



# compact system electricity advantages

## compact system advantages

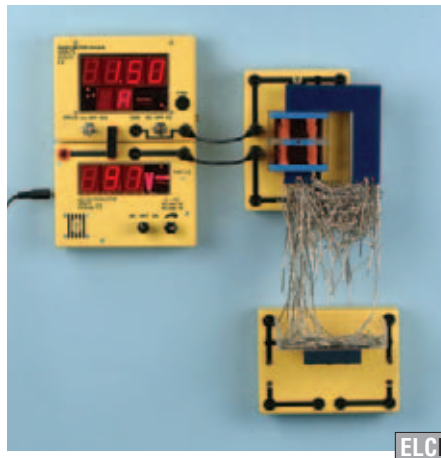
- Magnetic systems for demo and student experiments - no stands needed
- Both demo and student experiments are set up in the same way
- No more than three or four modules (including power supply) are needed for electricity experiments
- Simple, **compact** set-ups because no connecting elements are required, saving much time!
- Special experiments in magnetostatics and electricity, for which a vertical assembly is often required, may now be done by students as well.
- Power supplies and digital measuring instruments with magnetic bases, used for both demo and student experiments, may in most cases be connected to the other apparatus simply by jumper plugs.
- Experiments are guaranteed to succeed, even for non-specialized teachers
- Wide selection of experiments to choose from (see the following pages)
- Clearly structured storage (in sets or blocks)



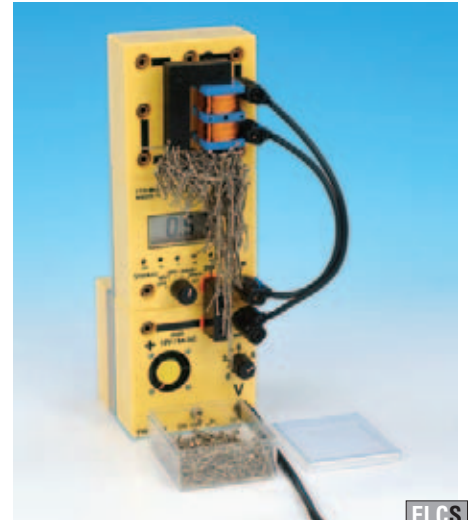
Experiment 010: Amperage



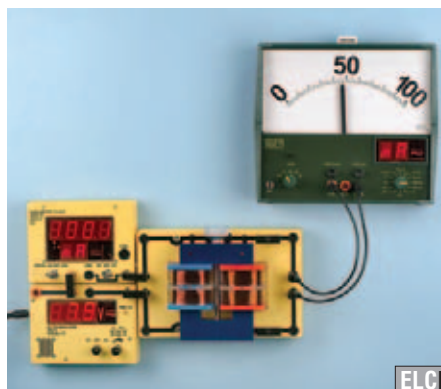
Experiment 010: Amperage



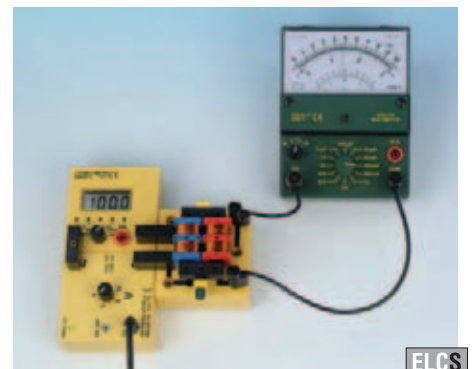
Experiment 066: Magnetic field of a current-carrying coil



