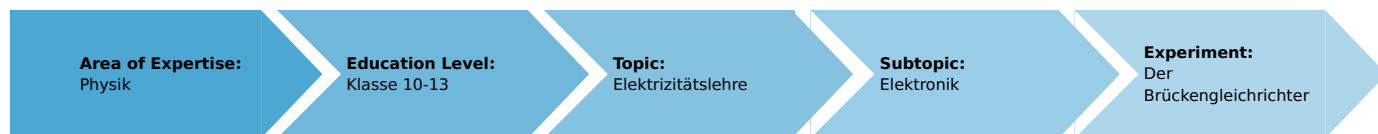


# Bridge rectifiers (Item No.: P1378300)

## Curricular Relevance



### Difficulty



Intermediate

### Preparation Time



10 Minutes

### Execution Time



10 Minutes

### Recommended Group Size



2 Students

### Additional Requirements:

### Experiment Variations:

### Keywords:

## Task and equipment

## Information for teachers

### Additional information

Now that the students have become familiar with the rectifying quality of diodes, this experiment should demonstrate the functioning of the bridge circuit normally used in practice. They should see that the current flows through the load resistor in the same direction in each half period of the alternating current when 4 diodes in a bridge rectifier are used.

Since oscilloscopes and alternating voltage generators with an extremely low frequency are generally not used in student experiments, the behaviour of the bridge rectifier in an alternating current circuit is simulated by reversing the polarity of a direct current power source to determine the direction of the current.

You should encourage the students to predict the behaviour of the circuit after reversing polarity of the power source.

Aside from the correct answer, here are some other predictions they might come up with:

- No current will flow after reversing polarity because the diodes only let the current flow in one direction.
- The current will flow in the opposite direction after reversing polarity of the voltage.

### Notes on setup and procedure

Hearing and distinguishing the hum noise superimposed on the direct voltage with the headphones should demonstrate the difference in the frequencies from alternating current line voltage and hum voltage.

You should advise the students which measurement range to select and which jacks on the meter to use.

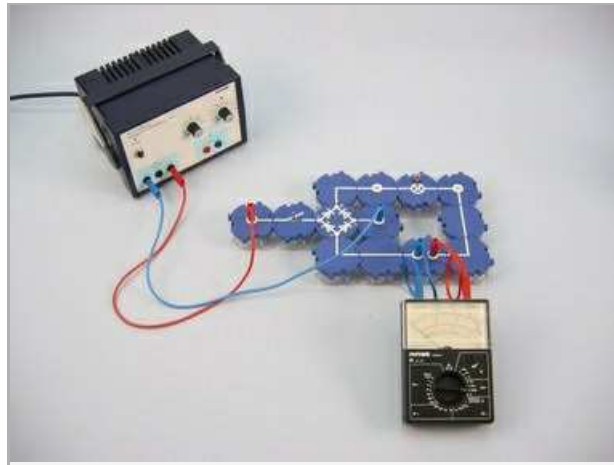
# Bridge rectifiers (Item No.: P1378300)

## Task and equipment

### Task

### How can both half periods of alternating current be used to create direct current?

Investigate on which path and in which direction the current flows through the bridge rectifier with various polarity scenarios for the voltage.



## Equipment



Position No.	Material	Order No.	Quantity
1	Straight connector module, SB	05601-01	2
2	Angled connector module, SB	05601-02	3
3	Interrupted connector module, SB	05601-04	1
4	Junction module, SB	05601-10	2
5	Straight connector module with socket, SB	05601-11	1
6	Angled connector module with socket, SB	05601-12	1
7	On-off switch module, SB	05602-01	1
8	Socket module for incandescent lamp E10, SB	05604-00	1
9	Bridge rectifier module, SB	05655-00	1
10	Earphones, 2kOhm, with 4mm-plugs	06811-00	1
11	Connecting cord, 32 A, 250 mm, red	07360-01	1
12	Connecting cord, 32 A, 250 mm, blue	07360-04	1
13	Connecting cord, 32 A, 500 mm, red	07361-01	1
14	Connecting cord, 32 A, 500 mm, blue	07361-04	1
15	Filament lamps 12V/0.1A, E10, 10	07505-03	1 piece
16	PHYWE power supply DC: 0...12 V, 2 A / AC: 6 V, 12 V, 5 A	13506-93	1
17	Multi-range meter, analogue	07028-01	1

## Set-up and procedure

### Set-up

#### First experiment

Set up the experiment as shown in Fig. 1 and Fig. 2. Select a measurement range of 300 mA-. Make sure that the polarity on the meter is correct.

