LEYBOLD

PHYSICS EXPERIMENTS SECONDARY

LD DIDACTIC

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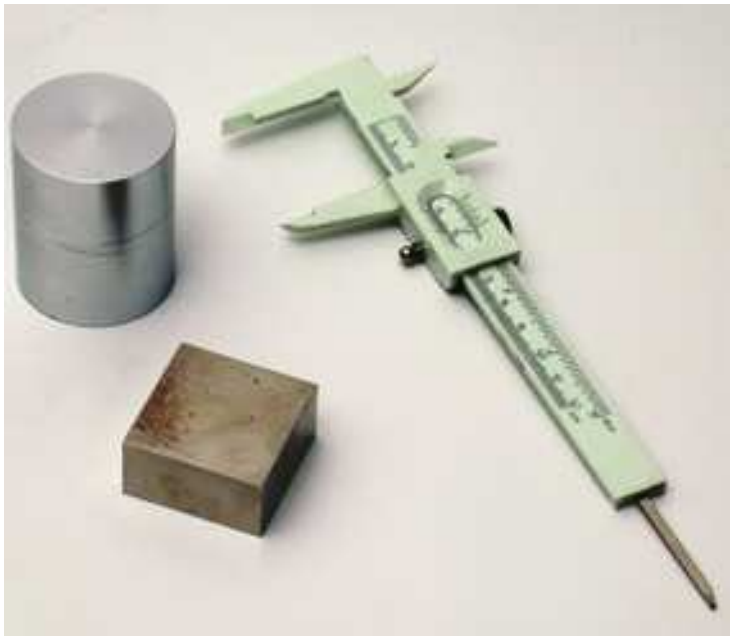
D1.1.1 Volume
D1.1.1.1 Determining the volume of regular solid bodies



Measuring the edge length of a rectangular parallelepiped and determining its volume.

Measuring the diameter and the height of a cylinder and determining its volume.

consisting of:

1	59033	Set of 2 gauge blocks
1	31153	Vernier callipers

D1.1.1 Volume
D1.1.1.2 Determining the volume of liquids

Determining the volume of a liquid by means of different graduated cylinders.

consisting of:

1	665754	Measuring cylinder 100 ml, with plastic base
1	665755	Measuring cylinder 250 ml, with plastic base
1	665756	Measuring cylinder 500 ml, with plastic base
1	665757	Measuring cylinder 1000 ml, with plastic base
1	604212	Measuring beaker, 2000 ml
1	30942	Colouring, red, 10 g

D1.1.1 Volume
D1.1.1.3 Determining the volume of a liquid

Determining the volume of a drop of water.

consisting of:

1	665073	Dropper funnel, 75 ml, ST 29
1	665751	Measuring cylinder 10 ml, with plastic base
1	30002	Stand base, V-shaped, small
1	30043	Stand rod 75 cm, 12 mm Ø
2	30101	Leybold multiclamp
2	666555	Universal clamp 0...80 mm
1	604211	Measuring beaker, 1000 ml
1	30942	Colouring, red, 10 g

D1.1.1 Volume
D1.1.1.4 Determining the volume of irregular solid bodies

Determining the volume of irregular solid bodies by means of the difference method.

consisting of:

1	68310	Weight with hook 0.1 kg
1	68311	Weight with hook 0.2 kg
1	31538	Weight with hook 0.5 kg
1	665757	Measuring cylinder 1000 ml, with plastic base
1	30002	Stand base, V-shaped, small
1	666609	Stand tube 45 cm x 10 mm Ø
1	666607	Stand tube, 400 mm, 13 mm diam.
1	666615	Universal bosshead
1	30108	Clamp with hook
1	604211	Measuring beaker, 1000 ml
1	30942	Colouring, red, 10 g
1	30948	Fishing line

D1.1.1 Volume
D1.1.1.5 Determining the volume of irregular solid bodies

Determining the volume of irregular solid bodies by means of the overflow method.

consisting of:

1	68310	Weight with hook 0.1 kg
1	68311	Weight with hook 0.2 kg
1	31538	Weight with hook 0.5 kg
1	36204	Overflow vessel
1	59008	Measuring cylinder 100 ml
1	30002	Stand base, V-shaped, small
1	666609	Stand tube 45 cm x 10 mm Ø
1	666607	Stand tube, 400 mm, 13 mm diam.
1	666615	Universal bosshead
1	30108	Clamp with hook
1	604211	Measuring beaker, 1000 ml
1	30942	Colouring, red, 10 g
1	30948	Fishing line

