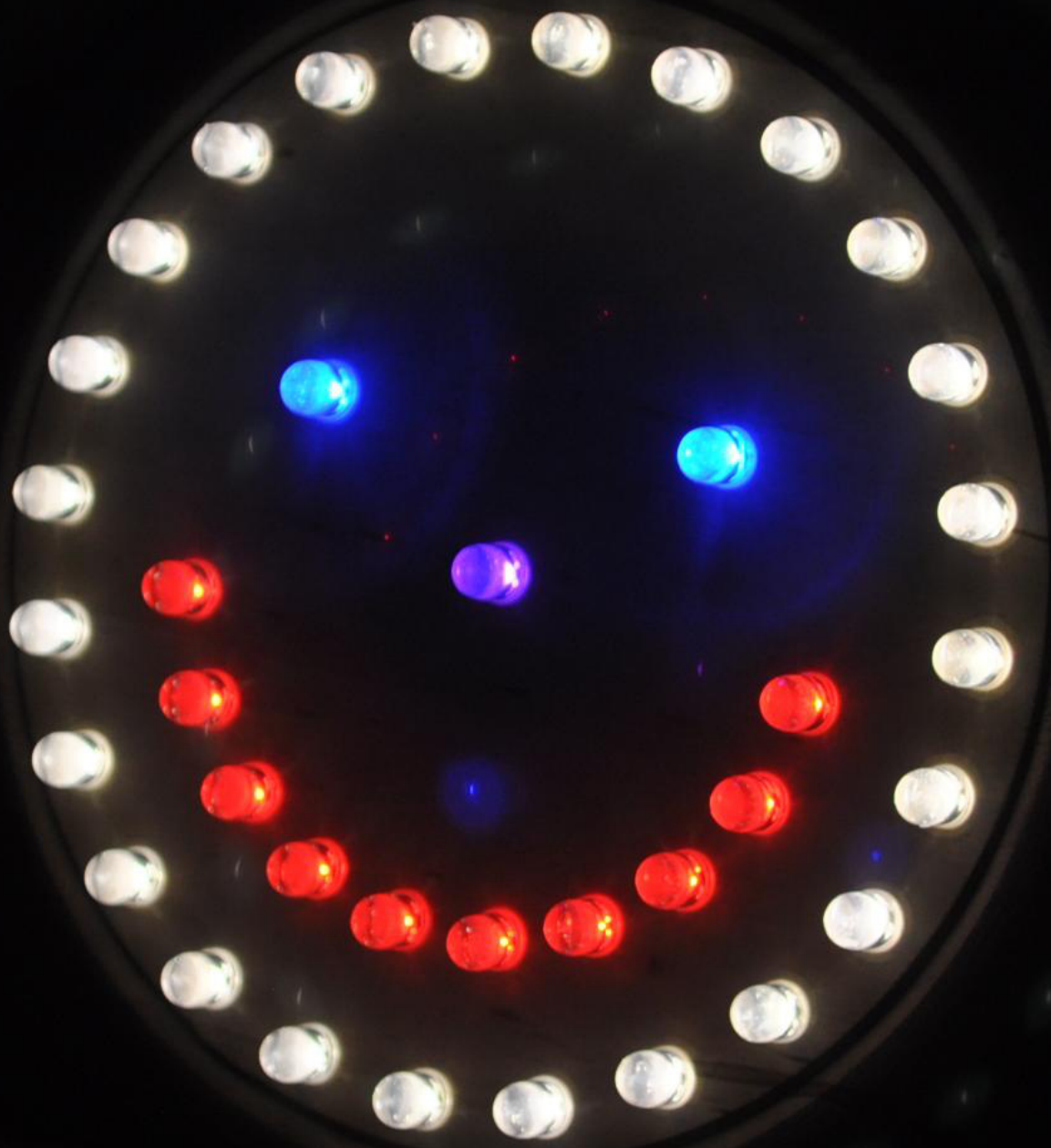
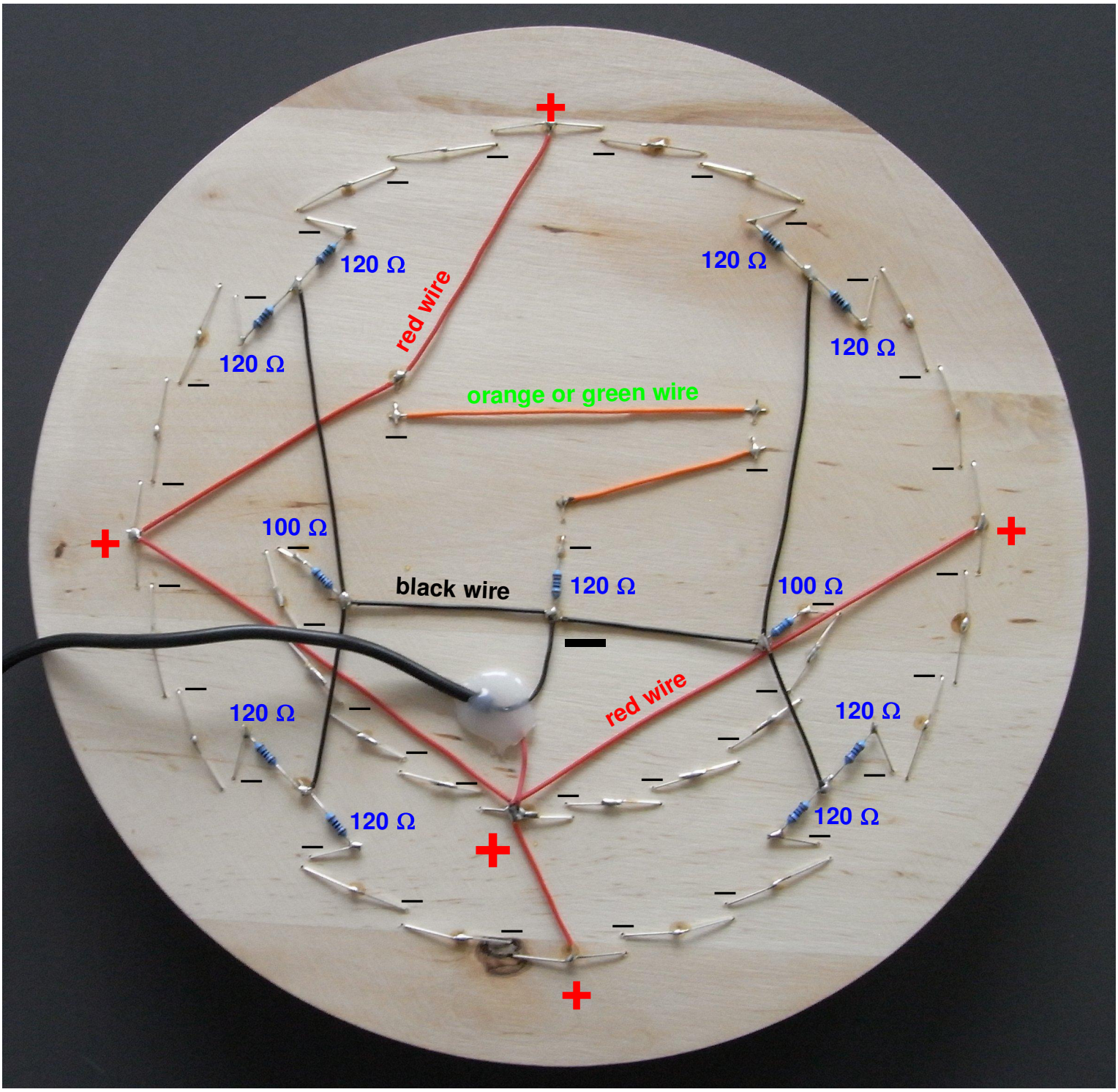
LED-Smiley



