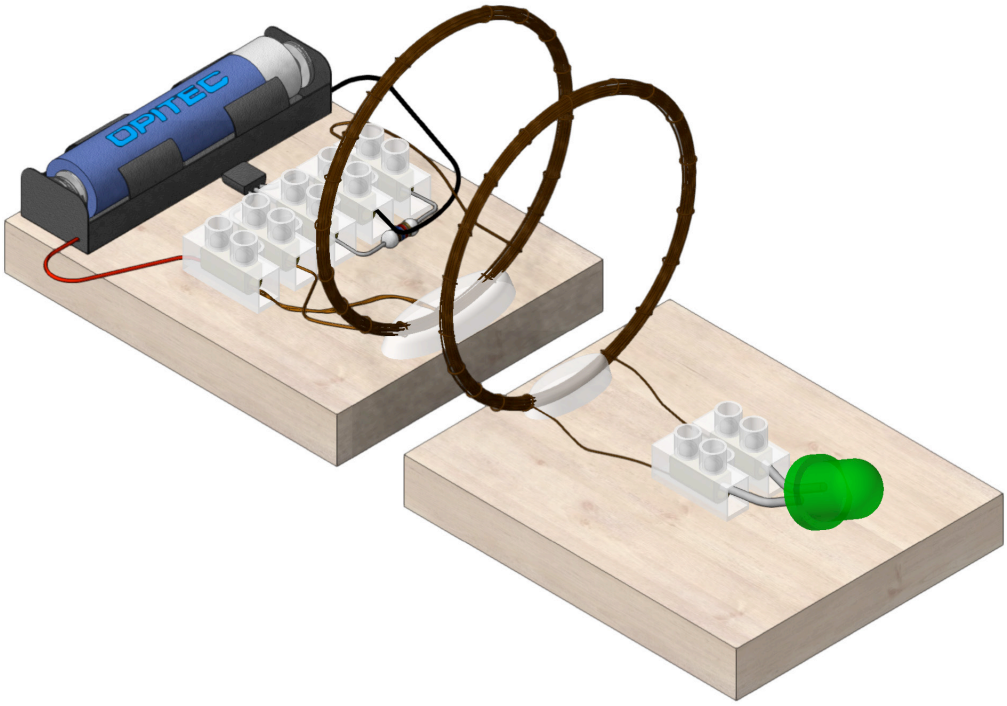
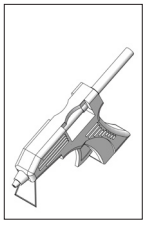
122.902

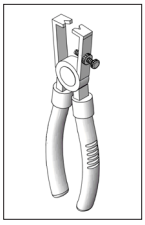
Wireless power transmission



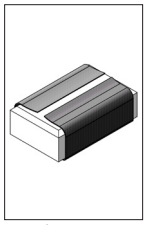
Tools required:



Hot glue gun



Wire stripper



Sandpaper

side cutter

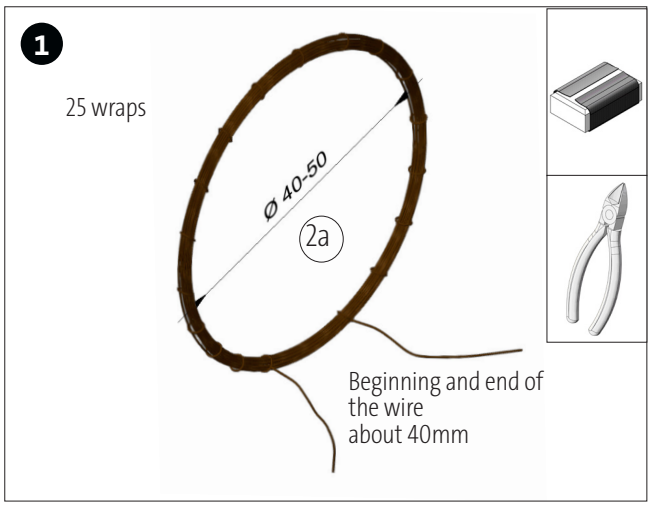
Slot screwdriver

Craft knife

Note

After completion, the OPITEC work kits are not articles with toy character of a generally commercial kind, but teaching and learning aids to support educational work. This kit may only be built and operated by children and young people under the guidance and supervision of competent adults. Not suitable for children under 36 months. Danger of suffocation!