D1.1.1 Volume
D1.1.1.6 Determining the volume of air

Determining the volume of air by filling an evacuated sphere with water.

consisting of:

1	37907	Sphere with 2 stopcocks, glass, 1 l
1	667072	Support ring for round flask, 250 ml, cork
1	37558	Hand vacuum pump
1	604211	Measuring beaker, 1000 ml
1	665757	Measuring cylinder 1000 ml, with plastic base
1	604432	Silicone tubing, 6 mm Ø
1	6753410	Water, pure, 5 l

D1.1.2 Mass

D1.1.2.1.a Determining the mass of a body by means of a balance - Measuring with a platform balance

Determining the mass of a body by weighing with a platform balance.

consisting of:

1	31522	Laboratory balance
1	31534	Set of weights 1 g to 1000 g
1	604211	Measuring beaker, 1000 ml
1	59033	Set of 2 gauge blocks
1	68653	Round tin with cap

D1.1.2 Mass
D1.1.2.1.b Determining the mass of a body by means of a balance - Measuring with a beam balance

Determining the mass of a body by weighing with a beam balance.

consisting of:

1	340831	Lever 37.5 cm
2	34247	Balance pan with stirrup
1	340811	Plug-in axle
1	31531	Set of weights 10 mg to 200 g
1	59033	Set of 2 gauge blocks
1	68653	Round tin with cap
1	59008	Measuring cylinder 100 ml
2	30121	Stand base MF
2	30126	Stand rod 25 cm, 10 mm Ø
1	30125	Support block

D1.1.2 Mass
D1.1.2.1.c Determining the mass of a body by means of a balance - Measuring with a single-pan suspension balance

Determining the mass of a body by weighing with a single-pan suspension balance.

consisting of:

1	31523	Single-pan suspension balance 610 Tara
1	604211	Measuring beaker, 1000 ml
1	59033	Set of 2 gauge blocks
1	68653	Round tin with cap

D1.1.3 Density
D1.1.3.1 Relation between the mass and the volume of a body

Investigating the relation between the mass and the volume in the case of bodies of equal volume and different substances.

consisting of:

1	666100	Set of 8 cubes
1	340831	Lever 37.5 cm
2	34247	Balance pan with stirrup
1	340811	Plug-in axle
1	31153	Vernier callipers
2	30121	Stand base MF
1	30126	Stand rod 25 cm, 10 mm Ø
1	30127	Stand rod 50 cm, 10 mm Ø

D1.1.3 Density
D1.1.3.2 Relation between the mass and the volume of a body

Investigating the relation between the mass and the volume in the case of bodies of equal mass and different substances.

consisting of:

1	36228	Bodies of equal mass, Set of 3
1	315234	Electronic balance MAULtronic S
1	31153	Vernier callipers

D1.1.3 Density
D1.1.3.3.a Determining the density of a solid body - Set of 8 cubes

Determining the densities of different cubes from the masses and volumes, and determining the substances the cubes are made of.

consisting of:

1	666100	Set of 8 cubes
1	31523	Single-pan suspension balance 610 Tara
1	31153	Vernier callipers

D1.1.3 Density
D1.1.3.3.b Determining the density of a solid body - Set of 2 gauge blocks

Determining the densities of different solid bodies.
Determining the substances the bodies are made of.

consisting of:

1	59033	Set of 2 gauge blocks
1	31523	Single-pan suspension balance 610 Tara
1	31153	Vernier callipers

D1.1.3 Density
D1.1.3.4.a Determining the density of a liquid - Determining mass and volume

Determining the densities of different liquids from their mass and volume.

consisting of:

1	6735720	Sodium chloride, 1 kg
1	6709990	Methylated spirits, 1 l
3	664130	Beaker, Boro 3.3, 250 ml, squat
3	665754	Measuring cylinder 100 ml, with plastic base
1	31523	Single-pan suspension balance 610 Tara
1	666966	Spoon-ended spatula, PP, 180 mm

D1.1.3 Density
D1.1.3.4.b Determining the density of a liquid - Measurement with an areometer

Measuring the density of a liquid by means of an areometer.

consisting of:

1	6709990	Methylated spirits, 1 l
1	6735720	Sodium chloride, 1 kg
1	664215	Self-supporting cylinder, 400 ml, 400 x 40 mm Ø
1	604211	Measuring beaker, 1000 ml
1	666966	Spoon-ended spatula, PP, 180 mm
1	666102	Areometers, set of 7, 0.6 ... 2.0 g/ml

D1.1.3 Density
D1.1.3.5 Determining the density of air

Determining the mass and volume of air.