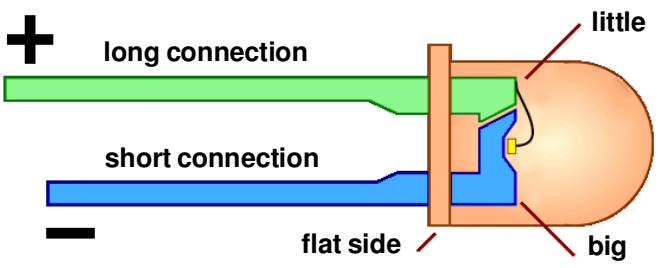
Josef Straßhofer

Made in Austria

Back of the LED-Smiley



Polarity of light-emitting diodes (LED)



resistors

100 Ω

brown-black-black-black-brown

120 Ω

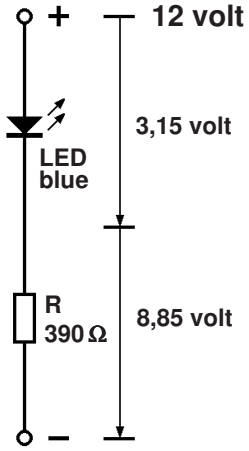
brown-red-black-black-brown

„Warm“ LED-colors: red, orange, yellow ... **1,95 volt**

„Cold“ LED-colors: blue, green, violet, warm and cold white ... **3,15 volt**

For a calculation you have to know the voltage and the current, that a LED needs for the right function. The voltage depends on the color, the current on the type of the LED.

