMBLY MANUAL

Let's start by analysing the PCB;

WHAT'S A PCB?

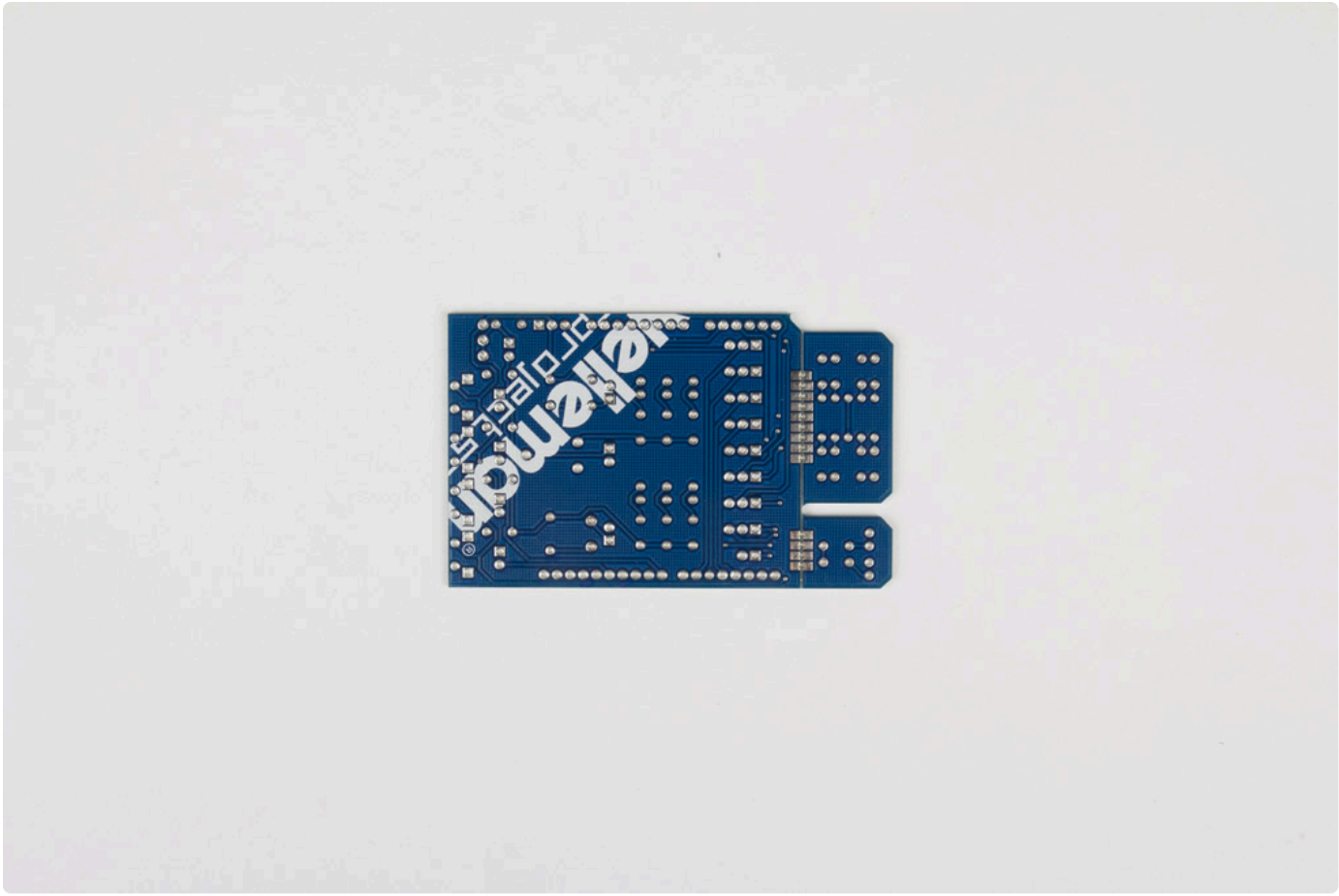
PCB stands for Printed Circuit Board. This is a glass-fiber board on which copper traces make-up the electronic connections. These can be single layered or multilayered. Electronic components as described below can be soldered on the PCB to create intricate diagrams.

Component side:



(https://cdn.velleman.eu/images/manuals/kaedu/02/002.jpg)

Solder side:



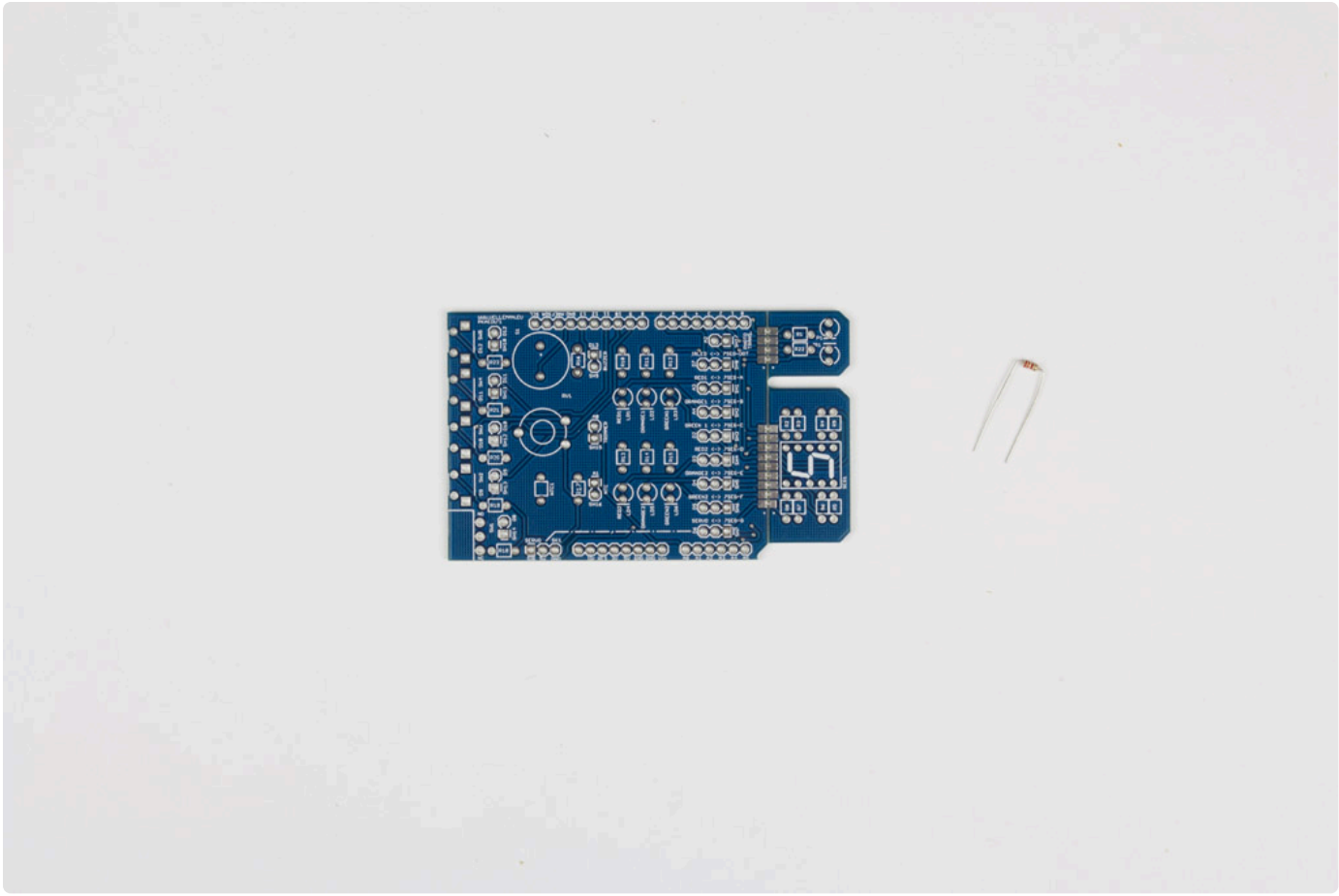
(https://cdn.velleman.eu/images/manuals/kaedu/02/003.jpg)

Now follow the steps below in order to solder your kit properly. Good luck!

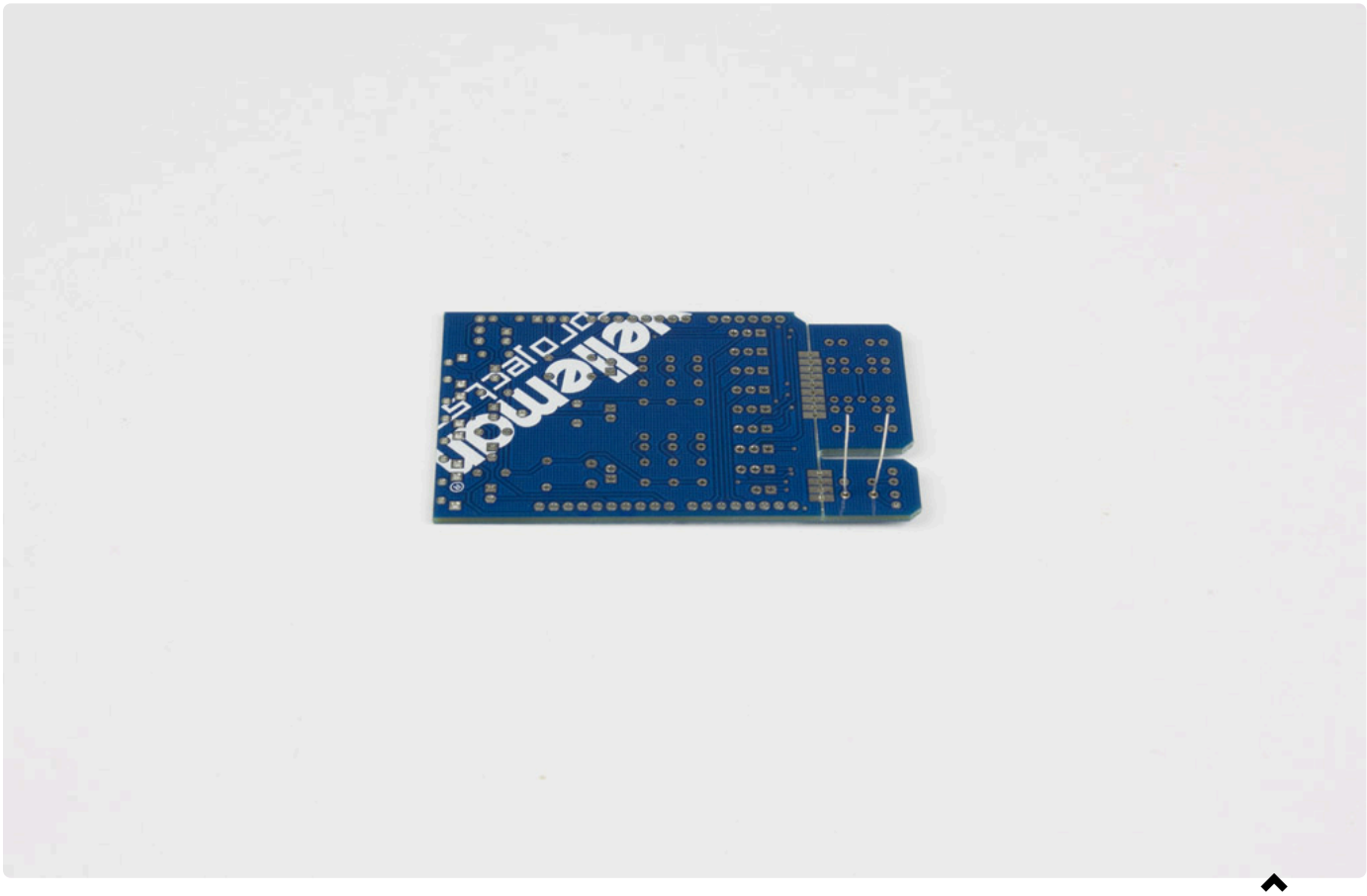
1. Resistors

Note: all resistors are placed in the correct order of usage on the supplied tape.