Parts list	Number of pieces	Dimensions (mm)	Description	Part no.
Wooden strip	2	75x60x10	Base plates	1
Enamelled copper wire	1	ø0,3x8000	Spools	2
LED green	1	ø10	LED	3
Battery holder	1		Battery holder	4
Resistor 1 kOhm	1		Resistor	5
Transistor	1		Transistor	6
Luster terminal strip 12-pole	1		Wiring	7

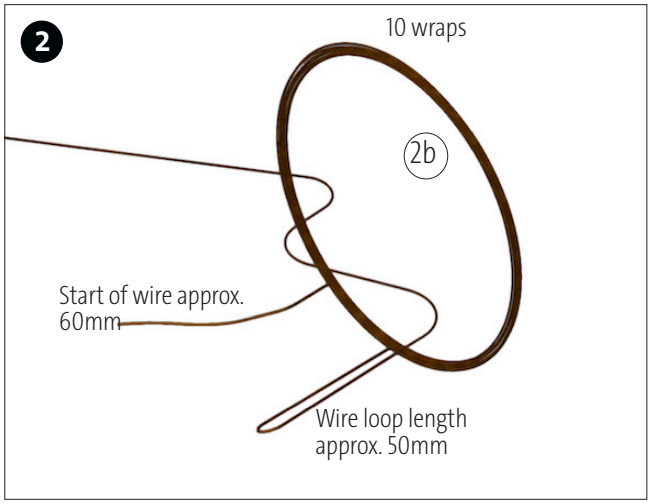


Wind an air coil (2a) with 25 windings (ø approx. 40-50mm) with the enclosed copper wire. Strip the wire ends (length approx. 40mm) with sandpaper or a craft knife.

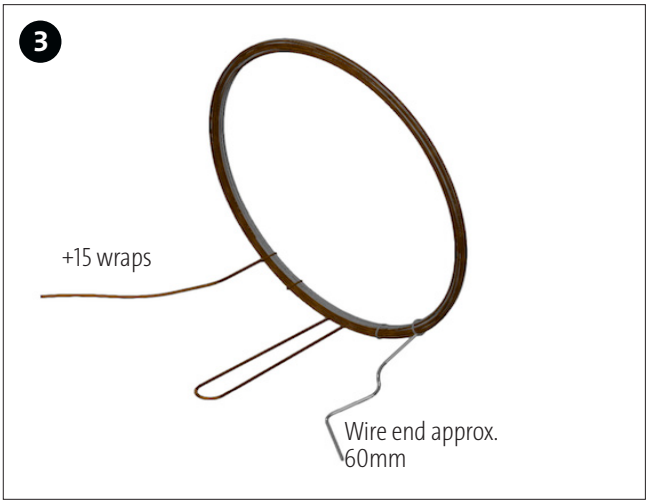
Notice:
The spool can be wrapped around a toilet paper roll or bottleneck of the appropriate diameter.

To fix the individual windings, wrap the coil with a separate piece of wire as shown.

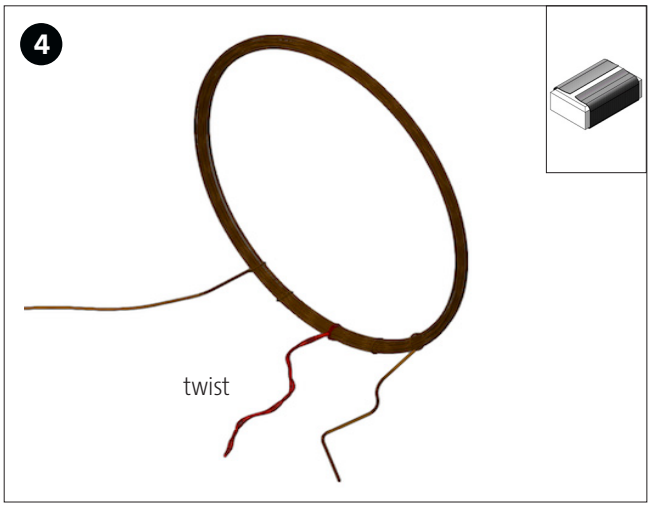
Observe circuit diagram (page 5)!