Example for a calculation with a blue LED on 12 volt



a) A ultrabright blue LED needs **3,15 volt** for a right function.
More voltage would destroy the LED.
Therefore you need a **resistor** in the same circuit as the LED.

b) Commercially LEDs need about **20 mA to 25 mA**, we use 20 mA.

c) The voltage for the circuit in this example is **12 volt**.

Calculation:

d) For the blue LED we need **3,15 volt**. If you subtract 3,15 volt from the total voltage of 12 volt, you get **8,85 volt**.

e) Now you use **Ohm‘s Law**. You get **442,5 Ohm**.
You cannot buy this resistor, because it is no standard-resistor.

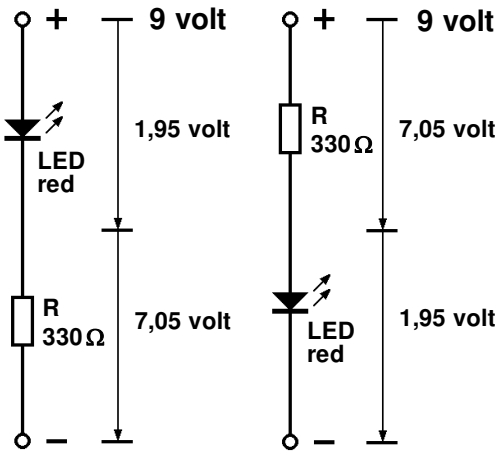
f) You may choose 470 Ohm or 390 Ohm. Look at the resistor-series E12!
If you choose 390 Ohm, you have little more current than 20 mA, about 22,7 mA. But this is no problem for the LED.

$$R = \frac{U}{I} = \frac{8{,}85}{0{,}02} = 442{,}5\ \text{Ohm} \Rightarrow 390\ \text{Ohm}$$

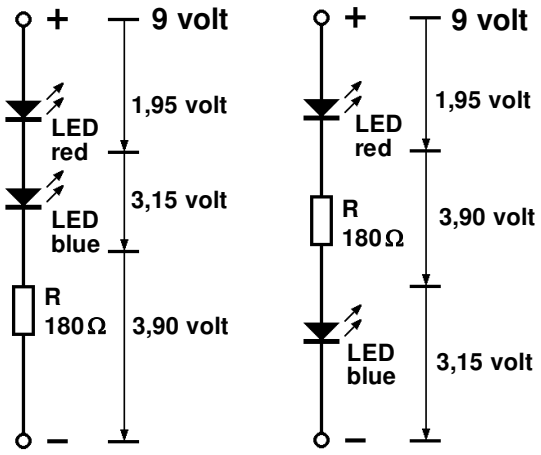
Resistor Series E12

1 Ohm	27 Ohm	680 Ohm	18 kOhm	470 kOhm
1,2 Ohm	33 Ohm	820 Ohm	22 kOhm	560 kOhm
1,5 Ohm	39 Ohm	1 kOhm	27 kOhm	680 kOhm
1,8 Ohm	47 Ohm	1,2 kOhm	33 kOhm	820 kOhm
2,2 Ohm	56 Ohm	1,5 kOhm	39 kOhm	1 MOhm
2,7 Ohm	68 Ohm	1,8 kOhm	47 kOhm	1,2 MOhm
3,3 Ohm	82 Ohm	2,2 kOhm	56 kOhm	1,5 MOhm
3,9 Ohm	100 Ohm	2,7 kOhm	68 kOhm	1,8 MOhm
4,7 Ohm	120 Ohm	3,3 kOhm	82 kOhm	2,2 MOhm
5,6 Ohm	150 Ohm	3,9 kOhm	100 kOhm	2,7 MOhm
6,8 Ohm	180 Ohm	4,7 kOhm	120 kOhm	3,3 MOhm
8,2 Ohm	220 Ohm	5,6 kOhm	150 kOhm	3,9 MOhm
10 Ohm	270 Ohm	6,8 kOhm	180 kOhm	4,7 MOhm
12 Ohm	330 Ohm	8,2 kOhm	220 kOhm	5,6 MOhm
15 Ohm	390 Ohm	10 kOhm	270 kOhm	6,8 MOhm
18 Ohm	470 Ohm	12 kOhm	330 kOhm	8,2 MOhm
22 Ohm	560 Ohm	15 kOhm	390 kOhm	10 MOhm

