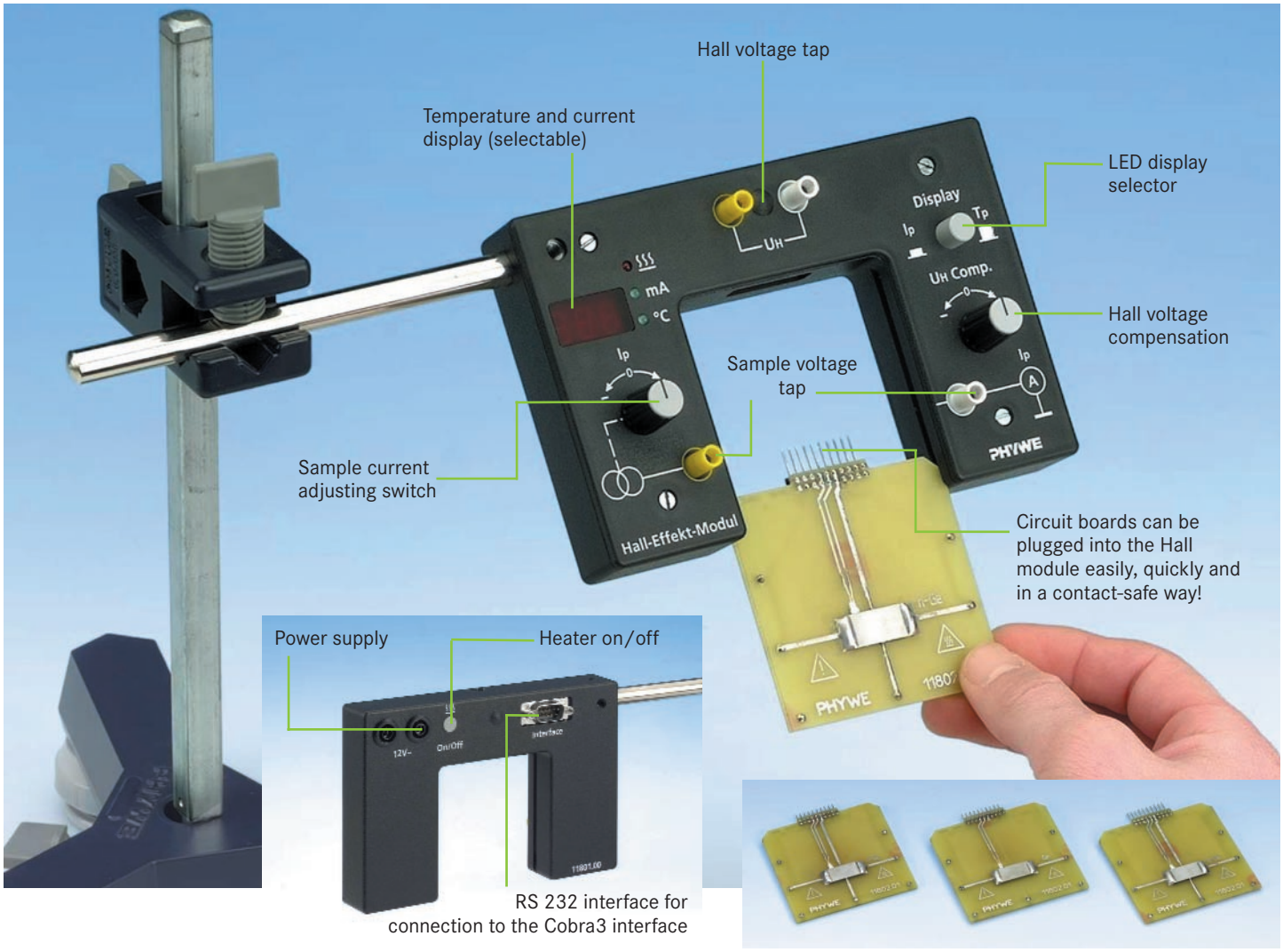
Hall Effect

quick, safe and comfortable!



Introduction

This highly modern and easy-to-use equipment system for determining the conducting mechanisms in semiconductors guarantees

- a simple and clear experiment set-up
- minimum preparation time and safe execution of the experiments

The system consists of a new type of Hall module and 3 heatable carrier boards each of which is equipped with a p- and n-doped germanium crystal and a non-doped Ge-crystal. The boards can be plugged easily and safely into the Hall module which requires only a 12V AC power supply. The Hall module provides all operating parameters for the samples and displays the sample current as well as the sample temperature.
Apart from the classical experiment method it is also possible to connect the PHYWE interface system Cobra3 to capture, display and evaluate measurement data using a PC.