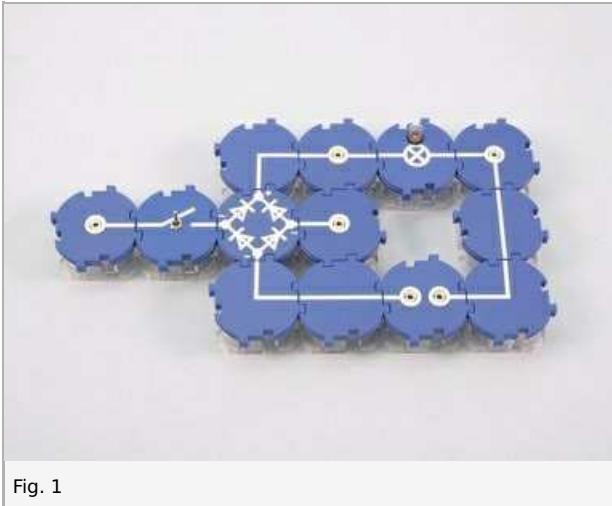


Fig. 1

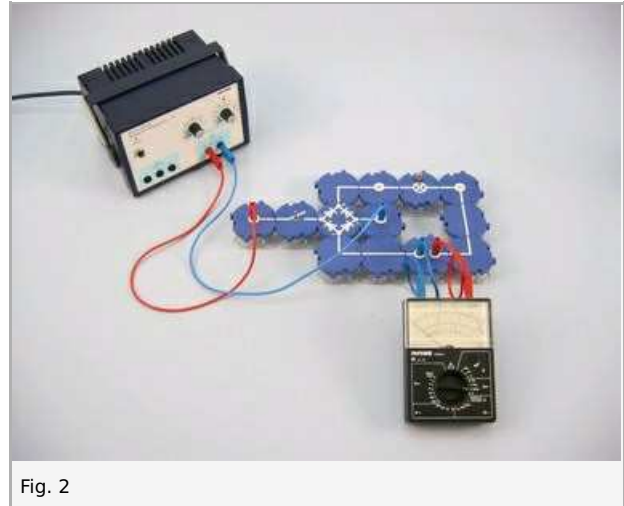


Fig. 2

#### Second experiment

Remove the connecting cord on the power supply unit from the direct voltage jack and plug it into the jack for 12 V~, as shown in Fig. 3.

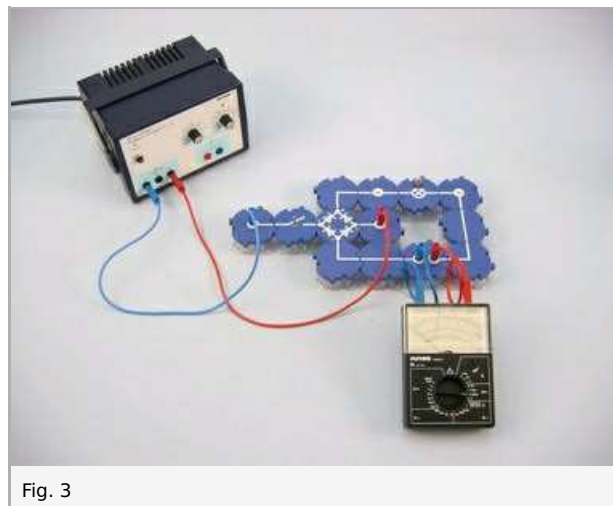


Fig. 3

#### Third experiment

First, plug headphones directly into the jack for 12 V~ (Fig. 4) and then connect them in parallel to the filament lamp (Fig. 5).