Experiment 066: Magnetic field of a current-carrying coil

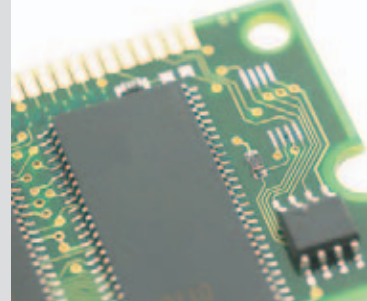


Experiment 135: Transformation of amperage



Experiment 135: Transformation of amperage

# compact system electricity advantages



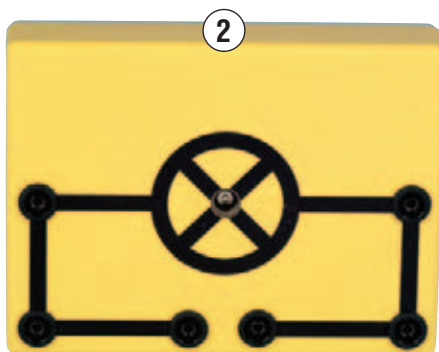
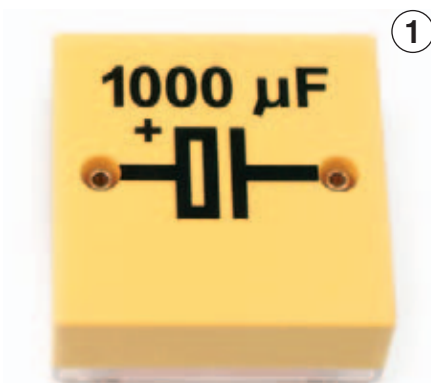
Compact system modules consisting of yellow ABS plastic cases with the **Dimensions: 84x84x39 mm**

Compact system demo consists of additional modules with the **Dimensions: 160x120x45 mm**

These square modules have either a transparent or opaque base plate that overlaps with the upper part of the module. With the aid of built-in plastic clasps, the base plate snaps firmly in place on the upper part, sealing and insulating the module without the use of screws.

The base plates of the larger demo modules are held in place by screws. The 4-mm jackets inset in the top face of the module are suitable for use not only with normal leads having 4-mm bunch-type banana plugs, they may also be used with 4-mm safety leads. With the aid of jumper plugs (P3712-1S/2S with or without terminals), modules may be closely coupled with each other. All plugs are 25 mm apart. The upper surface is labelled with circuitry symbols and connection paths that can be clearly seen even from a distance, when the modules are used in demonstrations on a magnetic panel.

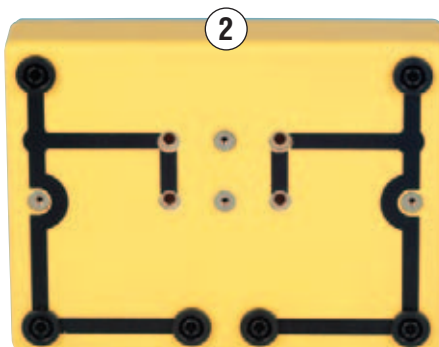
Four neodymium magnets set in the base plate ensure that modules stick well to a steel demo panel or to the assembly platform for student experiments (P3410-1A). Demo modules, such as power supplies, connecting leads, motors or pivot bearings, are fitted with 10 neodymium magnets in the base so that even modules in motion, such as the motor module with a rotating bar magnet during the generator experiment, remained fastened to the magnetic panel.



Magnetic module "compact" demo (MBCD)



MBCD reverse side with 4 neodymium magnets inside



Magnetic module "compact" demo (MBCD)

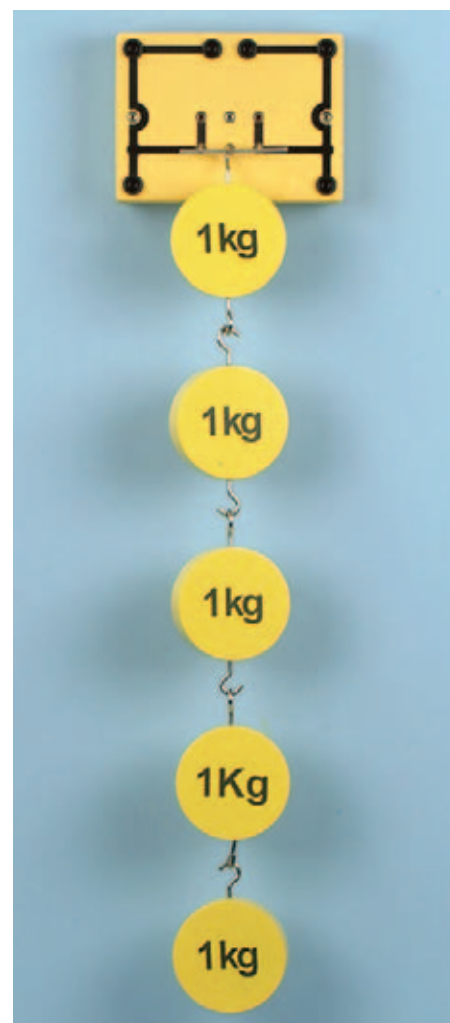


MBCD reverse side with 10 neodymium magnets inside



**P3719-9A Opener for MBCs**

Yellow powder-coated aluminium bracket with two clamping screws for easily opening MBC modules; L=95 mm, W=40 mm