Advantages

- Time-saving system due to an easy, quick and safe experiment set-up
- Hall module with
  - central power supply to provide an adjustable constant current for the sample and for the integrated sample heater
  - digital display to show either the sample current or the sample temperature
  - sample heater with fully automatic temperature control system to avoid damage to the samples
  - electronic compensating circuit for Hall voltage offset compensation
  - RS 232 interface to connect an interface for comfortable data capturing, display and evaluation using a PC
- Three carrier boards with temperature sensors, each equipped with a p- and n-doped germanium crystal and a non-doped Ge-crystal.

Teaching subjects

- Determination of the dependence of the Hall voltage on the sample current, sample temperature and magnetic flux density
- Determination of the charge carrier concentration in doped and non-doped semiconductors
- Difference between extrinsic (p and n) and intrinsic conduction
- Determination of the drift velocity and mobility of charge carriers
- Determination of the band gap of germanium
- Effect of the magnetic field on the conductivity of semiconductors (magnetoresistor)

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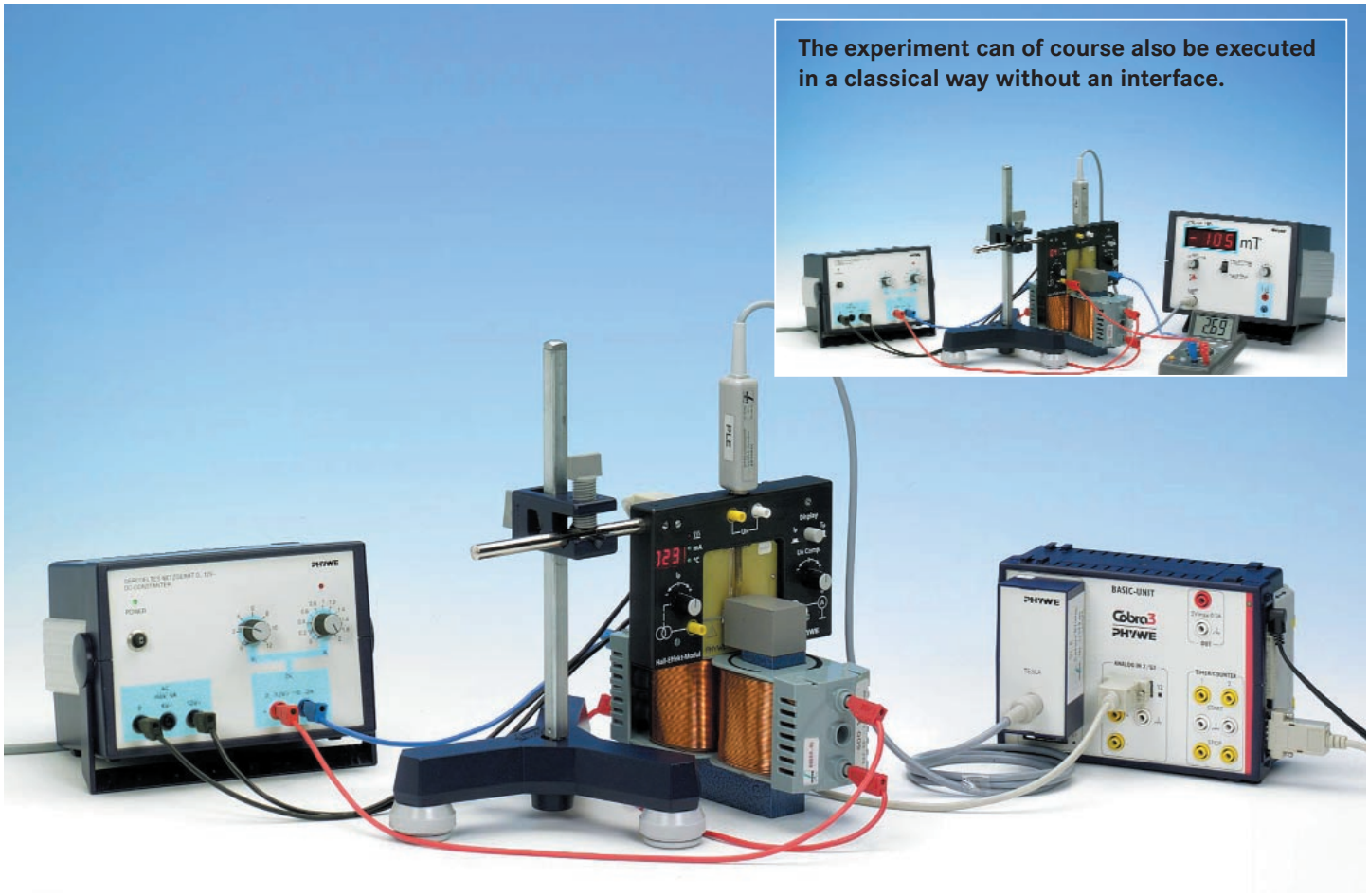
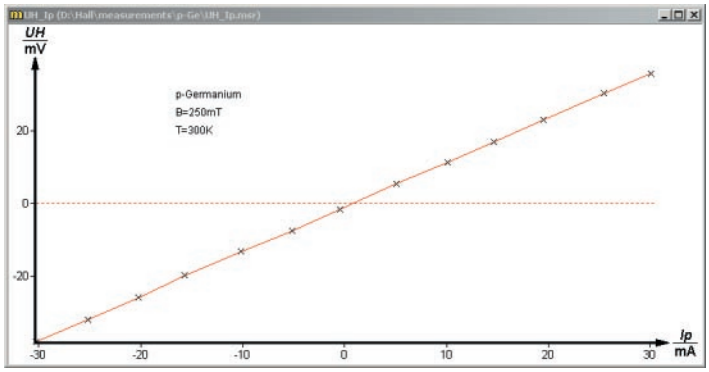
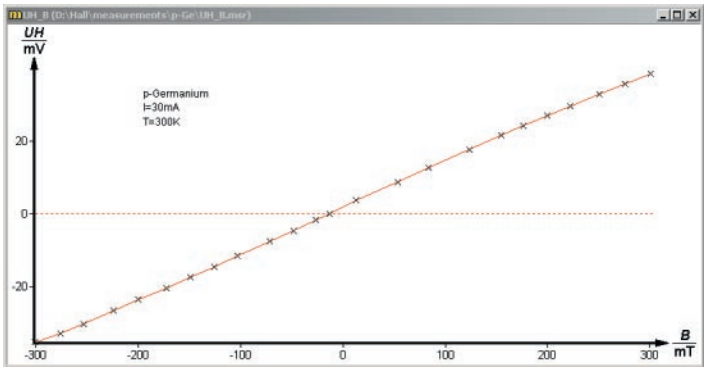


