4.4.03-01/11 Inductance of solenoids

Set-up of experiment P2440311 with FG-Module

What you can learn about ...

- ➔ Lenz's law
- ➔ Self-inductance
- ➔ Solenoids
- ➔ Transformer
- ➔ Oscillatory circuit
- ➔ Resonance
- ➔ Damped oscillation
- ➔ Logarithmic decrement
- ➔ Q factor

Principle:

A square wave voltage of low frequency is applied to oscillatory circuits comprising coils and capacitors to produce free, damped oscillations. The values of inductance are calculated from the natural frequencies measured, the capacitance being known.

What you need:

Experiment P2440311 with FG-Module
Experiment P2440301 with oscilloscope

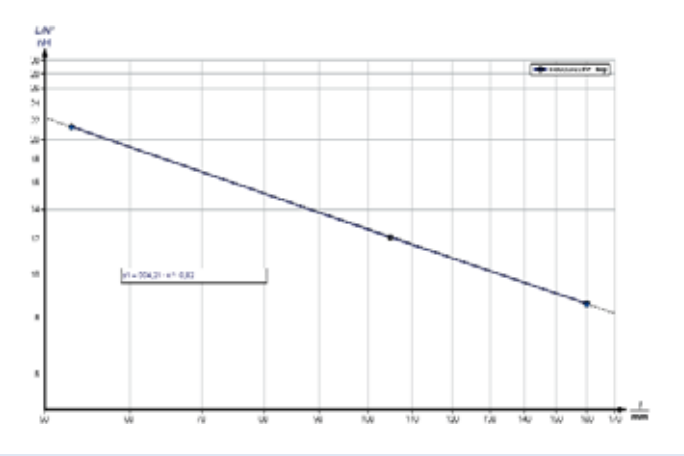
Function generator	13652.93	1	
Oscilloscope 30 MHz, 2 channels	11459.95	1	
Adapter, BNC plug/4 mm socket	07542.26	1	
Induction coil, 300 turns, d = 40 mm	11006.01	1	1
Induction coil, 300 turns, d = 32 mm	11006.02	1	1
Induction coil, 300 turns, d = 25 mm	11006.03	1	1
Induction coil, 200 turns, d = 40 mm	11006.04	1	1
Induction coil, 100 turns, d = 40 mm	11006.05	1	1
Induction coil, 150 turns, d = 25 mm	11006.06	1	1
Induction coil, 75 turns, d = 25 mm	11006.07	1	1
Coil, 1200 turns	06515.01	1	1
Capacitor 470 nF/250 V, G1	39105.20	1	1
Connection box	06030.23	1	1
Connecting cable, 4 mm plug, 32 A, red, l = 25 cm	07360.01	1	1
Connecting cable, 4 mm plug, 32 A, blue, l = 25 cm	07360.04	1	1
Connecting cable, 4 mm plug, 32 A, red, l = 50 cm	07361.01	2	2
Connecting cable, 4 mm plug, 32 A, blue, l = 50 cm	07361.04	2	2
Cobra3 BASIC-UNIT	12150.00		1
Power supply 12V/2A	12151.99		2
Data cable 2 x SUB-D, plug/socket, 9 pole	14602.00		1
Software Cobra3 Universal recorder	14504.61		1
Software Cobra3 PowerGraph	14525.61		1
Measuring module Function Generator	12111.00		1
PC, Windows® 95 or higher			

Complete Equipment Set, Manual on CD-ROM included
Inductance of solenoids with Cobra3 P24403 01/11

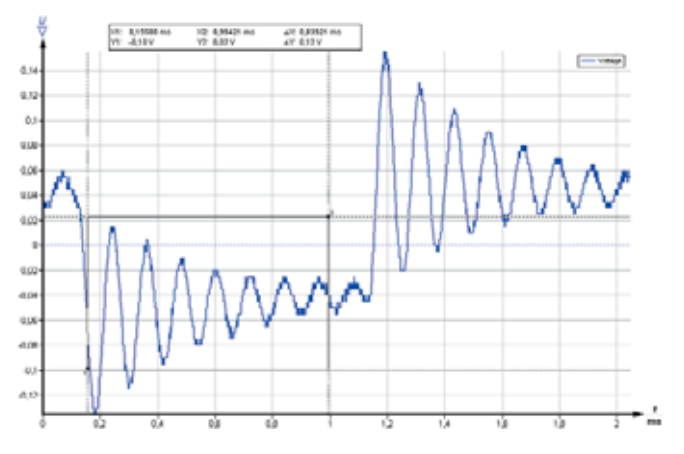
Tasks:

To connect coils of different dimensions (length, radius, number of turns) with a known capacitance C to form an oscillatory circuit. From the measurements of the natural frequencies, to calculate the inductances of the coils and determine the relationships between:

1. inductance and number of turns
2. inductance and length
3. inductance and radius.



Inductance per turn as a function of the length of the coil at constant radius.



Measurement of the oscillation period with the "Survey Function".