

# Electronics with the Modular System

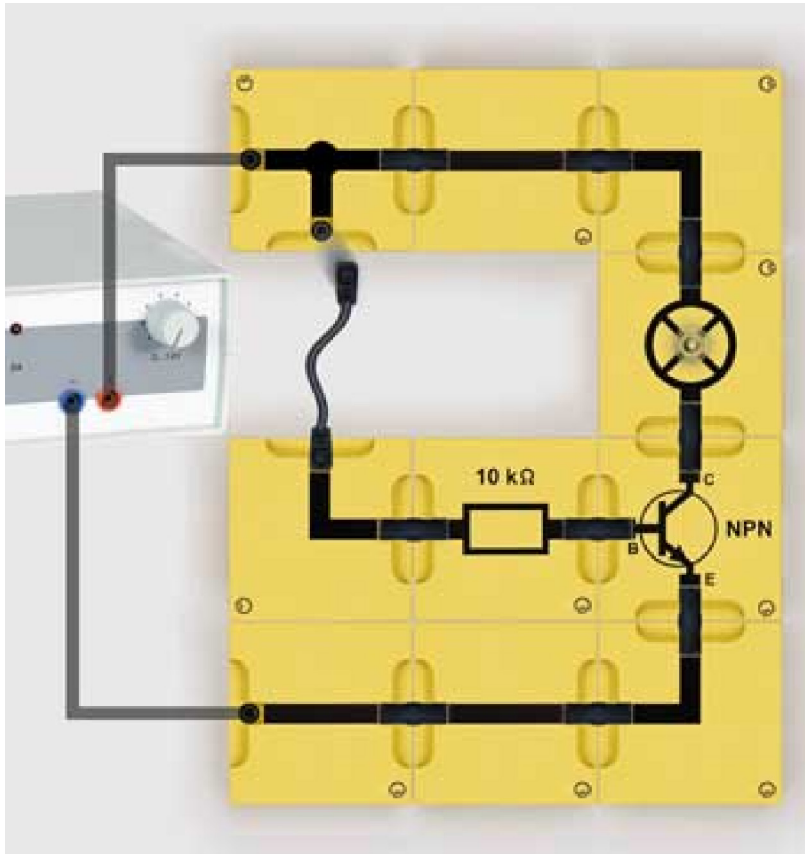
Basic Electronic Circuits  
Transistors

## Working principle of a transistor

### Objective of the experiment

To demonstrate the working principle of a transistor.

### Setup



### Apparatus

1	539 043	Transistor NPN, BD 137, BST	
1	539 013	Resistor 10 kΩ	
1	539 024	Lamp socket, E 10, BST	
1	from	505 15	Incandescent lamp, 6 V, 0.05 A, E10
3	539 001	Connector blocks BST, straight	
3	539 004	Connector blocks BST, 90° angle	
1	539 006	Connector blocks BST, T branch	
9	539 000	Bridging plug, BST	
1	521 49	Power supply, 12 V DC, 230 V	
2	500 644	Safety connection lead, 100 cm	
1	500 604	Safety connection lead, 10 cm	
1	301 300	Demonstration experiment frame	
1	301 301	Adhesive magnetic board	

### Carrying out the experiment

- Set up the circuit and adjust a voltage of approx. 6 V at the power supply.
- Connect the collector of the transistor to the positive terminal of the voltage source and the emitter, to the negative terminal. At the same time, observe the lamp.
- Use the connecting leads (500 604) to connect the base of the transistor to the collector as well and observe the lamp again.

### Observation

If the collector of the transistor is positive and the emitter is negatively polarised, the lamp doesn't light up (diode region).

If the base is also positively polarised, the lamp lights up.

### Evaluation

It is not possible to reduce the characteristic of a transistor to the behaviour of a diode region (see D 4.1.4.1.a Transistor as a diode region).

In an NPN transistor, when the emitter is negative and the collector and base are positively polarised, not only does a current flow between base and emitter, but also between collector and emitter.

### Note

In a PNP transistor, the emitter should be positive and the base and collector should be negatively polarised, so that a current flows between collector and emitter.