Demonstration of the holding power of a compact system demo module

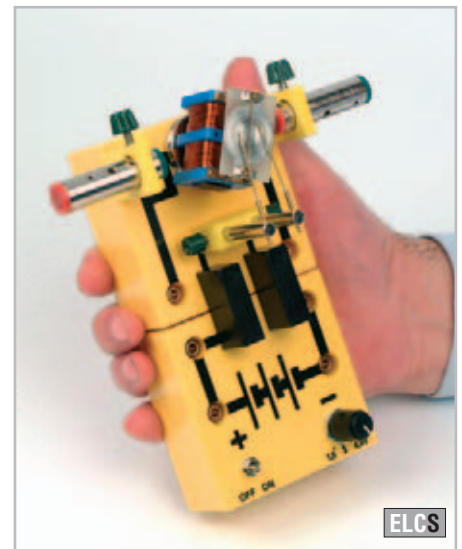
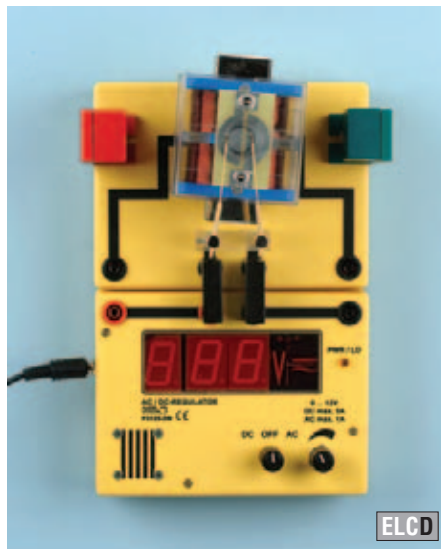
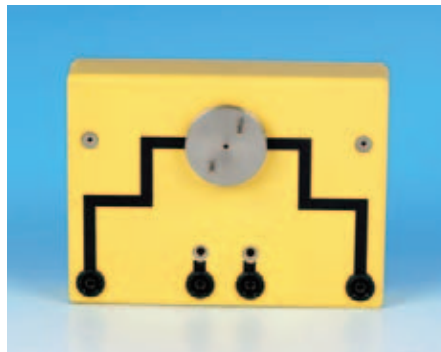


# compact system electricity

Both electromotor module MB200-1M for student experiments and electromotor module DE820-2M for demo experiments may be used either as “active drive motors”, that is, for rotating a coil or bar magnet in generator experiments, or as a “passive rotating bearing” in motor models.

## Patent applied for

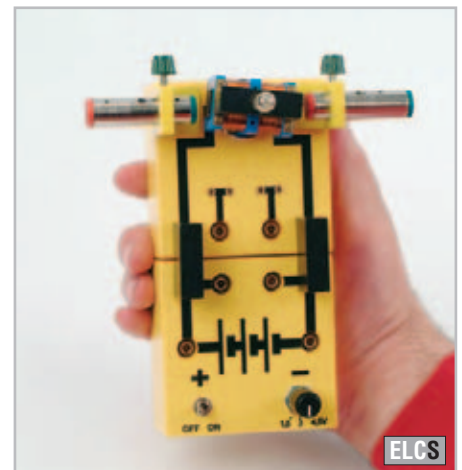
Depending on the position of the two inserted jumper plugs, the module may be used in generator or motor models either as a drive motor (jumper plugs on the outside) or as a rotating bearing (jumper plugs on the inside).



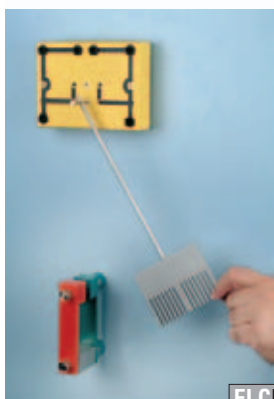
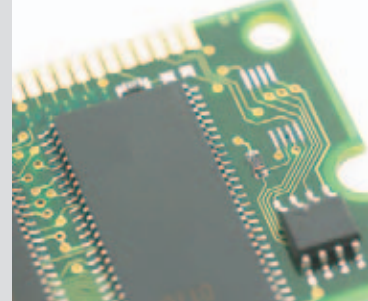
**Experiment 090:** simple electromotor with two-pole rotor  
Electromotor module used as a “passive rotating bearing” for a two-pole rotor



**Experiment 117:**  
Simple AC generator -  
electromotor module used as  
an “active drive motor” for  
the rotor coil



# compact system electricity



ELCD



ELCS

**Experiment 112**  
Eddy current (Waltenhofen) pendulum

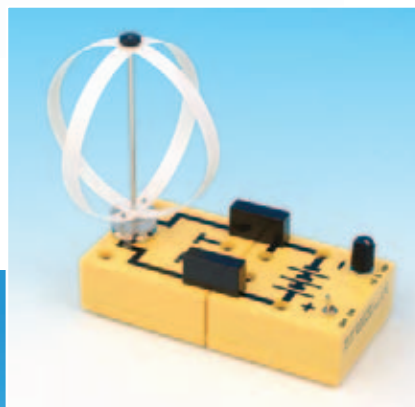
Another example of a student experiment using electromotor module MB200-1M as a “pivot bearing”: the eddy current (Waltenhofen) pendulum. The motor, acting as “passive pivot bearing”, ensures a precise oscillating movement with the pendulum rod.