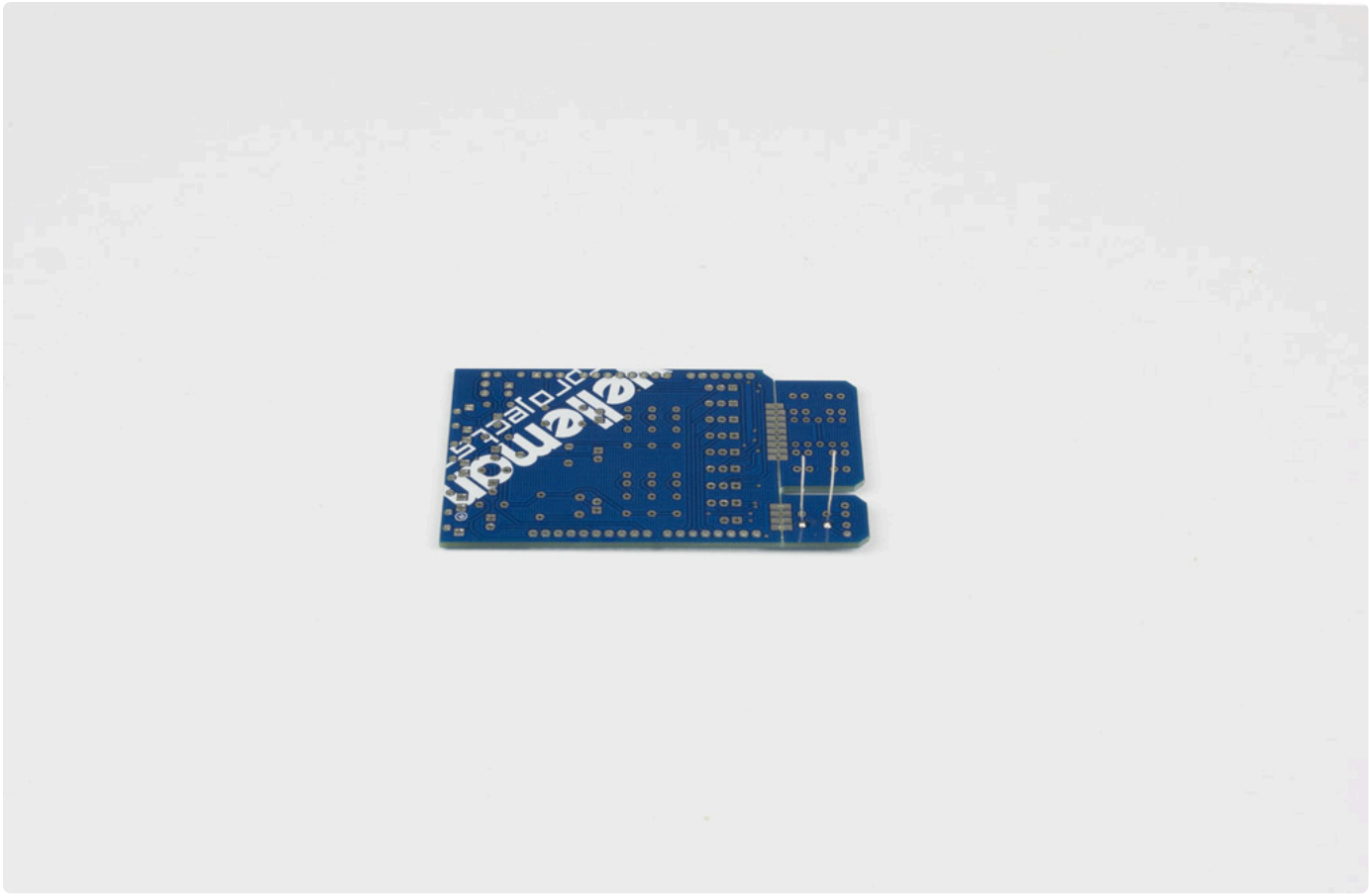
- **R1:** 2K2 (red, red, red)
- **R2 ... R15:** 180Ohm (brown, grey, brown)
- **R16:** 220Ohm (red, red, brown)
- **R17 ... R21:** 100k (brown, black, yellow)
- **R22:** 100Ohm (brown, black, brown)
- **R23:** 100K (brown, black, yellow)



(https://cdn.velleman.eu/images/manuals/kaedu/02/004.jpg)



(https://cdn.velleman.eu/images/manuals/kaedu/02/005.jpg)



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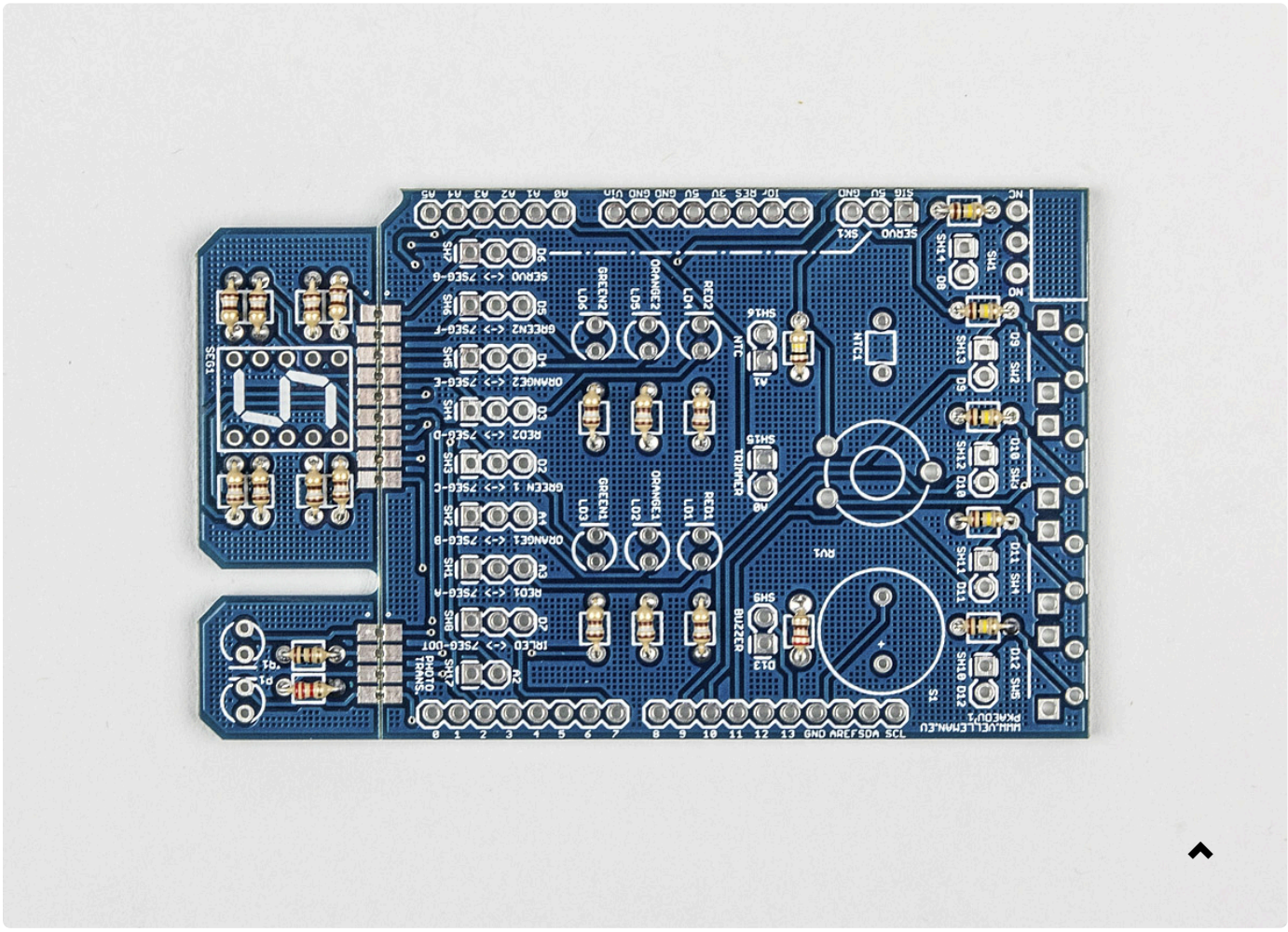


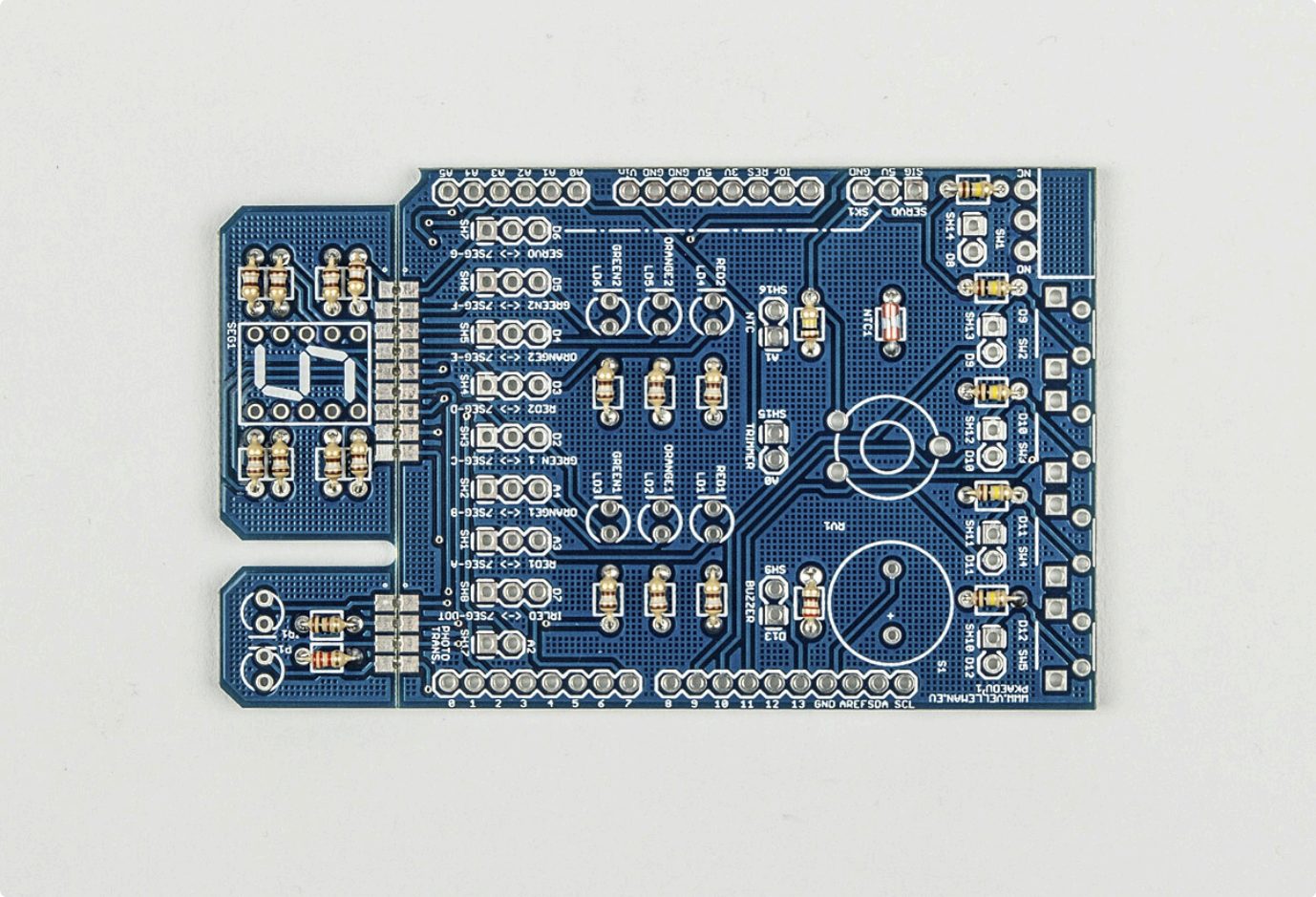
(https://cdn.velleman.eu/images/manuals/kaedu/02/007.jpg)

WHAT'S A RESISTOR FOR?

A resistor serves as a current limiter or as a voltage divider. Because each electronic device needs a particular amount of current, there are different kinds of resistors that each have their own value. Its value is indicated by colored rings and the unit of resistance is called 'Ohm'.