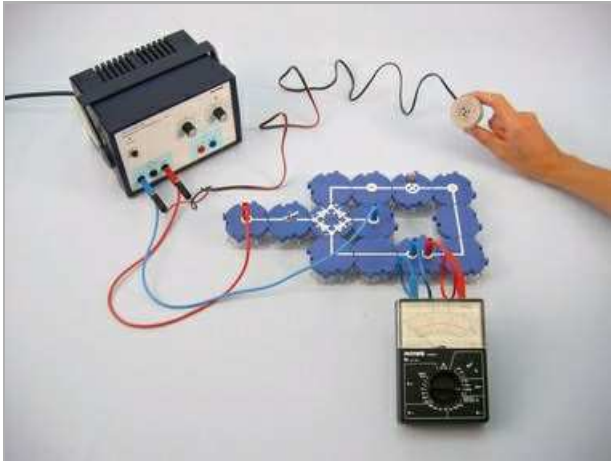


Fig. 4

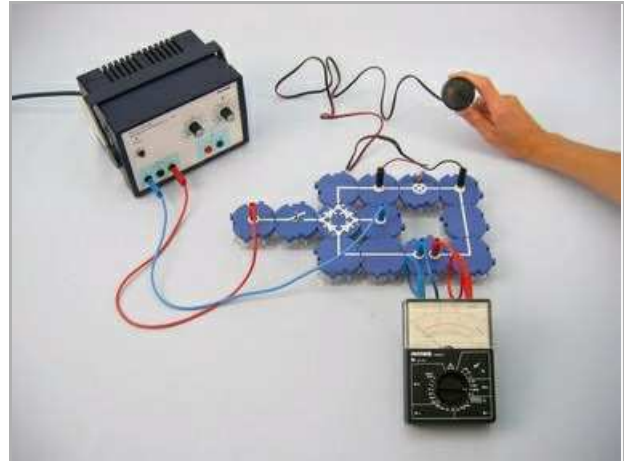


Fig. 5

## Procedure

### First experiment

- Switch on the power supply unit and set the direct voltage to 12 V-.
- Close the circuit with the on/off switch. Observe the filament lamp and deflection of the pointer on the meter. Note your observations under Result - Observations 1 in the report.
- Open the circuit. Switch around the connecting cords to the power source so that the voltage is connected with opposite polarity.
- Try to predict the reaction of the filament lamp and in what direction the pointer on the meter will deflect when you close the circuit Result - Observations 2.
- Close the circuit with the on/off switch. Compare the actual reaction of the filament lamp and the deflection of the pointer on the meter with your prediction and with the reaction recorded with the original polarity. Note your results under Result - Observations 3.

### Second experiment

- Close the circuit with the on/off switch.
- Observe the filament lamp and ammeter. Note your observations under Result - Observations 4.

### Third experiment

- Compare the pitch and note your results under Result - Observations 5.
- Plug the circuit back into the 12 V- jack. Toggle the switch on and off and listen carefully to the signals in the headphones. Note your observations under Result - Observations 6.

## Report: Bridge rectifiers

### Result - Observations 1

Note your observations.

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### Result - Observations 2

Note your prediction.

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### **Result - Observations 3**

Note your observations.

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### **Result - Observations 4**

Note your observations.

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### **Result - Observations 5**

Note your observations.

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### **Result - Observations 6**

Note your observations.

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### Evaluation - Question 1

What conclusions can you draw from the comparison of Observations 1 and 3?

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### Evaluation - Question 2

Based on your observation under Observations 4, what do bridge rectifiers do?