Multi-functional use of the electromotor module

See also the chapters on mechanics and optics.



In the area of **optics**, for instance, now even students can perform the experiment “recombining spectral colours to yield white” thanks to electromotor MB200-1M and colour disc P3711-3B in combination with either 4.5-V battery module MB201-2B, compact DC regulator MB230-1D or compact solar cell MB210-1S.



Experiments on rotational motion, such as “centrifugal force”, “flattening at the poles during rotation”, “the rotational dynamics paradox”, “the surface of rotating liquids (accelerometer)”, “maintenance of the plane of oscillation during rotation (model of Foucault’s pendulum) and others, have rarely been performed by students up to now because of a lack of suitable apparatus. Yet the motor and power supply modules of the compact system are well-suited for doing such experiments without any danger to students.



# compact system electricity measuring instruments, power supplies



**P3126-2W AC/DC regulator, “compact”**  
With 26-mm LCD display.  
See under P3125-2W on page 261 for further technical details.

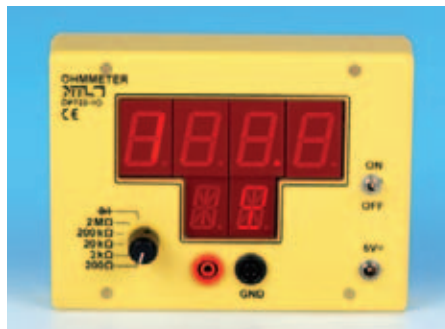


**Example for use:** AC/DC regulator connected to a fixed-voltage transformer as a power supply and a panelmeter set as an ammeter.

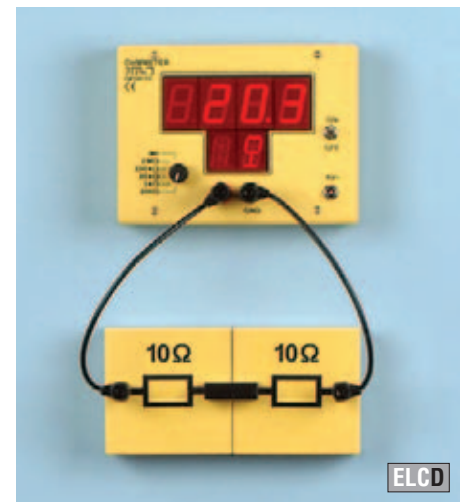


**P3130-2P Fixed voltage transformer**  
**12V DC/5.8A**  
Especially suited for supplying power to the AC/DC regulator P3125-2W (P3126-2W)  
Output voltage: 12 V DC, max. 5.8 A  
Voltage source:  
100 ... 240 V AC/50...60Hz

**DP130-2A Adapter cable**  
Red-black cable with 5.5-mm hollow DC jacks and 4-mm plugs, L=500 mm



**DP722-10 Ohmmeter “compact”**  
Demonstration meter for measuring resistance and for testing diodes. See under DE722-10 on page 273 for technical details.



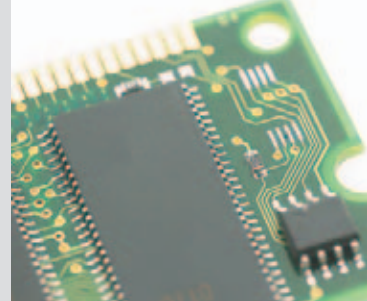
**Experiment:** Demo and student  
(ELCD 024, ELCS 024)  
Ohmic resistors in series circuits



**DP722-1P Panelmeter “compact”**  
Demonstration instrument for measuring current and voltage.  
Display: 3 1/2-digit LED display; digit height 26 mm  
Measuring ranges: 0 ... 200 mA, 0 ... 20 A, 0 ... 40 V AC/DC  
See under DE722-1P on page 273 for further technical details.



# compact system electricity measuring instruments, power supplies



ELCS

### Example for use:

“Compact” DC regulator connected to a mains transformer as a power supply and a panelmeter set as a voltmeter.