2. NTC thermistor

- NTC1: NTC 100K



(https://cdn.velleman.eu/images/manuals/kaedu/02/008.jpg)

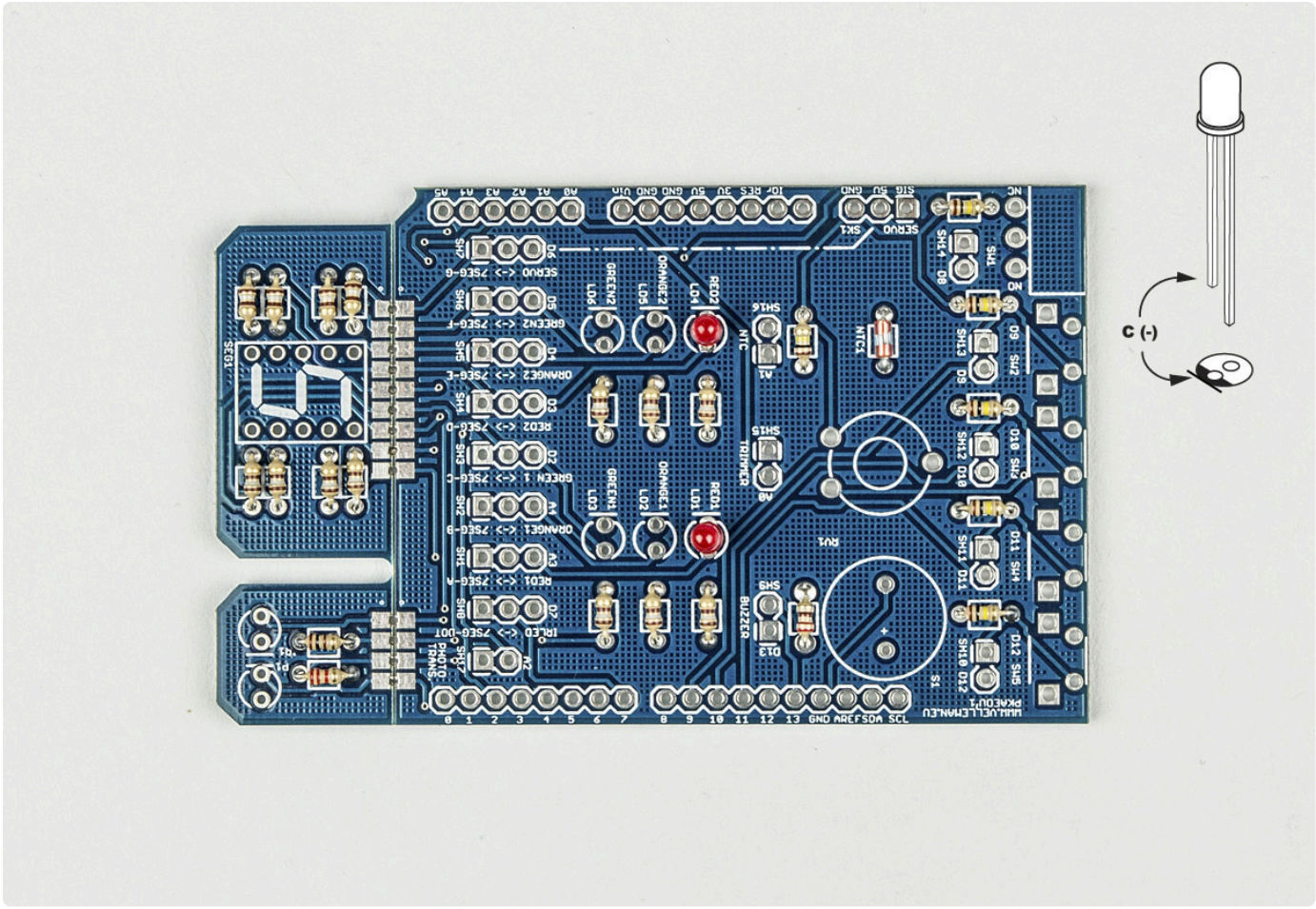
WHAT'S AN NTC THERMISTOR FOR?

NTC stands for Negative Temperature Coefficient. A thermistor is a variable resistor that is influenced by temperature. Resistance decreases as temperature rises. This component can be used as a temperature sensor when wired as a voltage divider.

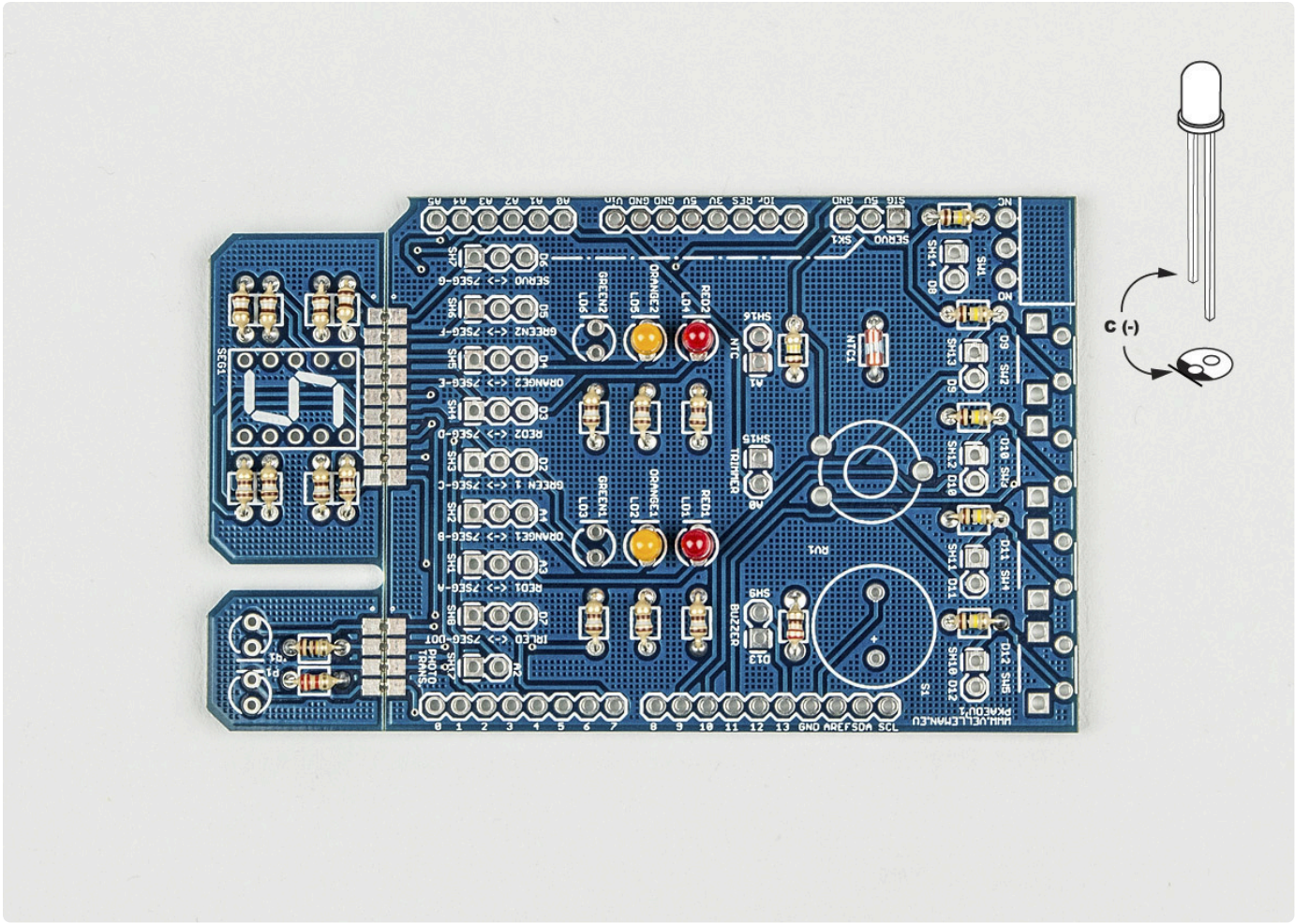
3. 3mm LED

- **LD1 & LD4 :** red 3 mm LED
- **LD2 & LD5** orange 3mm LED
- **LD3 & LD6:** green 3mm LED

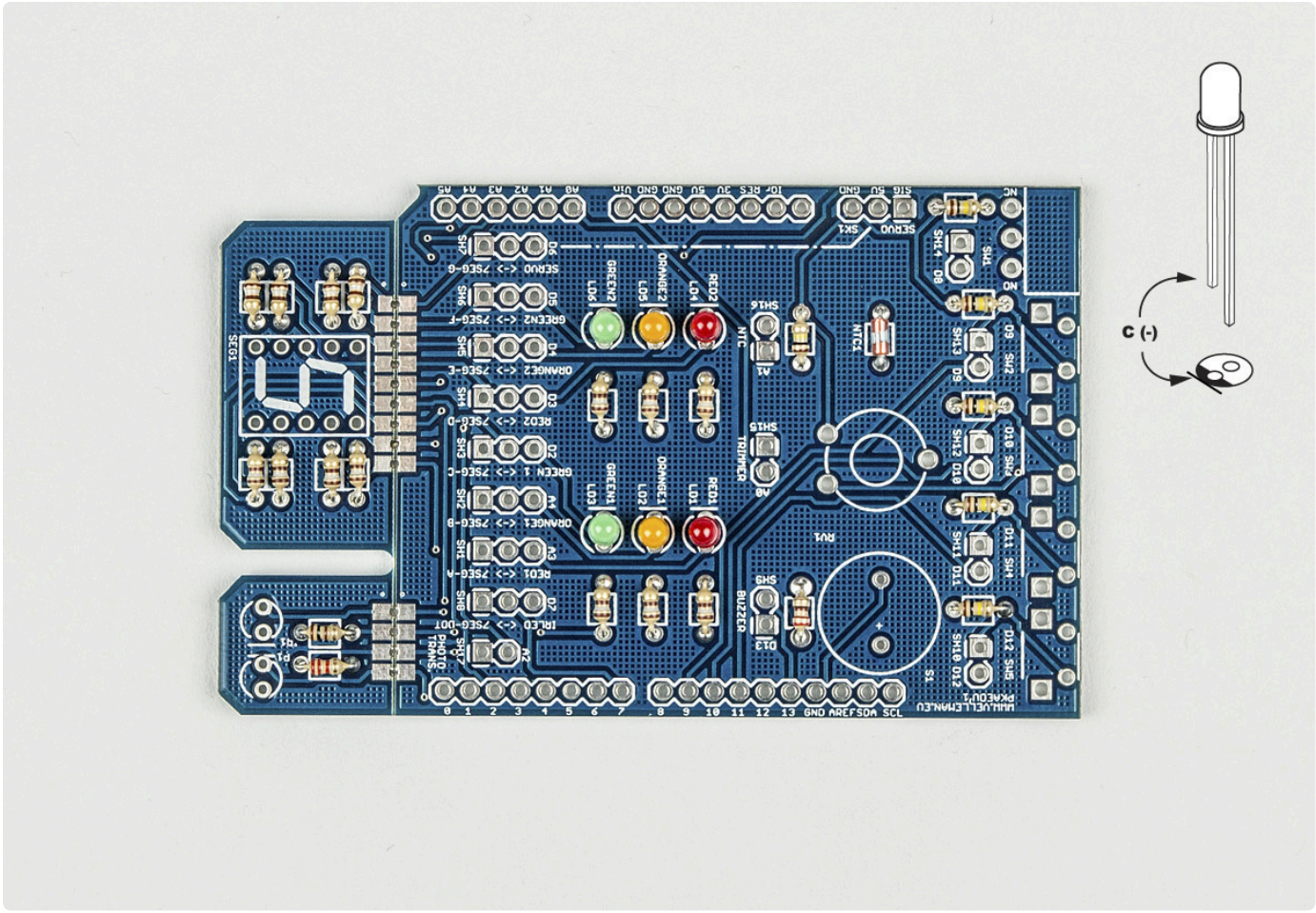
Note the polarity!



(https://cdn.velleman.eu/images/manuals/kaedu/02/009.jpg)



(https://cdn.velleman.eu/images/manuals/kaedu/02/010.jpg)



(https://cdn.velleman.eu/images/manuals/kaedu/02/011.jpg)

WHAT DOES AN LED DO?

