

How a commutator functions

Task and equipment

Information for teachers

Additional information

Continual and rapid reversal of the polarity of an electromagnet is an important event in an electric motor. This experiment shows how this is implemented in practice.

This is the last step towards being able to understand how a complete electric motor is constructed. It teaches how a current reverser works and which function it undertakes in an electric motor.

Notes on procedure

Take care during the installation of the pole shoes that the coil can move between them without any hindrance and also that the pole shoes do not touch the iron core even in the horizontal position.

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Task and equipment

Task

Polarity reversal of a coil in an electric motor

Examine how a current reverser functions.



Equipment

Position No.	Material	Order No.	Quantity
1	TESS advanced Physics set Electric motor/ Generator:	15221-88	1
	Base plate		1
	Pole shoes		2
	Current reverser		1
	Bar magnet		1
	Coil		1
	Iron core		1
2	PHYWE power supply DC: 0...12 V, 2 A / AC: 6 V, 12 V, 5 A	13506-93	1
3	Connecting cord,15A,25cm, red	07313-01	1
4	Connecting cord,15A,25cm, blue	07313-04	1

Set-up and procedure

Set-up

Continual and rapid reversal of the polarity of an electromagnet is an important event in an electric motor. This experiment shows how this is implemented in practice.

Set-up

Push the coil with iron core on the current reverser. Insert the current reverser contacts in the red sockets.

Now set the experiment up as shown in Fig. 1. The coil must be positioned vertically and a voltage of 4 to 4.5 volts is to be applied to the connecting cables. The coil must be able to turn freely between the pole shoes.

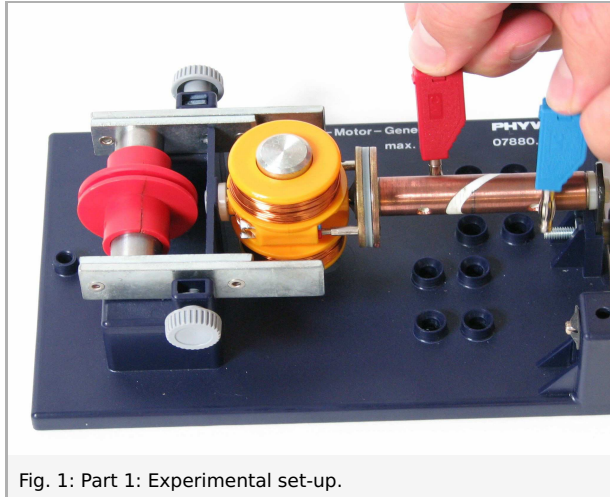


Fig. 1: Part 1: Experimental set-up.

Procedure

Switch the current on and hold the plugs of the connecting cables as shown in Fig. 1, one against each of the two insulated copper rollers of the current reverser which are insulated from each other. What do you observe? Note your observations in the report. Bring the coil back to the vertical position and reverse polarity. Ensure that the same half of the coil is again the upper one. What do you now observe?

Bring the coil back to the vertical position. This time hold the two plugs as shown in Fig. 2, at the middle section of the current reverser where the copper rollers overlap. How do coil and current reverser now behave? What happens, when you bring the coil to the horizontal position and repeat this part of the experiment?



Fig. 2: Part2: Experimental set-up.

Report: How a commutator functions

Result - Observations 1

Observations from the first part.

Result - Observations 2

Observations from the second part.

Evaluation - Question 1

Which function of the copper rollers of the current reverser have you found out from the first part of the experiment?

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Evaluation - Question 2

Explain the action which occurs in the second part of the experiment. Bring the term "current reverser" in your answer.

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Evaluation - Question 3

Why is it so important that the current reverser is first in the vertical position? During turning, it keeps coming to a horizontal position, so how can it keep turning despite this?

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