### MB230-1A AC-Regulator, MBP module

Magnetic module for generating any AC voltage from 0 to 12 V; output current of 0.5 A max. supplied by means of 4-mm safety jacks; short-circuit protection; input voltage of 12 V DC supplied by means of 12 V mains transformer P3130-1P through a hollow jack  
Dimensions: 84x84x39 mm



### MB230-1D DC regulator “compact”

Magnetic module for generating stabilized, smoothed and continuously variable DC voltage from 0 to 12 V; output current of 5 A max. (dependent on the input-power), supplied by means of 4-mm safety jacks; short-circuit protection; input voltage of 12 V DC supplied by 12 V DC mains transformer P3130-1P or P3130-2P through a hollow jack  
Dimensions: 84x84x39 mm



### MB220-10 Ohmmeter “compact”

Student instrument for measuring resistance, with 3 1/2-digit, 13-mm LCD display. Choice of five measuring ranges: 20, 200 ohms or 2, 20, 200 kOhms  
Accuracy:  $\pm 0.3\%$  (20 ohms - 20 kOhms),  $\pm 3\%$  (at 200 kOhms) Battery-powered module with 9-V battery; automatic shutdown after approx. 15 minutes.  
Dimensions: 84x84x39 mm



### P3130-1P Mains transformer 12V/2A

Transformer with electronic overload protection, especially designed for use with DC regulator MB230-1D, AC regulator MB230-1A, function generator MB250-3F and 12V/20W combination experiment lamp SE using adapter cable P3130-2K  
Output voltage: 12 V DC, max. 2 A, supplied by 5.5 or 2.5-mm hollow DC jacks  
Voltage source: 100...240V/50...60 Hz



### MB220-1L Digital measurement device, “compact”

Automatic multimeter with 3 1/2-digit, 13-mm LCD display; choice of seven measuring ranges: 40 V DC/AC, 200 mA DC/AC, 20 A DC/AC, 20 kOhm; better than 1% accuracy; overload protection for all ranges up to 40 V; battery-powered module with 9 V cell; automatic shutdown after approx. 20 minutes.  
Dimensions: 84x84x39 mm



# compact system electricity accessories



## DE710-00 Universal multimeter "inno", magnetic

Durable remote-control measuring instrument with three insertable double scales

Arc length of scale: approx. 200 mm

Digit height: 26 mm

LED display indicates measuring units and type of current

Measuring ranges:

1 mV, 1 ... 30 V DC

1 ... 30 V AC

100  $\mu$ A ... 10 A AC and DC amperage

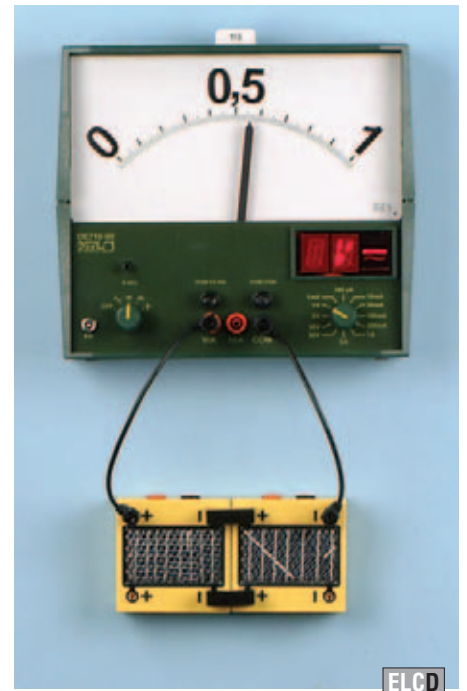
Dimensions: approx. 260x230x60 mm

Weight: approx. 2.7 kg

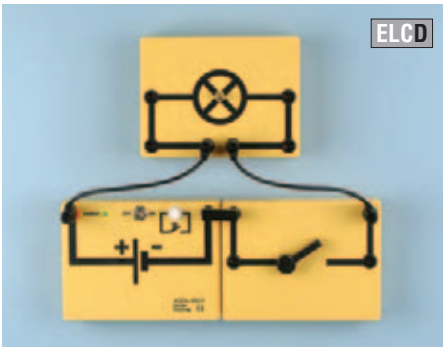
## DE710-2S Insertable double scale, zero at midpoint, 5/15

White metal scale for insertion in "inno" universal multimeter DE710-00 with zero set to midpoint