LED stand for Light Emitting Diode, which means that this component can emit light by using a small current (max 20mA with a 1.8V drop). An LED has a short and long lead which indicates its polarity. Always remember that the long lead is the + side (also called anode) and the short lead is the - side (also called cathode).

WHAT IS ELECTRICAL POLARITY?

The polarity is the direction of the current flow in an electrical circuit. In this case, the current flows from the positive pole (terminal) to the negative pole. But this is not always the case in every electrical circuit.

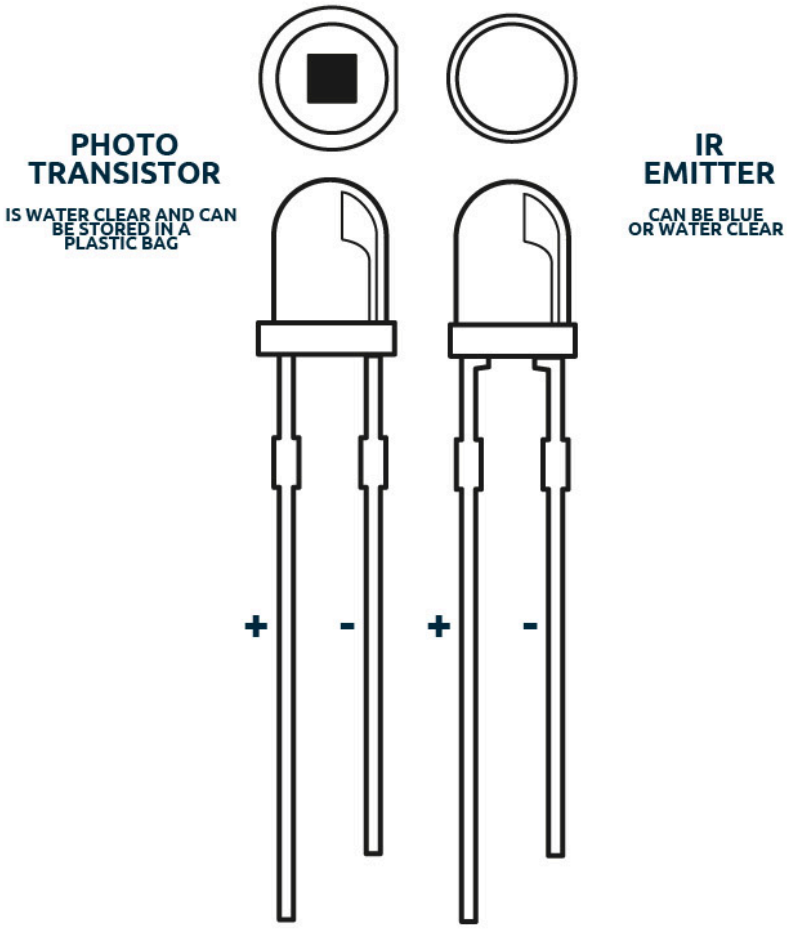
4. photo transistor

HOW TO SEE THE DIFFERENCE BETWEEN THE PHOTO TRANSISTOR AND THE IR EMITTER

The photo transistor and IR transmitter can both be clear and look like 3mm LEDs depending on the production. If this is the case, the photo transistor is placed in a plastic bag!
If the clear photo transistor is not placed in a plastic bag, then the IR emitter is blue colored and looks like a blue 3mm LED.

A more technical way to see the difference between a photo transistor and an IR emitter is to look closely inside the clear component. If you see a small black square inside the component, then it is the photo

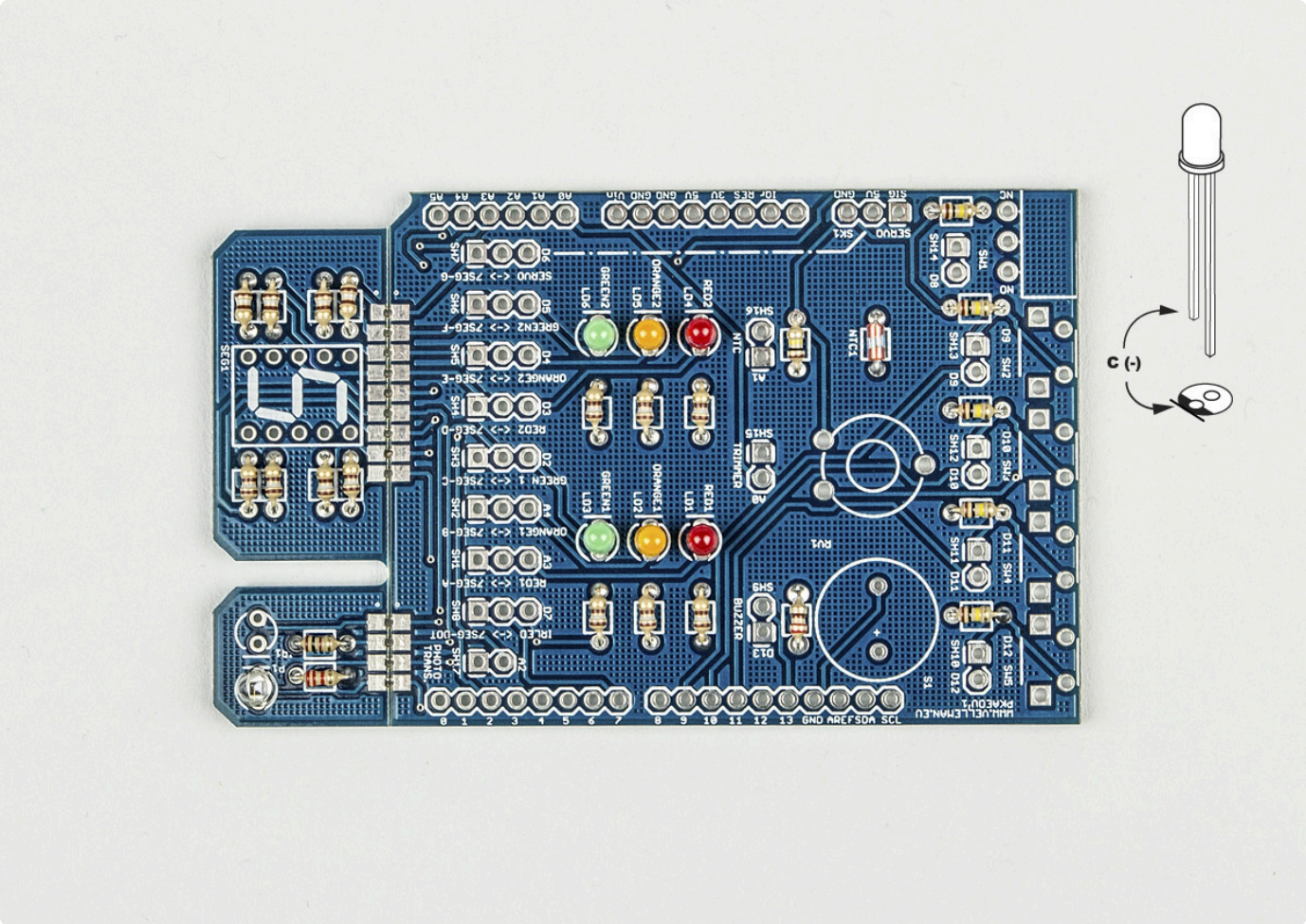
transistor. (check out the picture below!) The black square actually 'catches' light and transmits it into energy.



(https://cdn.velleman.eu/images/manuals/kaedu/02/012_a.jpg)

- P1: 3mm photo transistor (L-32ROPT1C)

Note the polarity!



(https://cdn.velleman.eu/images/manuals/kaedu/02/012.jpg)

WHAT DOES A PHOTO TRANSISTOR DO?

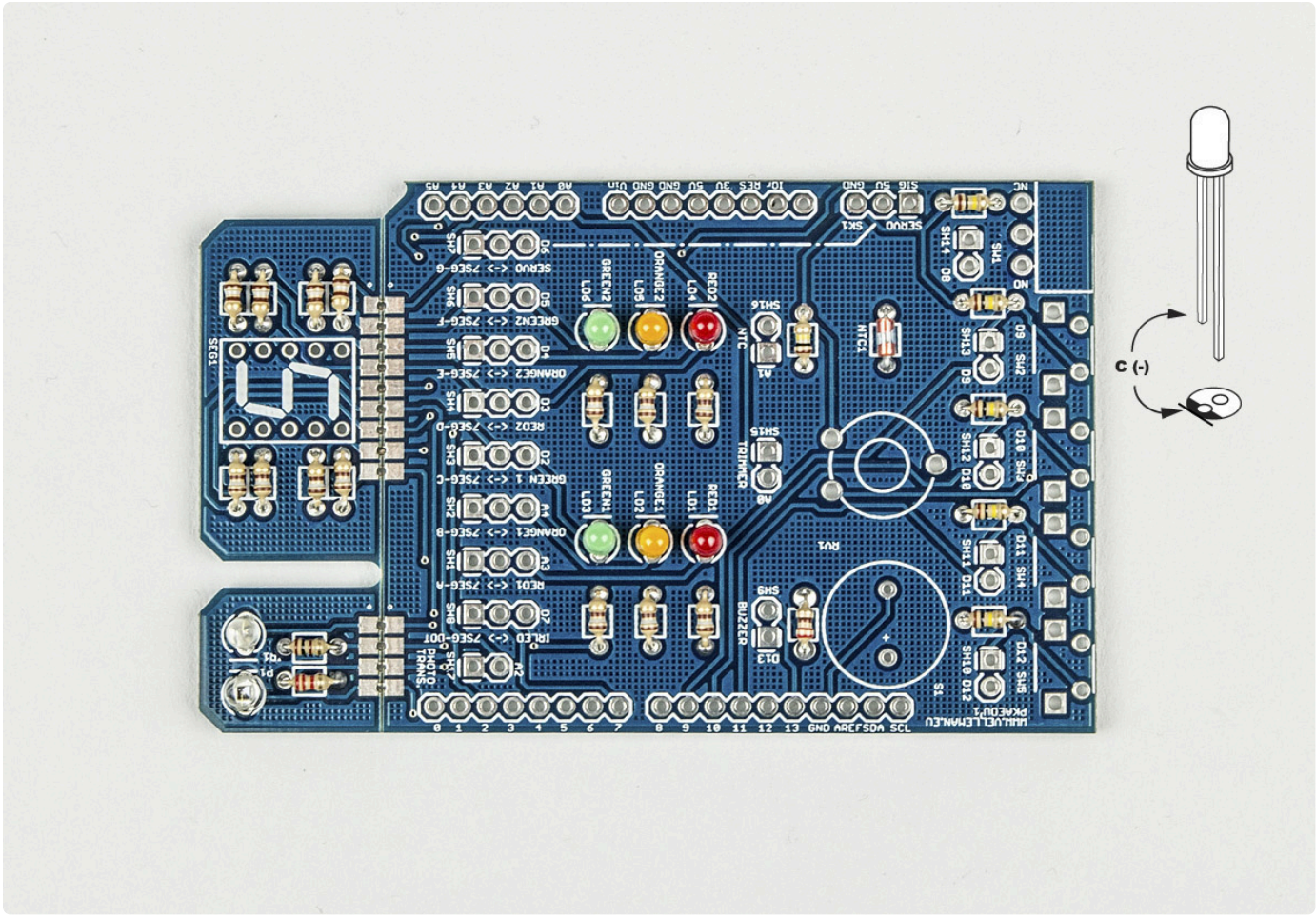
A photo transistor is a device that converts light energy into electric energy. Photo transistors are similar to photo resistors but control both current and voltage, while photo resistors only control current.

5. IR emitter

Note: the IR emitter can be blue!

- IR1: 3mm IR emitter (L-934F3C)

Note the polarity!



