

## 4.1.06-01/15 Current balance / Force acting on a current-carrying conductor



Set-up of experiment P2410615 with Cobra3

## What you can learn about ...

- Uniform magnetic field
- Magnetic induction (formerly magnetic-flux density)
- Lorentz force
- Moving charges
- Current

## Principle:

The force acting on a current-carrying conductor loop in a uniform magnetic field (Lorentz force) is measured with a balance.

Conductor loops of various sizes are suspended in turn from the balance, and the Lorentz force is determined as a function of the current and magnetic induction. The uniform magnetic field is generated by an electromagnet. The magnetic induction can be varied with the coil current.

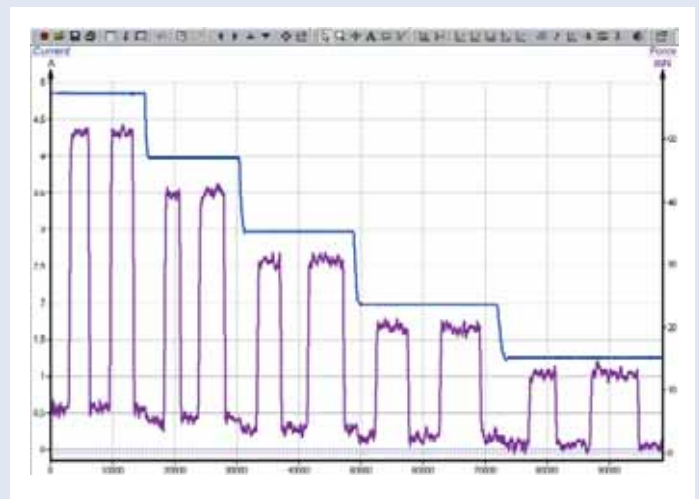
## What you need:

## Experiment P2410615 with Cobra3

## Experiment P2410601 with amperemeter

Ammeter 1/5 A DC	07038.00	2
Tripod base -PASS-	02002.55	2
Support rod -PASS-, square, $l = 1000$ mm	02028.55	1
Right angle clamp -PASS-	02040.55	1
Balance LGN 310, on rod	11081.01	1
Pole pieces, rectangular, 1 pair	11081.02	1 1
Wire Loop, $l = 12,5$ mm, $n = 1$	11081.05	1 1
Wire Loop, $l = 25$ mm, $n = 1$	11081.06	1 1
Wire loop, $l = 50$ mm, $n = 2$	11081.07	1 1
Wire Loop, $l = 50$ mm, $n = 1$	11081.08	1 1
Iron core, U-shaped, laminated	06501.00	1 1
Base for iron cores	06508.00	2 2
Coil, 900 turns	06512.01	2 2
Metal strip with plugs	06410.00	2 2
Distributor	06024.00	1 1
Bridge rectifier, 30 VAC/1 ADC	06031.10	1 1
On/Off switch	06034.01	1 1
Power supply, universal	13500.93	1 1
Connecting cable, 4 mm plug, 32 A, red, $l = 10$ cm	07359.01	1 2
Connecting cable, 4 mm plug, 32 A, red, $l = 25$ cm	07360.01	2 2
Connecting cable, 4 mm plug, 32 A, blue, $l = 25$ cm	07360.04	2 3
Connecting cable, 4 mm plug, 32 A, red, $l = 50$ cm	07361.01	2
Connecting cable, 4 mm plug, 32 A, blue, $l = 50$ cm	07361.04	1 1
Connecting cable, 4 mm plug, 32 A, red, $l = 100$ cm	07363.01	1 1
Connecting cable, 4 mm plug, 32 A, blue, $l = 100$ cm	07363.04	1 1
Support base, variable	02001.00	1
Bosshead	02043.00	2
Support rod, stainless steel 18/8, $l = 1000$ mm	02034.00	1
Cobra3 BASIC-UNIT	12150.00	1
Newton measuring module	12110.00	1
Newton Sensor	12110.01	1
Cobra3 current probe 6 A	12126.00	2
Software Cobra3 PowerGraph	14525.61	1
Power supply 12V/2A	12151.99	1
Data cable 2 x SUB-D, plug/socket, 9 pole	14602.00	1
PC, Windows® 95 or higher		

Complete Equipment Set, Manual on CD-ROM included  
Current balance / Force acting on a current-carrying conductor  
P24106 01/15

Lorentz force  $F$  as a function of the current  $I_L$  in the conductor loop.

## Tasks:

1. The direction of the force is to be determined as a function of the current and the direction of the magnetic field.
2. The force  $F$  is to be measured, as a function of the current  $I_L$  in the conductor loop, with a constant magnetic induction  $B$  and for conductor loops of various sizes. The magnetic induction is to be calculated.
3. The force  $F$  is to be measured, as a function of the coil current  $I_M$ , for a conductor loop. In the range being considered, the magnetic induction  $B$  is, with sufficient accuracy, proportional to the coil current  $I_M$ .