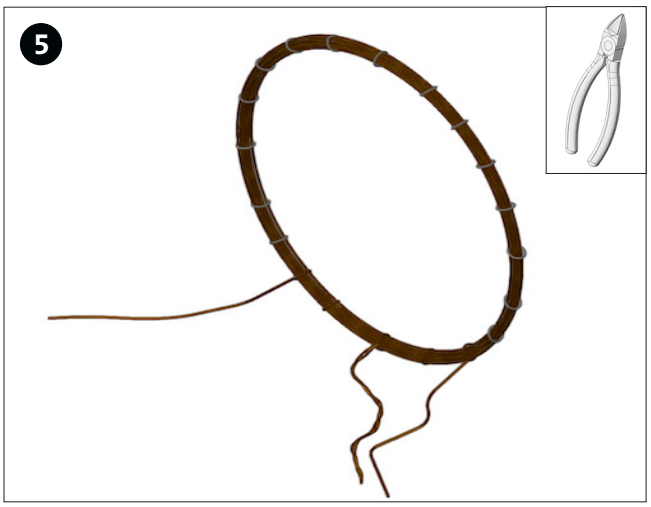
For the second coil (2b), first wind 10 turns (observe the diameter of coil 1). Then put a loop on the outside. see illustration.



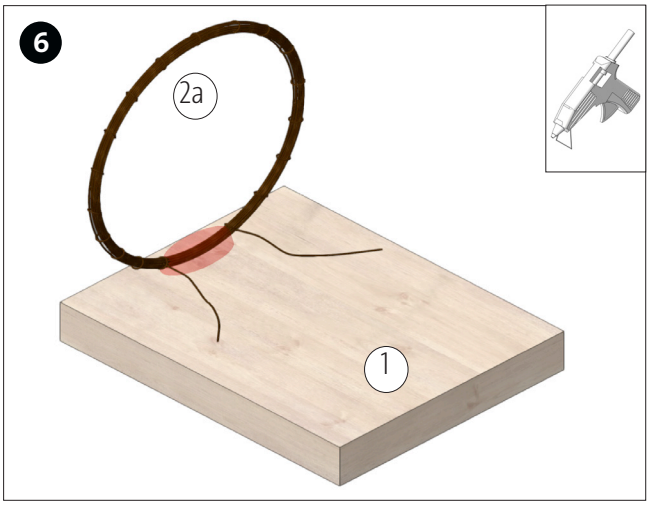
After the loop, wrap another 15 wraps in the same direction. **Note:** Do not cut the loop!



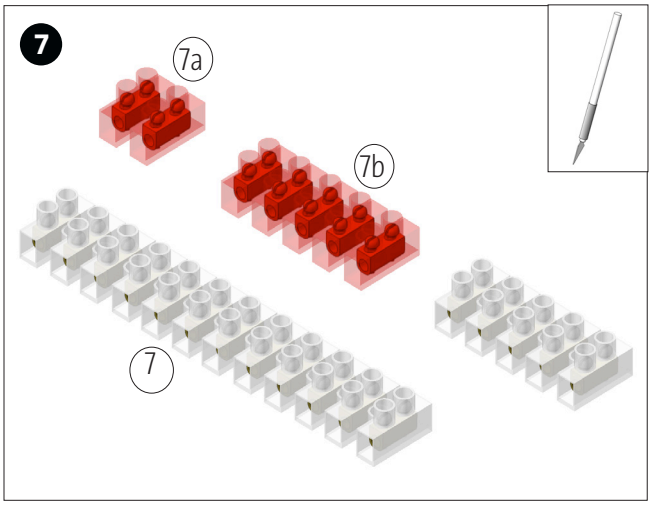
For a better connection, twist the loop as shown.
Strip all wire ends generously with sandpaper or a craft knife.