Scale ranges: -5...0...+5 / -15...0...+15



ELCD



ELCD



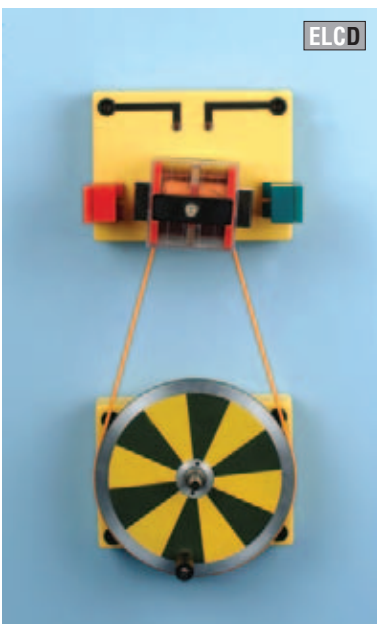
## P3121-2B MBCD rechargeable battery, 6 V/7Ah

The 6V/7 Ah "compact" rechargeable battery delivers 6 V of fixed direct current supplied through 4-mm safety jacks controlled by a toggle switch. When doing high-current experiments, the output circuit can be closed for a maximum of 3 seconds using a push button.

LED indicator: displays operating mode

Case: yellow ABS plastic.

Dimensions: approx. 160x120x45 mm



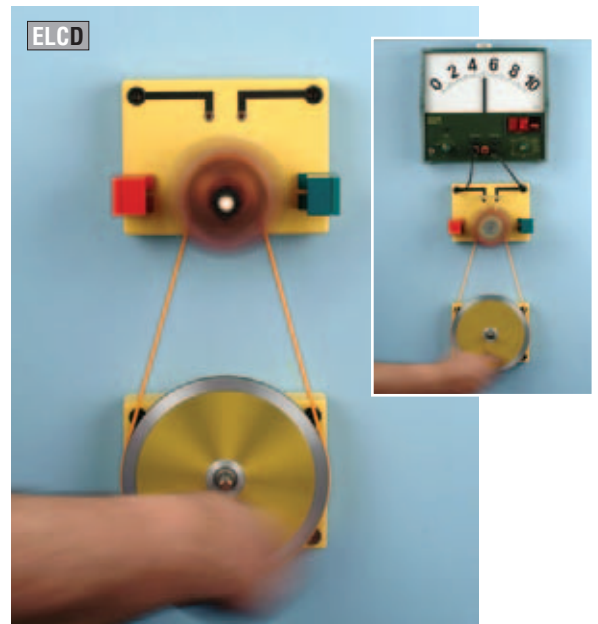
ELCD



## DE820-2K MBCD pivot bearing

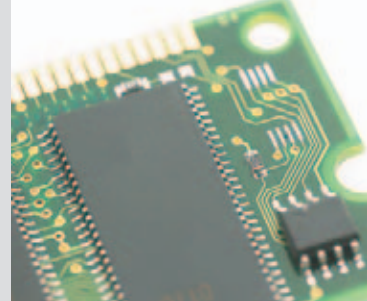
Rotating disc mounted on double ball bearing; for fixed or rotatable mounting of plug-in coils DP911-2R and DP911-3R and bar magnet DP410-1R. Two 4-mm jacks for electrically mounting brush holder DP711-1N and two 4-mm safety jacks.

Dimensions: 160x120x45 mm



ELCD

# compact system electricity accessories



ELCD  
ELCS

**Experiment:** How a relay works



### MB250-3F Function generator "compact"

Output signals: sine, triangle and square  
 Frequency range: 0.1 Hz ... 50 kHz, continuously variable  
 Output voltage: 4 V<sub>eff</sub>/1 A<sub>eff</sub> (4 watts at 4 ohms) from two 4-mm safety jacks  
 Input voltage: 12 V DC through hollow jack, supplied by mains transformer P3130-1P (12V/2A) or 12 V DC/5.8 A fixed-voltage transformer P3130-2P  
 Dimensions: 84x84x39 mm



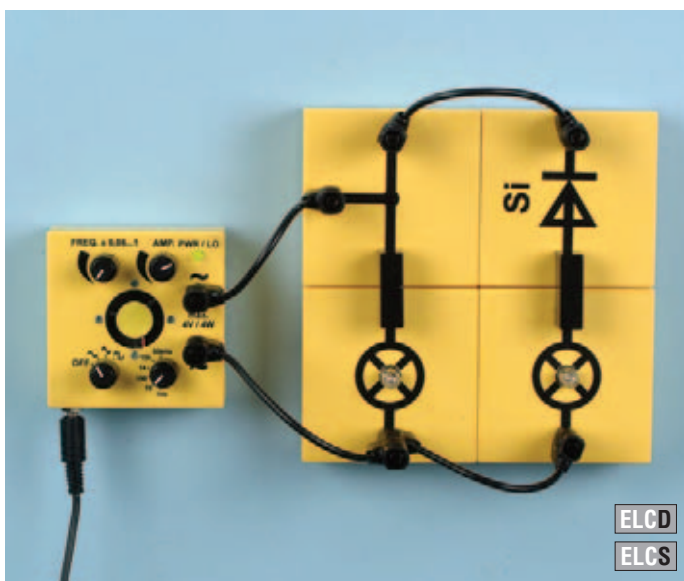
### MB270-2V LF amplifier "compact"