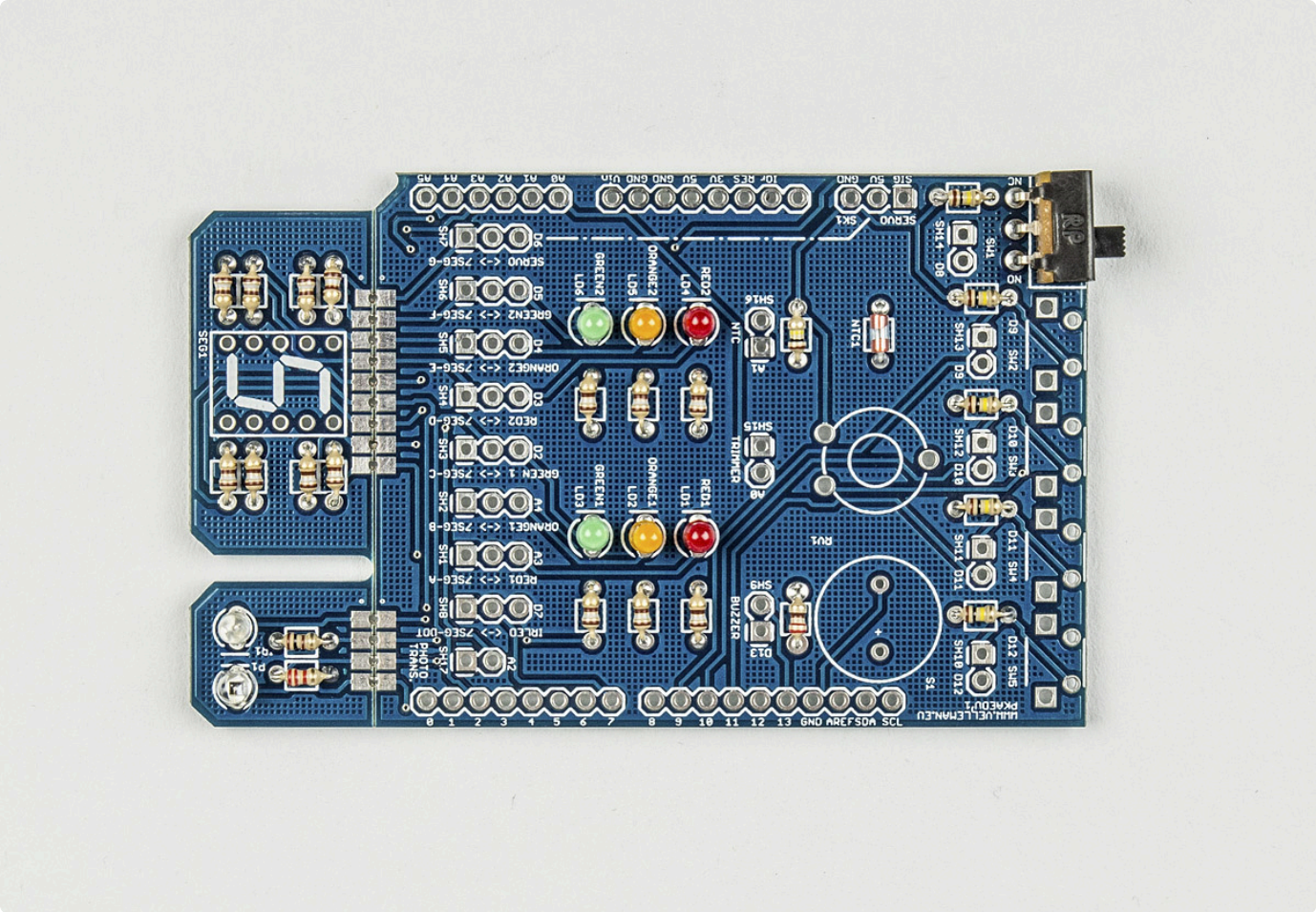
(https://cdn.velleman.eu/images/manuals/kaedu/02/013.jpg)

WHAT DOES AN IR EMITTER DO?

Is a type of LED that only emits Infrared light. Most commonly used in remote controls. This light sits outside the visible spectrum for humans.

6. Slide switch

- SW1



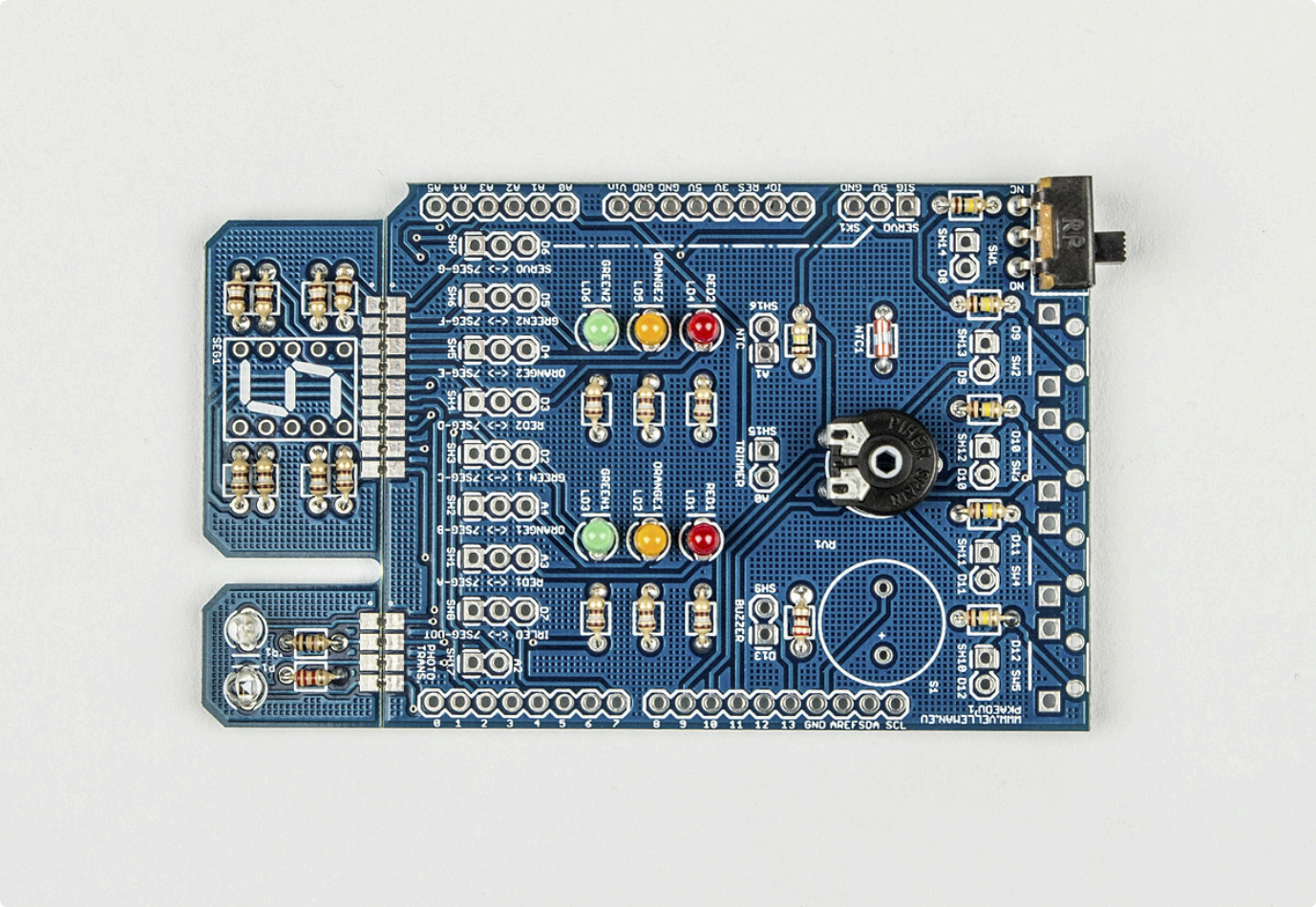
(https://cdn.velleman.eu/images/manuals/kaedu/02/014.jpg)

WHAT'S A SLIDE SWITCH?

A slide switch will conduct current when it is slid to the ON side and interrupts the current when slid back to the OFF side.

7. Trimmer

- RV1: trimmer 100K



(https://cdn.velleman.eu/images/manuals/kaedu/02/015.jpg)

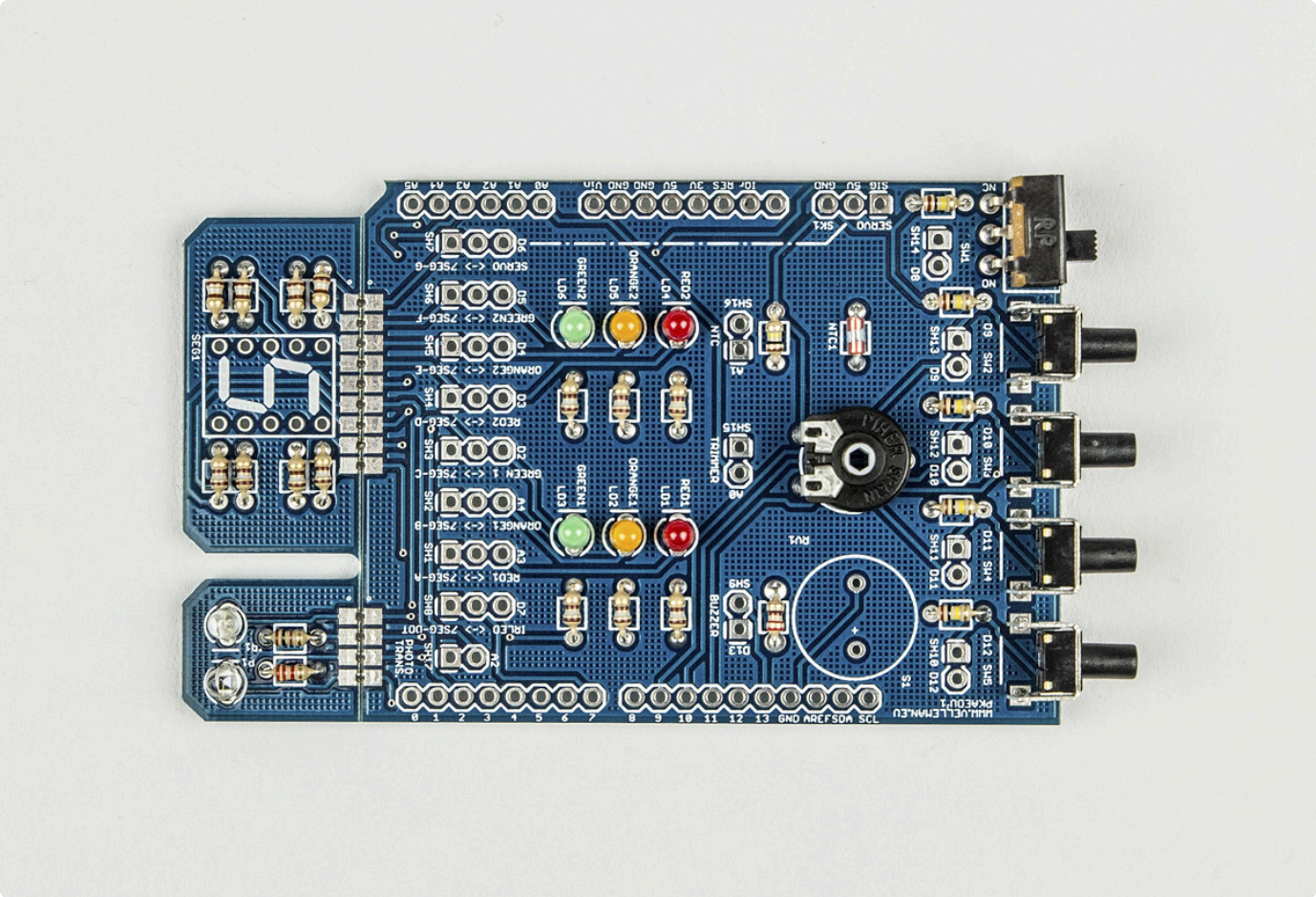
WHAT'S A TRIMMER FOR?

Is also known as a potentiometer. This is a variable resistor which means that its value can be controlled by the position of a knob.

8. Tactile switch

- SW2 ... SW5

Note the orientation!