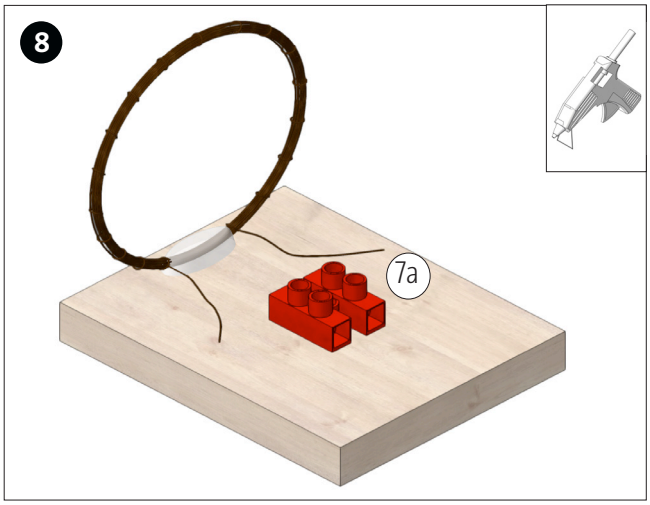
.To fix the individual windings, wrap the coil with a separate piece of wire.



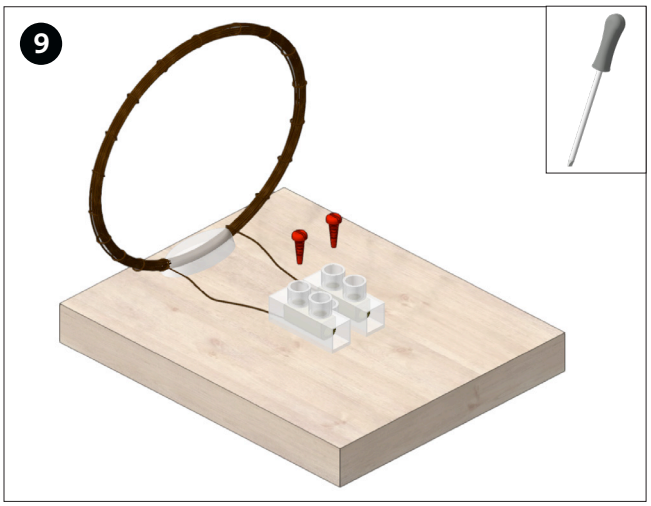
Glue the coil (2a) as shown on a wooden board (1) with a distance of approx. 5mm to the outer edge. Cable ends point to the middle of the wooden board.



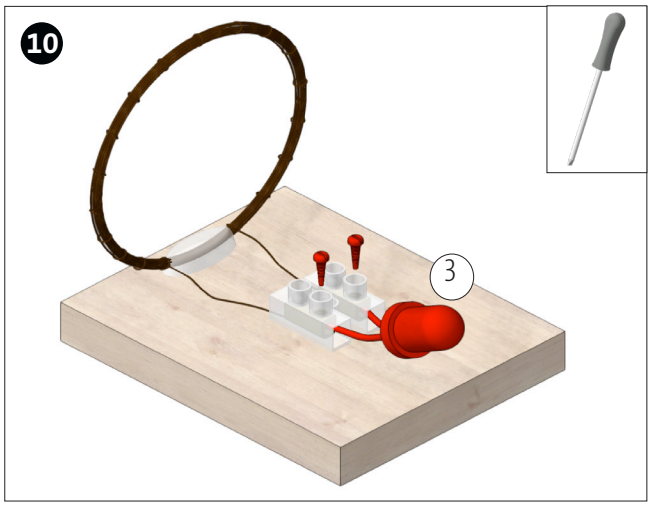
Cut off a piece with 2 poles (7a) and a piece with 5 poles (7b) from the luster terminal strip (7).



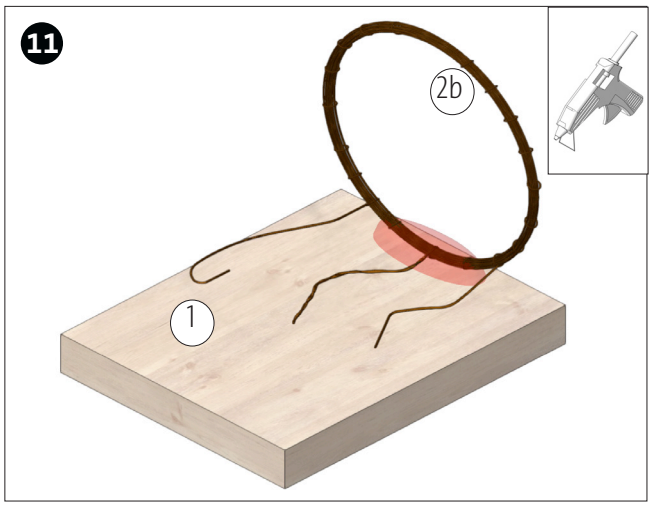
Glue the luster terminal strip (7a) centred on the wooden board as shown.



