

Electronics with the Modular System

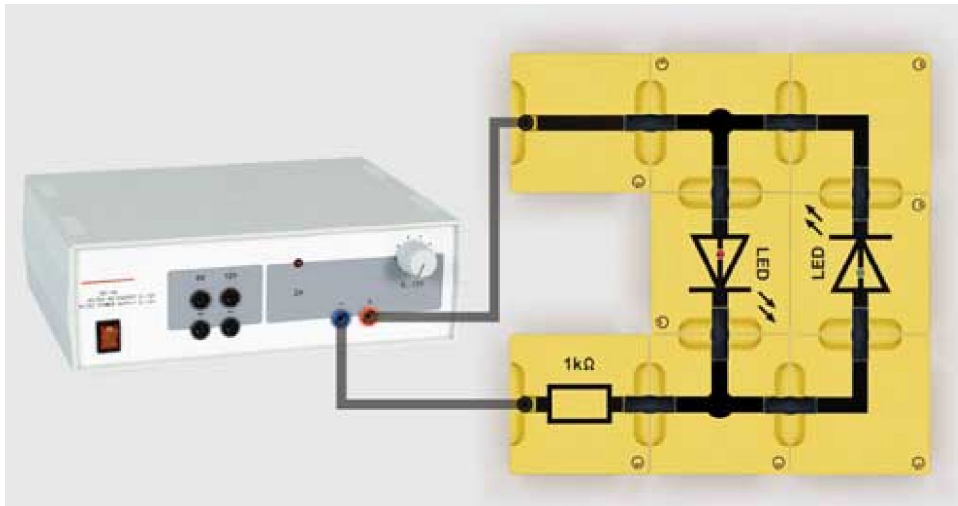
Basic Electronic Circuits
Semiconductor diodes

Polarity tester with light-emitting diodes

Objective of the experiment

To demonstrate the layout and working principle of a polarity tester using light-emitting diodes.

Setup



Apparatus

1	539 037	Light-emitting diode, red, BST
1	539 038	Light-emitting diode, green, BST
1	539 011	Resistor 1 k Ω , BST
1	539 001	Connector block BST, straight
2	539 004	Connector blocks BST, 90° angle
2	539 006	Connector blocks BST, T branch
8	539 000	Bridging plug, BST
1	521 49	Power supply, 12 V DC, 230 V
2	500 644	Safety connection lead, 100 cm
1	301 300	Demonstration experiment frame
1	301 301	Adhesive magnetic board

Carrying out the experiment

- Set up the circuit with the polarity shown in the picture (polarity 1) and apply a voltage of 6 V (DC).
- Observe both light-emitting diodes.
- Reverse the voltage (polarity 2) and observe the light-emitting diodes.
- Then apply a voltage of 6 V (AC).

Observation

	Red LED	Green LED
DC voltage polarity 1	lights up	not lit
DC voltage polarity 2	not lit	lights up
AC voltage	lights up	lights up

Evaluation

With a polarity tester, the terminals of any power source can be checked to discover their polarity.

Because of this, we utilize the characteristics of the light-emitting diodes, which only emit light when they are connected to the circuit in the forward direction. Thus, we are able to deduce the polarity of the voltage source we are testing based on the light emission of the diode.

On commercially available polarity testers, LEDs are already labelled with the polarity (+ and -), and light up depending on the pole where the probe is inserted.

If the polarity tester is checking an AC voltage source ($f = 50 \text{ Hz}$ or $f = 60 \text{ Hz}$), both diodes light up. In actuality, because of the rectifying effect, the diodes alternately light up 50 or 60 times per second (see Experiment D 4.1.2.2.a). The eye, however, is too slow to perceive this rapid flashing.