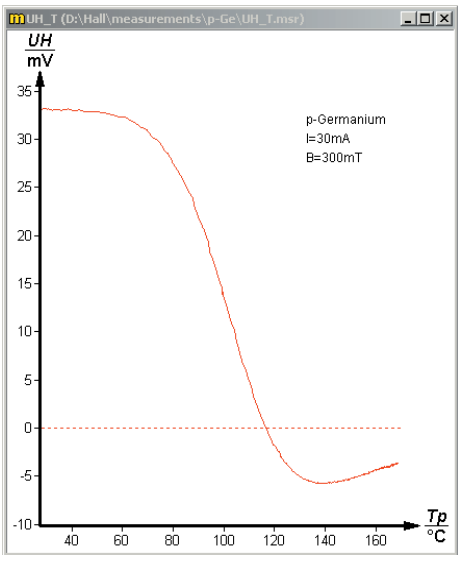
Experiment set-up for studying the Hall effect in p-germanium using a Cobra3 interface.



Hall voltage as a function of the sample current



Hall voltage as a function of the magnetic flux density



Hall voltage as a function of the sample temperature

A. List of material for Hall effect (p- or n-Ge)

Hall effect module	11801.00	1
Hall effect of p-Ge, carrier board	11805.01	1
or		
Hall effect of n-Ge, carrier board	11802.01	1
Power supply 0-12V DC/6VAC,12VAC	13505.93	1
Coil, 600 turns	06514.01	2
Iron core, U-shaped, laminated	06501.00	1
Pole pieces, plane	06489.00	1
Hall probe, tangential	13610.02	1
Tripod base PASS	02002.55	1
Support rod PASS, *l* = 25 cm	02025.55	1
Right angle clamp PASS	02040.55	1
Connecting cables		

B. Without Cobra3 interface

Equipment required in addition to list A		
Teslameter, digital	13610.93	1
Digital multimeter	07134.00	1

C. With Cobra3 interface

Equipment required in addition to list A		
Cobra3 Basic Unit	12150.00	1
Cobra3 power supply 12VDC/2A	12151.99	1
Tesla measuring module	12109.00	1
RS232 data cable	14602.00	2
Hall effect software	14521.61	1

The new experiment system at a glance

Hall effect module	11801.00
Hall effect of p-Ge, carrier board	11805.01
Hall effect of n-Ge, carrier board	11802.01
Intrinsic conductivity of Ge, carrier board	11807.01

Additional PHYWE experiment boards
(not for use with Hall module 11801.00)

Hall effect of copper, carrier board	11803.00
Hall effect of zinc, carrier board (Abnormal Hall effect)	11804.01

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