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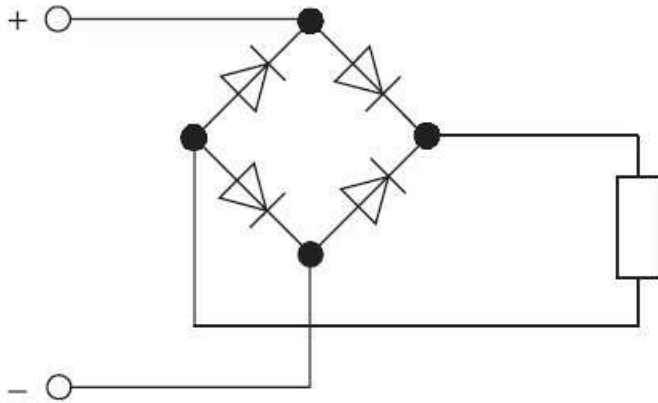
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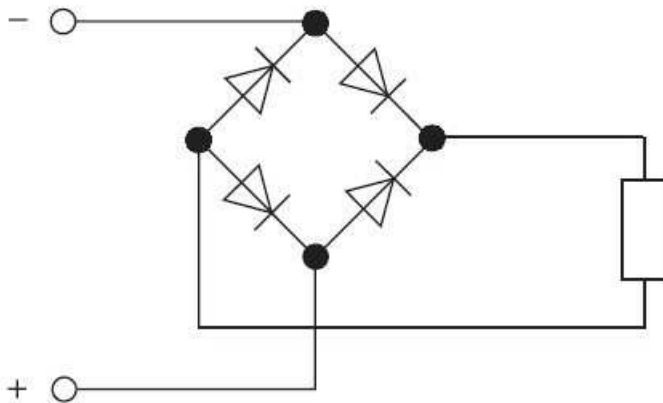
### Evaluation - Question 3

mark the current paths in the bridge rectifier for both polarity scenarios for the voltage.



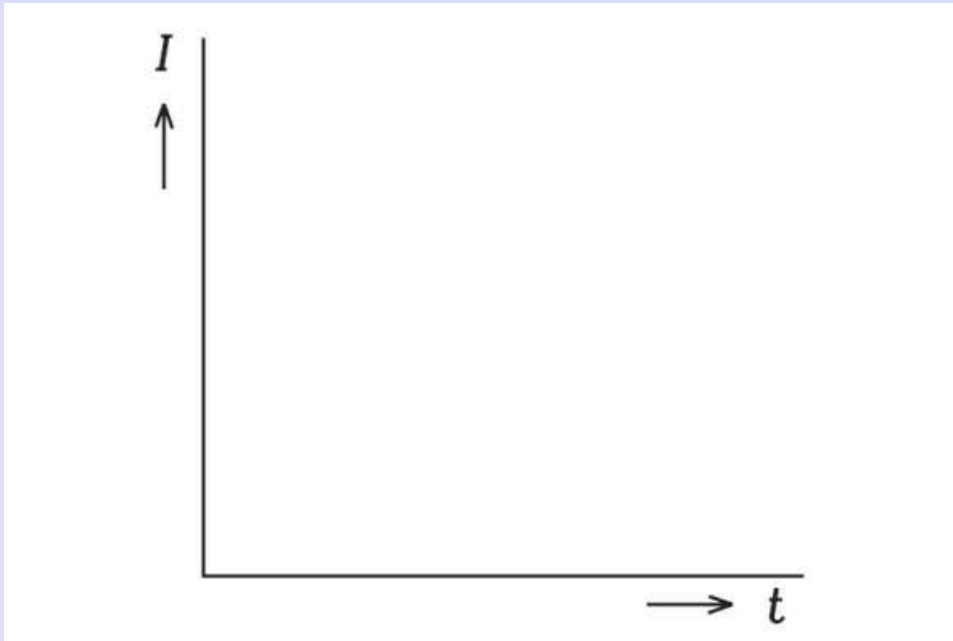
### Evaluation - Question 4

Mark the current paths in the bridge rectifier for both polarity scenarios for the voltage.



### Evaluation - Question 5

Draw the time curve for the pulsating direct current.



### Evaluation - Question 6

How do you explain the difference in pitch you determined in the third experiment?

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### Evaluation - Question 7

What is the advantage of using a bridge rectifier as opposed to a single diode?

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### Evaluation - Question 8

What conclusion can you draw from the observation you made under Observations 6 about the characteristic of the direct voltage from the power supply unit?

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