Used in amplifying weak audio signals for measurement purposes or for driving a loudspeaker.  
 Amplification factor: 1, 3, 10, 30, 100, 300, 1,000, 3,000, 10,000 times  
 Accuracy: better than 20 %  
 Frequency range: 25 Hz ... 70 kHz  
 Output voltage: 2.8 V<sub>eff</sub> (2.1 V<sub>eff</sub> rms at 4 ohms); two 4-mm output jacks, short-circuit protection  
 Input voltage: 2.8 V<sub>eff</sub> (max. 30 V<sub>eff</sub>)  
 Power supply: 12 V DC through hollow jack, supplied by mains transformer P3130-1P (12V/2A) or 12 V DC/5.8 A fixed-voltage transformer P3130-2P  
 Dimensions: 84x84x39 mm

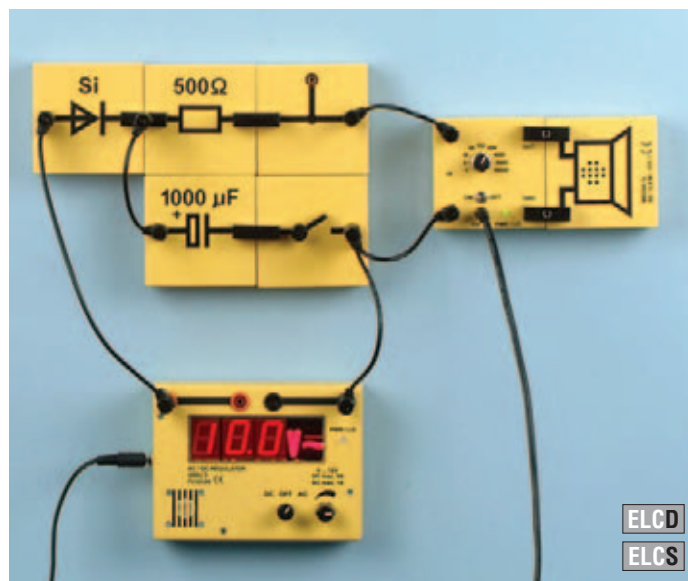


### P3710-4R MBC Relay

Magnetic "compact" module in yellow ABS plastic; built-in coil with iron core serves as contactor; max. operating voltage 6 V; max. switching voltage 42 V  
 Dimensions: 84x84x39 mm



**Experiment:** Demo and student (EOCD 042,EOCS 042)  
 Half-wave rectification



**Experiment:** Demo and student (EOCD 043,EOCS 043)  
 Smoothing rectified voltage



# compact system electricity assembly platform demo



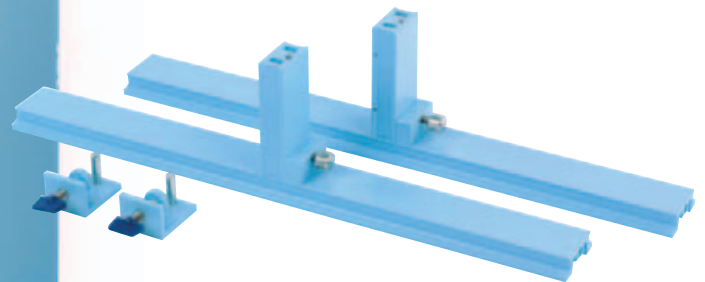
1 Front side 2 Reverse side

## DS602-2A Assembly panel

Portable, multi-functional steel panel for freely positioning magnetic compact system modules.

Dimensions: 750 x 750 mm

For details see also the section on support stands and assembly material as well as the versatile applications in mechanics, thermodynamics and optics.