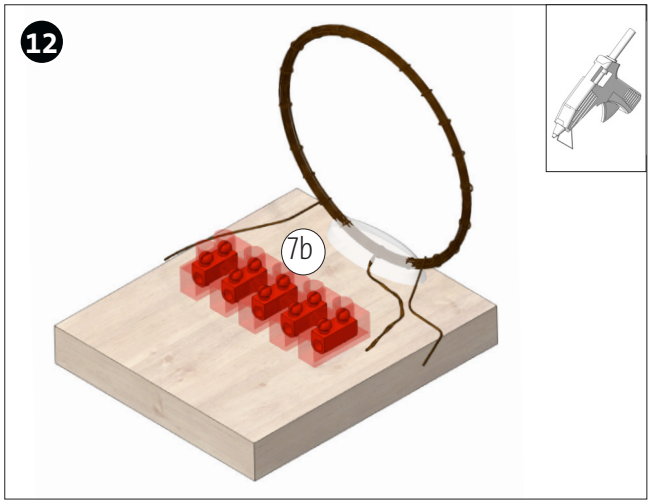
Insert the coil connection cables into the luster terminal strip as shown and screw tight.



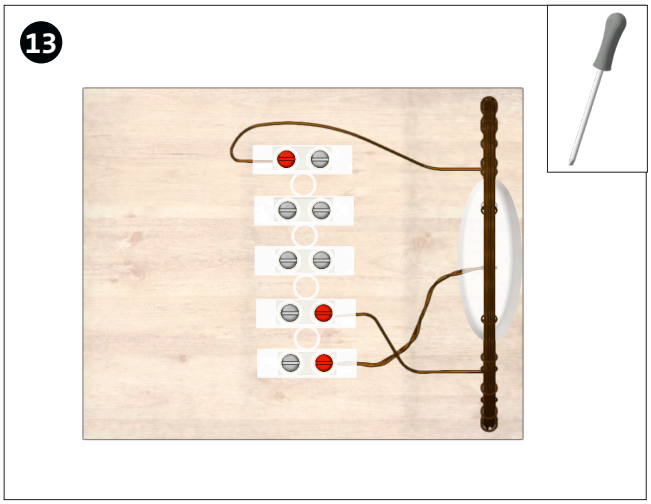
Insert the LED (3) into the luster terminal block as shown and screw tight.



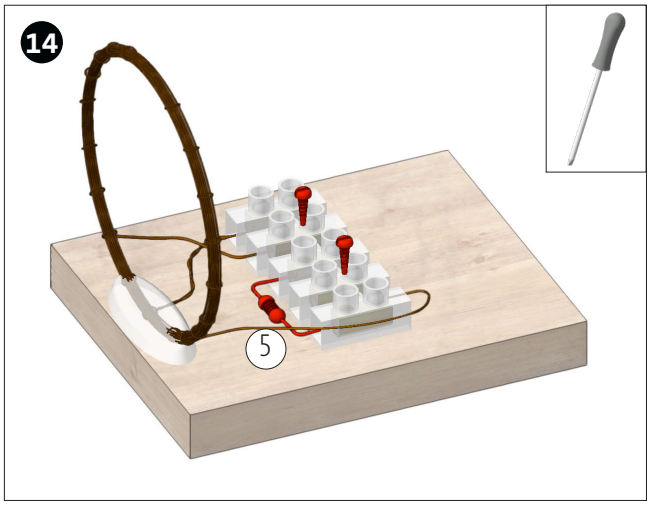
Glue the coil (2b), as shown, to the second wooden board (1) with a distance of approx. 5mm from the outer edge.