(https://cdn.velleman.eu/images/manuals/kaedu/02/016.jpg)

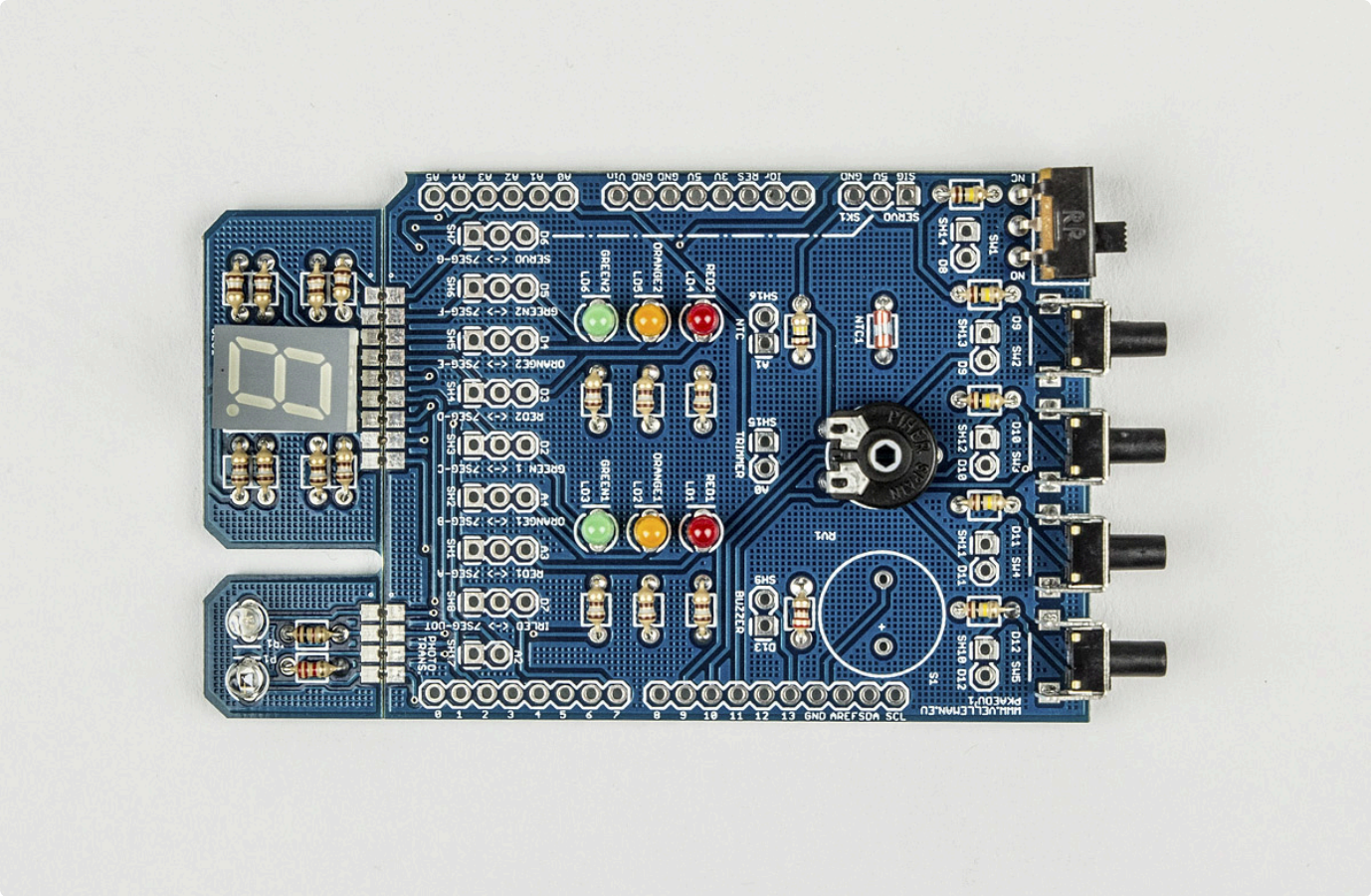
WHAT'S A TACTILE SWITCH?

A tactile switch or push button will conduct current when pushed in and interrupts the current when released.

9. Single digit display

- SEG1

Note the orientation of the decimal dot on the display! The dot should point towards the outer side of the PCB. Check the picture below!



(https://cdn.velleman.eu/images/manuals/kaedu/02/017.jpg)

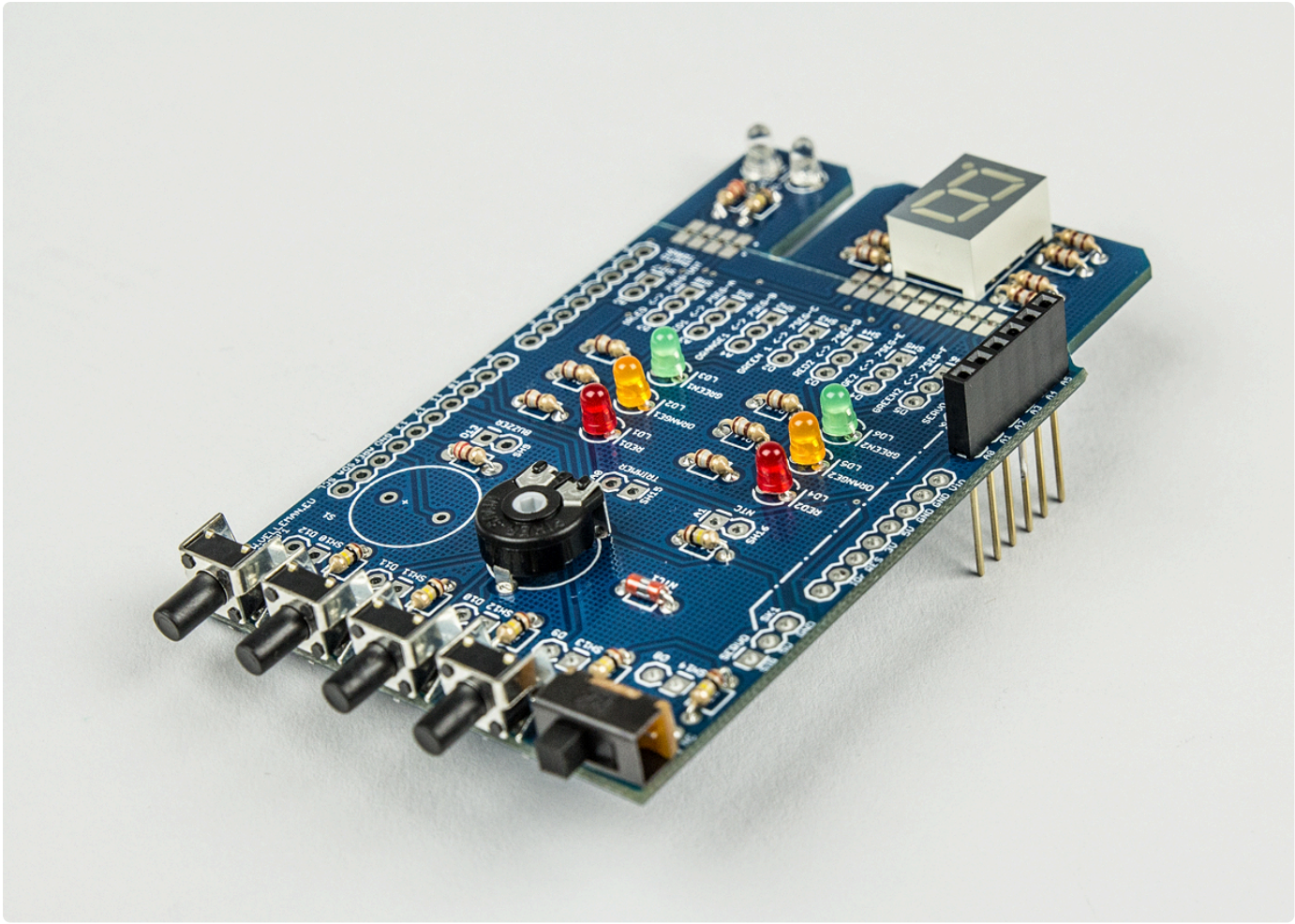
WHAT'S A SINGLE DIGIT DISPLAY?

A single digit display is a form of electronic display device for displaying decimal numerals. The numerals are comprised out of 7 LEDs that can be switched on or of creating the separate "legs" of the digits. These LEDs are wired with a common anode or a common cathode.

10. 6-Pin female header

- position it as shown in the picture (A0 … A5)

Do not trim the leads of the header!

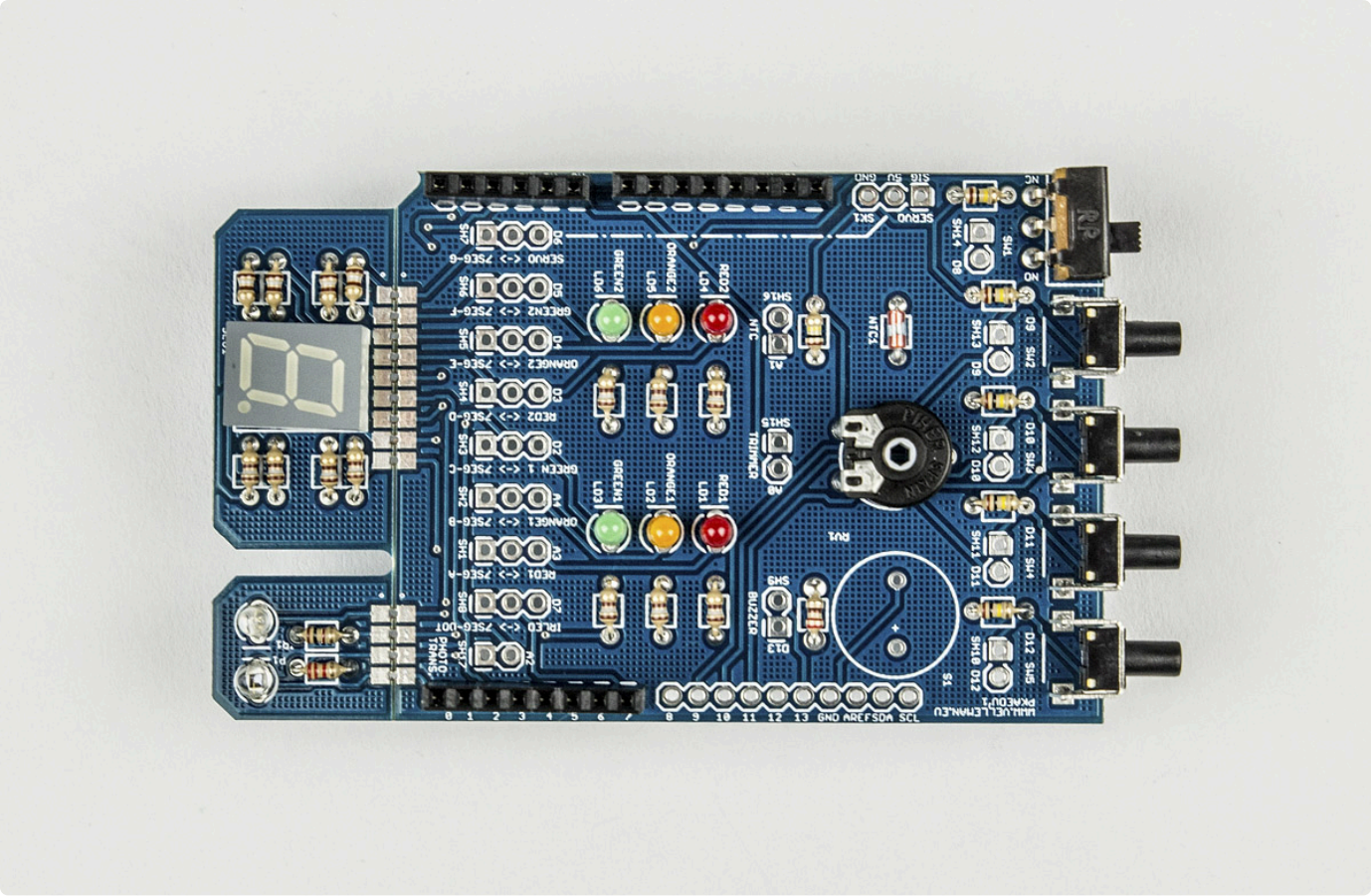


(https://cdn.velleman.eu/images/manuals/kaedu/02/018.jpg)

11. 8-Pin female header

- position it as shown in the picture (0 … 7 and IOr … Vin)

Do not trim the leads of the header!