## DS602-3A Support bases, vertical, pair

Length: 500 mm

## DS602-1B Screw clamps, pair

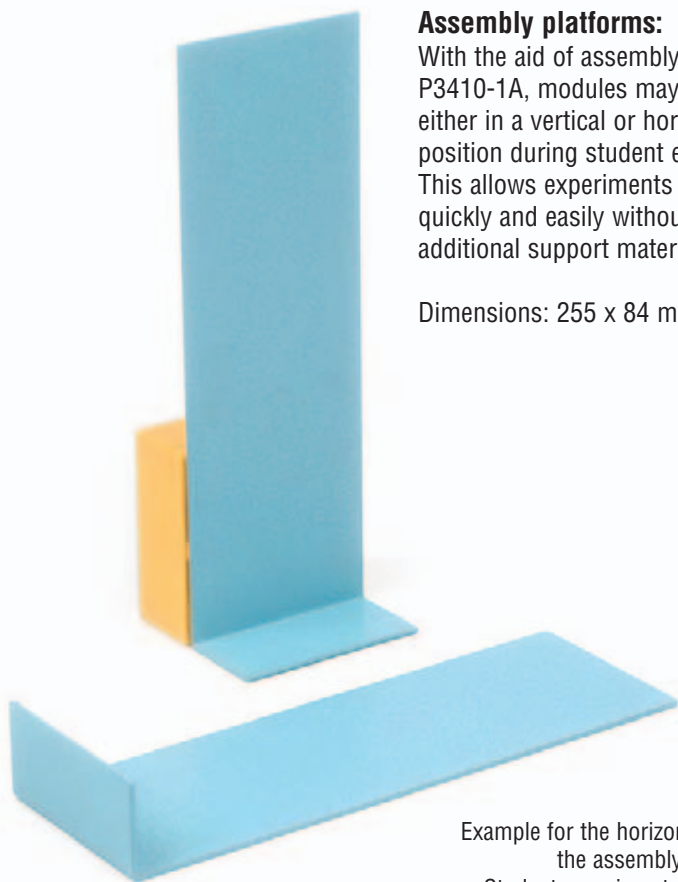
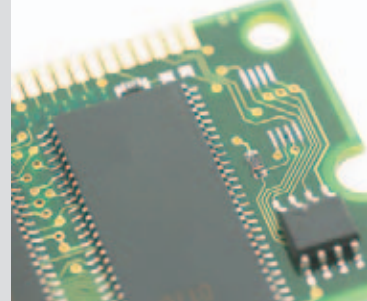


Example for the use of the assembly panel.  
Demo experiment: ELCD 050  
Model of a bimetallic fire alarm



Example for the use of the assembly panel.  
Demo experiment: ELCD 120  
Revolving field generator with electromagnetic rotor

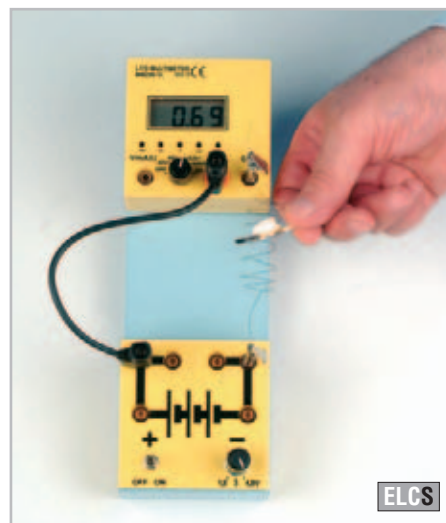
# compact system electricity assembly platform student



## Assembly platforms:

With the aid of assembly platform P3410-1A, modules may be mounted either in a vertical or horizontal position during student experiments. This allows experiments to be set up quickly and easily without any additional support material.

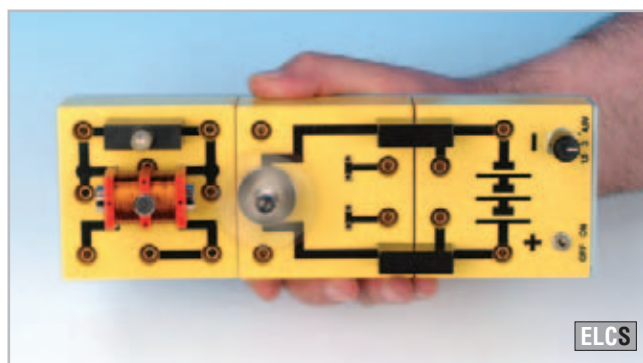
Dimensions: 255 x 84 mm



Example for the horizontal use of the assembly platform.

Student experiment: ELCS 022  
Iron wire is a PTC conductor

Example for the horizontal use of the assembly platform.  
Student experiment: ELCS 116  
Revolving field generator with rotating permanent magnet



Example for the vertical use of the assembly platform.  
Student experiment: ELCS 047  
Model of a hot-wire instrument



Like poles

Unlike poles

Example for the vertical use of the assembly platform.  
Student experiment: MACS 007  
Magnetic force