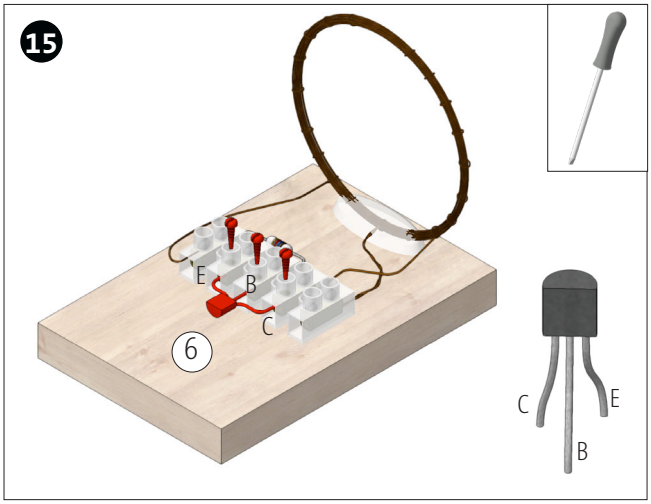
Center the luster terminal strip (7b) on as shown.



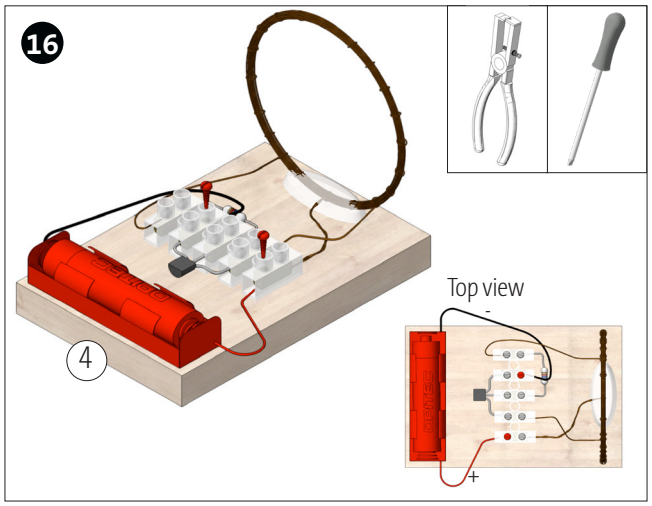
Insert the coil connections into the luster terminal strip as shown and connect.



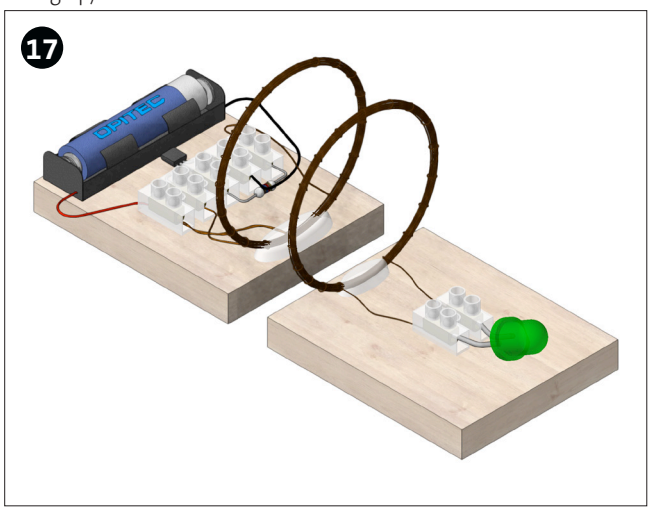
Insert the resistor (5) into the luster terminal strip and screw tight.



Bend the legs of the transistor (6) and insert them into the luster terminal strip at the position shown and screw tight. (Flat side still facing up)