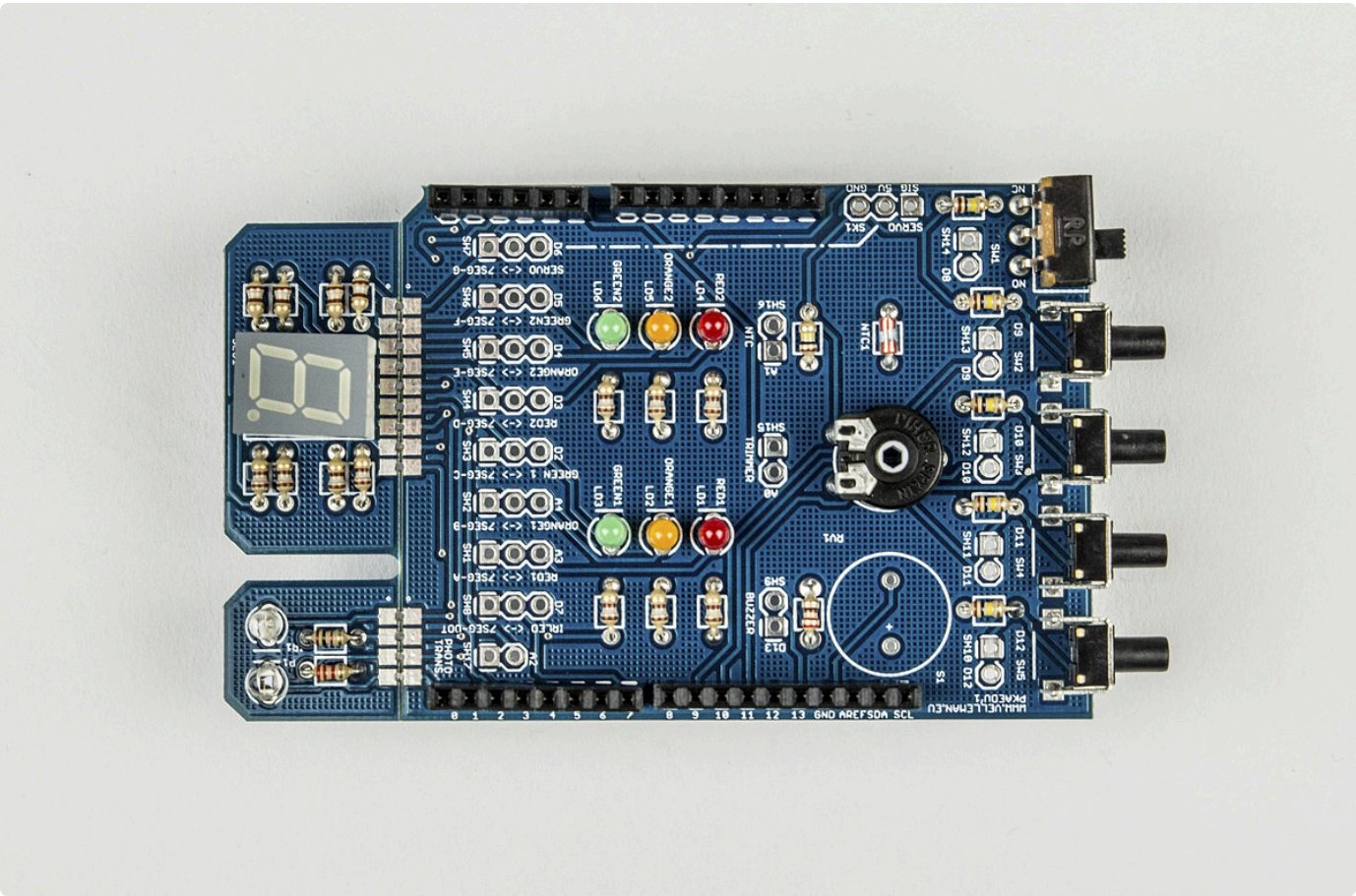


(https://cdn.velleman.eu/images/manuals/kaedu/02/019.jpg)

12. 10-Pin female header

- position it as shown in the picture (8 … SCL)

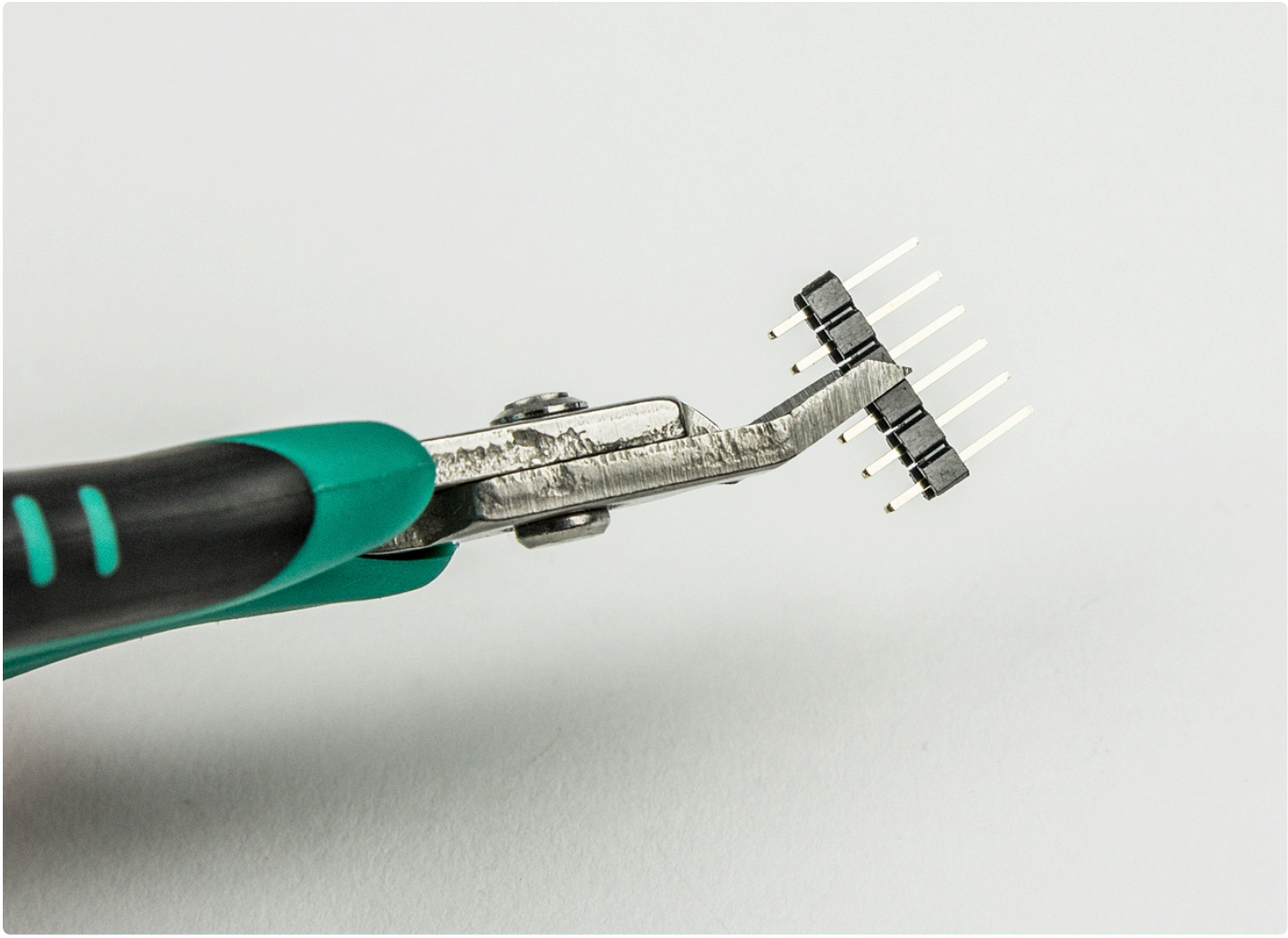
Do not trim the leads of the header!



(https://cdn.velleman.eu/images/manuals/kaedu/02/020.jpg)