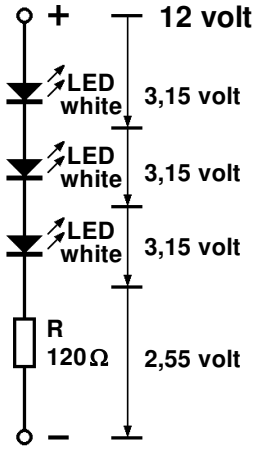
More examples for ultrabright LEDs: 12 volt or 9 volt or any other voltage



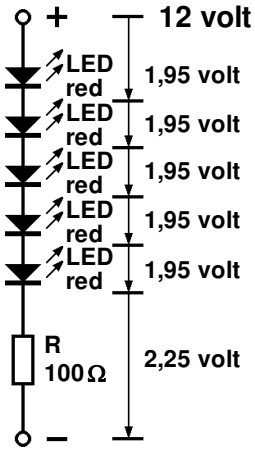
You may put in the resistor into the circuit, where you like. You have **the same current** in the LED.



In this circuit it is the same. **It does not matter**, where you put in the resistor. You have the same current.



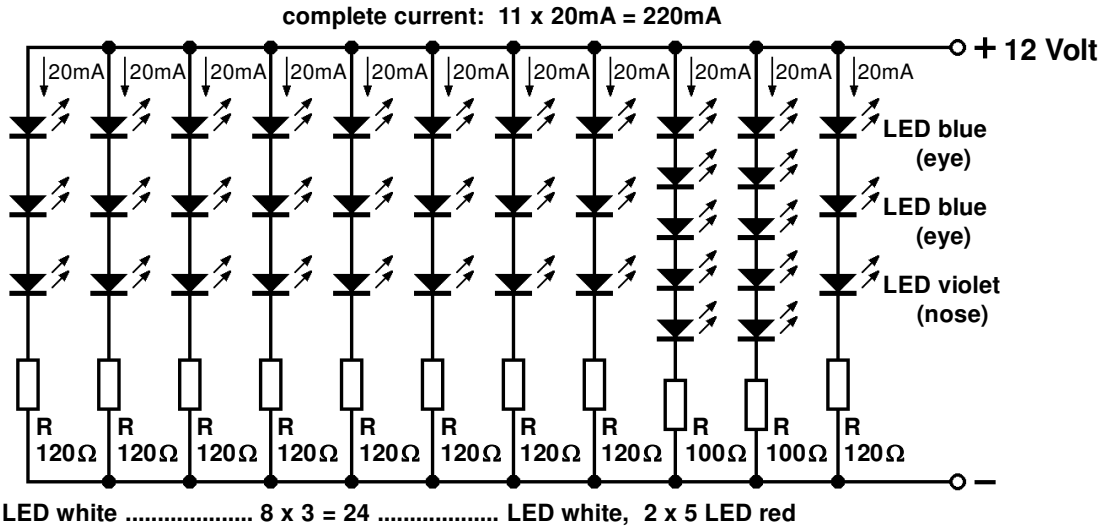
3,15 volt
20 mA
LED white
LED blue
LED green
LED violet



1,95 volt
20 mA
LED red
LED orange
LED yellow

If you have a power supply with **12 volt**, it is not possible to have more than 3 white (blue, green, violet) LEDs in a row or more than 5 red (orange, yellow) LEDs in a row.

LED-Smiley ..... Circuit diagram with 37 ultrabright LEDs



LED white ..... 8 x 3 = 24 ..... LED white, 2 x 5 LED red

Circle with 24 ultrabright white LEDs mouth

Power supply: electronic transformer: 12 volt, 500 mA or more

Your smiley with 37 LEDs

Fix this paper with a tape into the center of the round board.
Drill all points (74 x 1mm) **very exactly**!
Good luck!