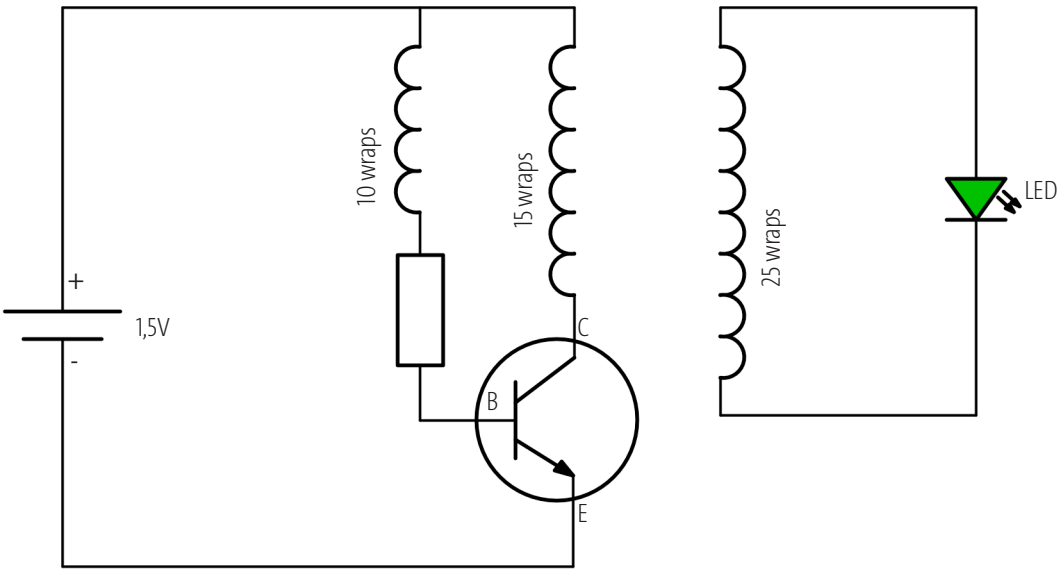


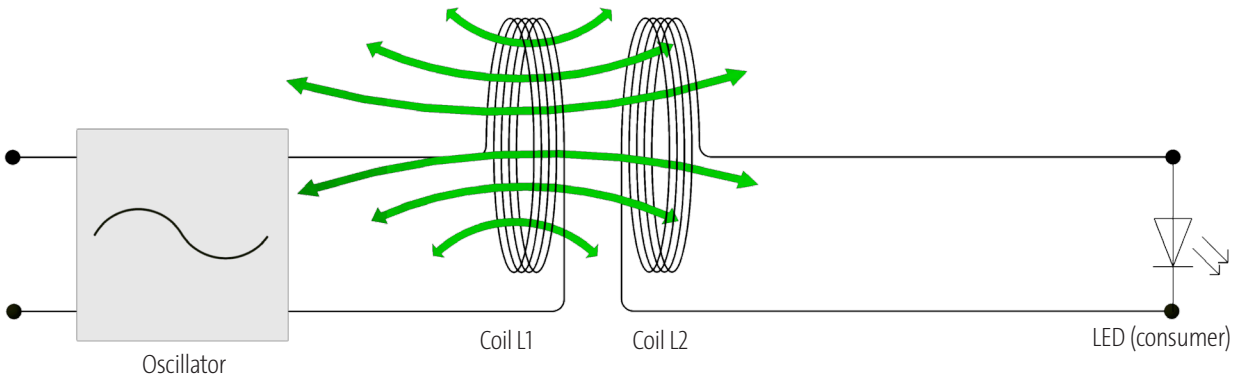
Strip the battery holder cables as shown, insert them into the luster terminal strip and screw tight. Insert 1.5V AA battery.



Done!

Circuit diagram





Principle of wireless energy transmission by means of *induction*:
In the 'transmitter' on the left, an oscillating circuit (oscillator, consisting of the coil with 10 windings, the resistor and the transistor) generates an alternating current that flows through the coil L1. This alternating current generates an alternating magnetic field in this coil (curved arrows). The magnetic field is 'received' by the coil L2, which must be at a suitable distance for this, and in turn ***induces*** an alternating current that can now be used for various loads, in this case it lights up an LED. If the distance between the two coils is too great, too few field lines are 'received' in the second coil and only very little energy is transferred. Our design differs slightly from this explanation. We are not dealing here with a 'real' oscillator (this would send alternating voltage or current through the coil), but with a 'pulse current source', i.e. the polarity of the voltage does not change, only positive current pulses are allowed to flow through the coil L1. However, this is irrelevant for the function of the circuit, the change in coil current provides the necessary magnetic field change.

Practical examples of use:
Contactless charging of smartphones (QI charging), electric toothbrushes, electric vehicles (currently being trialled) or some car key batteries (as soon as they are inserted in the ignition lock).

Advantage: No cables need to be connected for charging, and no open contacts need to be used, so the housings of the devices can be completely waterproof.

Disadvantage: The position of the charger and consumer must match relatively precisely, the transmission only works up to a certain distance, and the power to be transmitted is also limited, i.e. charging does not take place as quickly as if a cable were connected.