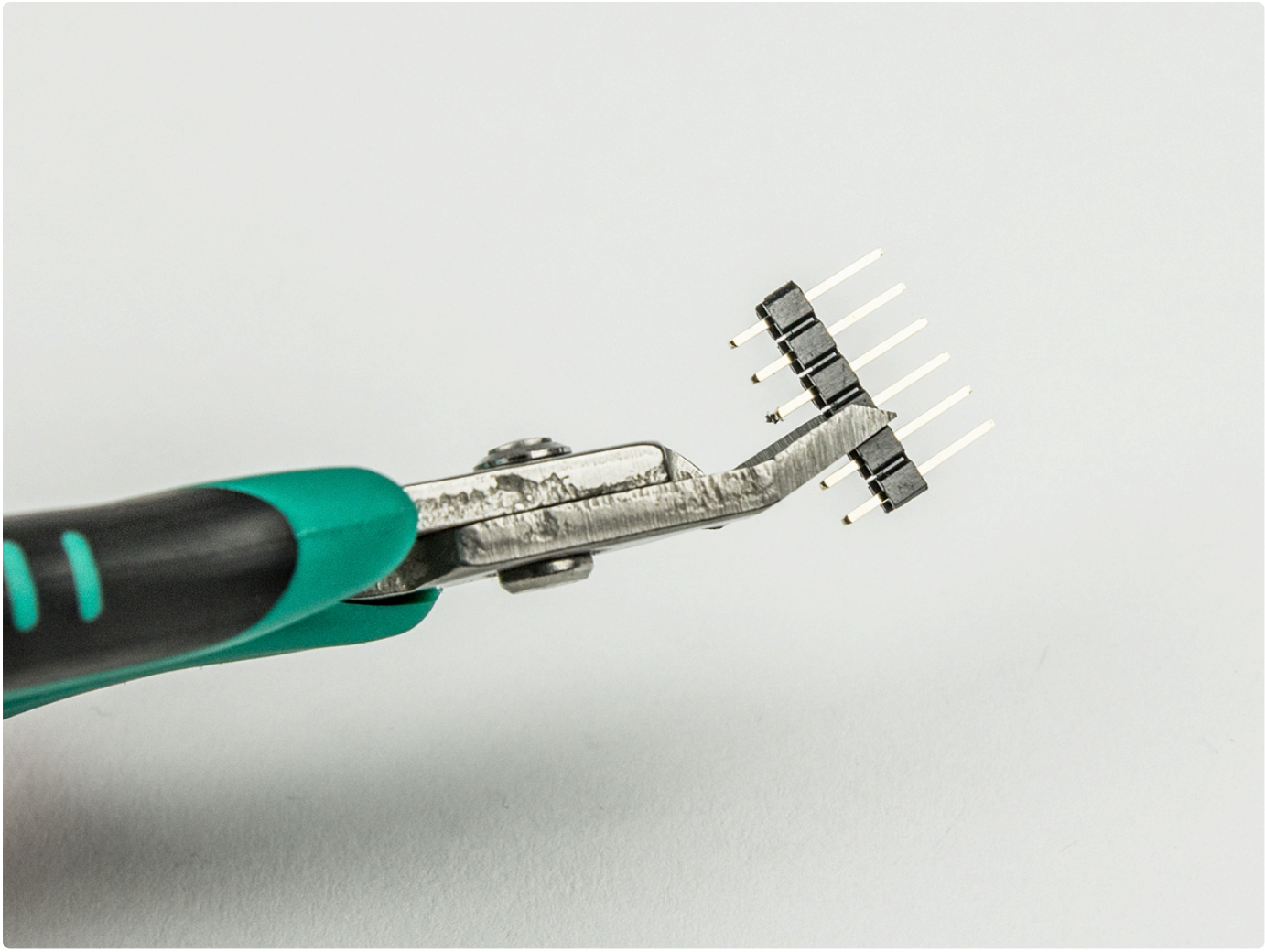
13. 6-Pin headers

First break 5 of the 6-pin headers in half to get **9 x 3-pin headers.**



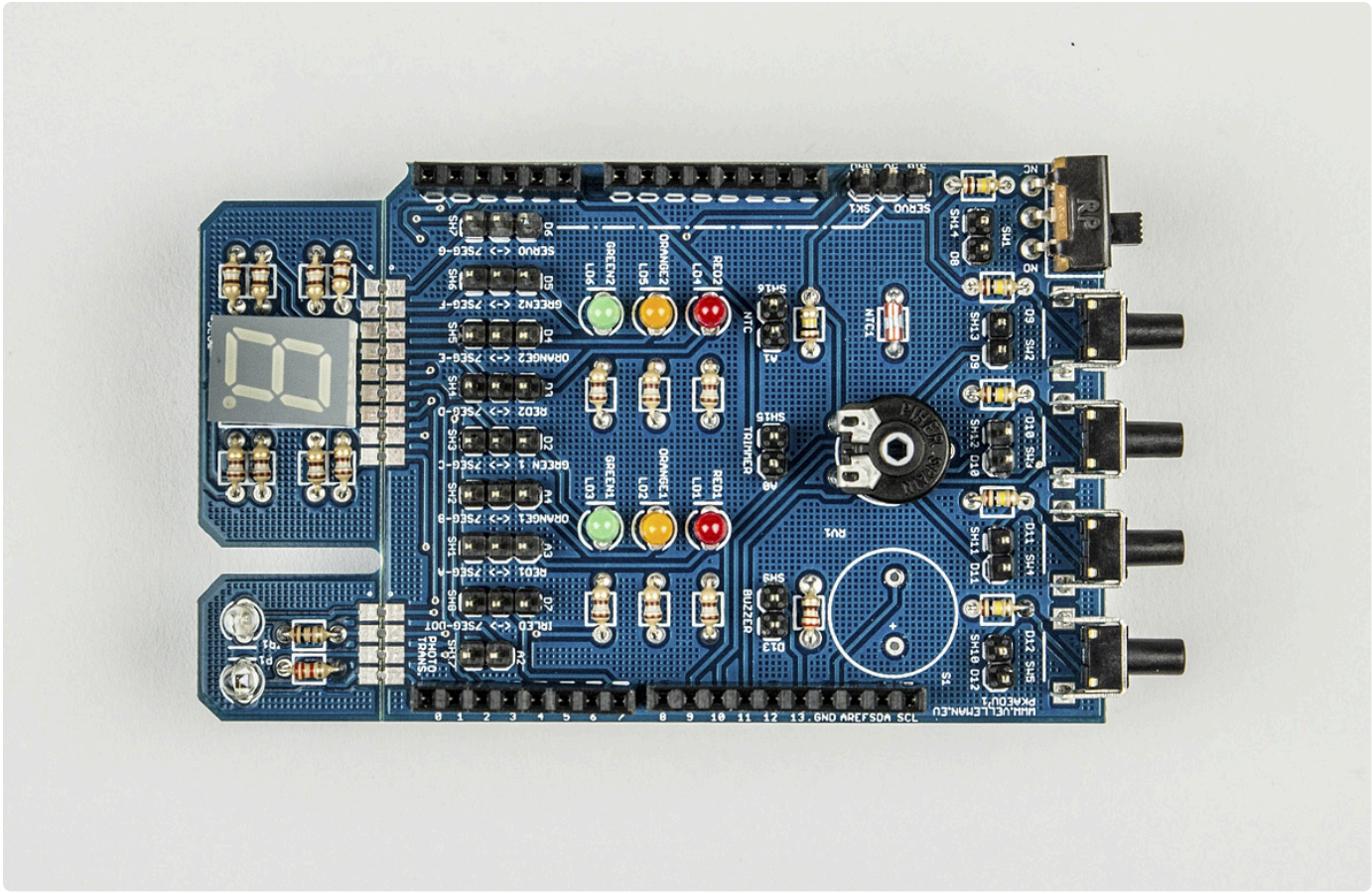
(https://cdn.velleman.eu/images/manuals/kaedu/02/021.jpg)

Then break 3 of the 6-pin headers 3 ways to get **9 x 2-pin headers** .



(https://cdn.velleman.eu/images/manuals/kaedu/02/022.jpg)

- D2, D3, D4, D5, D6, D7, A3, A4 and SK1: 3-pin headers
- D8, D9, D10, D11, D12, D13, A0, A1, A2: 2-pin headers

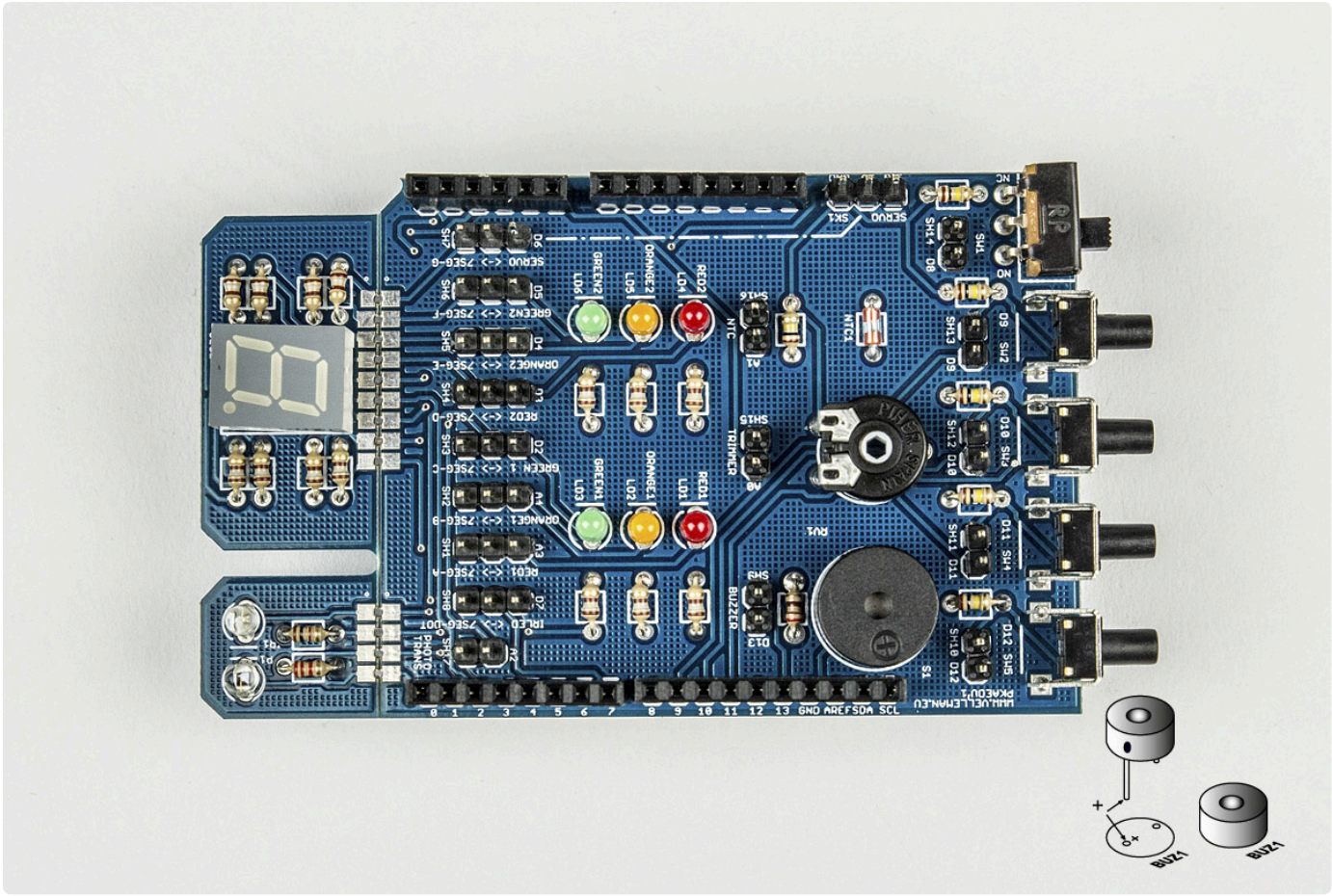


(https://cdn.velleman.eu/images/manuals/kaedu/02/023.jpg)

14. Sounder

- S1

Note the polarity!



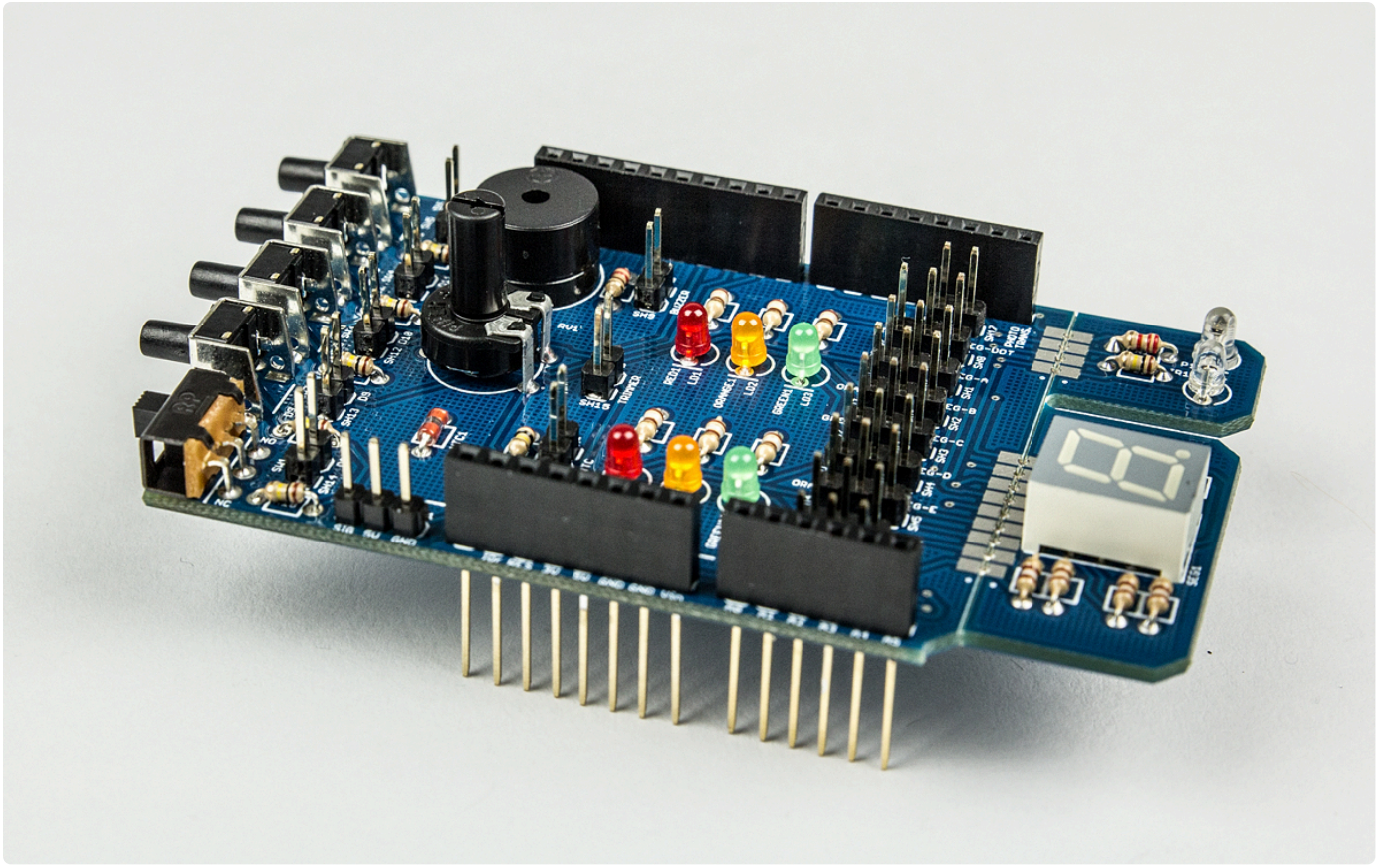
(https://cdn.velleman.eu/images/manuals/kaedu/02/024.jpg)

WHAT'S A SOUNDER?

A sounder or buzzer produces a signalling sound to alert bystanders in case of a dangerous situation, timer confirmation, a button is pressed, ... The pitch of the buzzer can't be changed because the frequency of the oscillator is fixed.

15. Place the spindel into the trimmer.

Congrats, your kit is finished! Head over to the projects4edu.be website (http://projects4edu.be/category/arduino/) to learn how to program your shield and find lots of cool projects for home or for school (Dutch only)!



(https://cdn.velleman.eu/images/manuals/kaedu/02/025.jpg)

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