Calculating the density of air.

consisting of:

1	37907	Sphere with 2 stopcocks, glass, 1 l
1	667072	Support ring for round flask, 250 ml, cork
1	37558	Hand vacuum pump
1	31523	Single-pan suspension balance 610 Tara
1	604211	Measuring beaker, 1000 ml
1	665757	Measuring cylinder 1000 ml, with plastic base
1	604432	Silicone tubing, 6 mm Ø
1	6753410	Water, pure, 5 l

D1.2.1 Forces and their effects
D1.2.1.2.a Hooke's law - Stand setup

Investigating the relation between the force acting on a helical spring and the spring elongation.

consisting of:

1	35212	Helical spring 32 N/m
1	68310	Weight with hook 0.1 kg
1	68311	Weight with hook 0.2 kg
1	31538	Weight with hook 0.5 kg
1	31539	Weight with hook 1 kg
1	31102	Metal rule, 1 m
1	30129	Pointer, pair
1	30001	Stand base, V-shaped, large
1	30044	Stand rod 100 cm, 12 mm Ø
1	30108	Clamp with hook

D1.2.1 Forces and their effects
D1.2.1.4.a Setting up a dynamometer - Stand setup

Calibrating a helical spring as a dynamometer.

consisting of:

1	35207	Helical spring 10 N/m
8	34263	Weight 50 g
1	31102	Metal rule, 1 m
1	30002	Stand base, V-shaped, small
1	30011	Saddle base
1	30044	Stand rod 100 cm, 12 mm Ø
1	30108	Clamp with hook
1	30945	Universal pencil

D1.2.1 Forces and their effects
D1.2.1.5.a Weight and mass - Universal Measuring Instrument Physics

Investigation of relationship between weight and mass.

consisting of:

1	524042	Force sensor S, ±50 N
1	531835	Universal Measuring Instrument Physics
1	315450	Slotted mass hanger, 50 g, large
1	315454	Slotted weight, 50 g, polished
1	30002	Stand base, V-shaped, small
1	30041	Stand rod 25 cm, 12 mm Ø
1	30101	Leybold multiclamp

D1.2.3 Force-transforming apparatus
D1.2.3.3.a Forces and paths at a fixed pulley - Stand setup

Investigating the relation between load and force.

Investigating the relation between the load path and the force path.

consisting of:

1	340921	Pulley Ø 100 mm, plug-in123
1	31538	Weight with hook 0.5 kg
1	68311	Weight with hook 0.2 kg
1	68310	Weight with hook 0.1 kg
1	314161	Precision dynamometer, 5.0 N
1	46097	Metal rule, 0.5 m
2	30129	Pointer, pair
3	30121	Stand base MF
1	608052	Stand tube, 1000 mm x 10 mm Ø
1	608051	Stand tube, 750 mm x 10 mm Ø
1	666609	Stand tube 45 cm x 10 mm Ø
1	30126	Stand rod 25 cm, 10 mm Ø
2	30125	Support block
1	31404	Support clip, for plugging in
1	30950	Demonstration line, l = 20 m

D1.2.3 Force-transforming apparatus
D1.2.3.4.a Forces and paths at the loose pulley - Stand setup

Investigating the relation between load and force.

Investigating the relation between the load path and the force path.

consisting of:

1	340921	Pulley Ø 100 mm, plug-in
1	34087	Load hook
1	31538	Weight with hook 0.5 kg
1	68311	Weight with hook 0.2 kg
1	68310	Weight with hook 0.1 kg
1	314161	Precision dynamometer, 5.0 N
1	46097	Metal rule, 0.5 m
2	30129	Pointer, pair
3	30121	Stand base MF
2	608052	Stand tube, 1000 mm x 10 mm Ø
1	608051	Stand tube, 750 mm x 10 mm Ø
1	30127	Stand rod 50 cm, 10 mm Ø
2	30125	Support block
2	31404	Support clip, for plugging in
1	30950	Demonstration line, l = 20 m

D1.2.3 Force-transforming apparatus
D1.2.3.5.a Forces and paths at a block and tackle - Stand setup

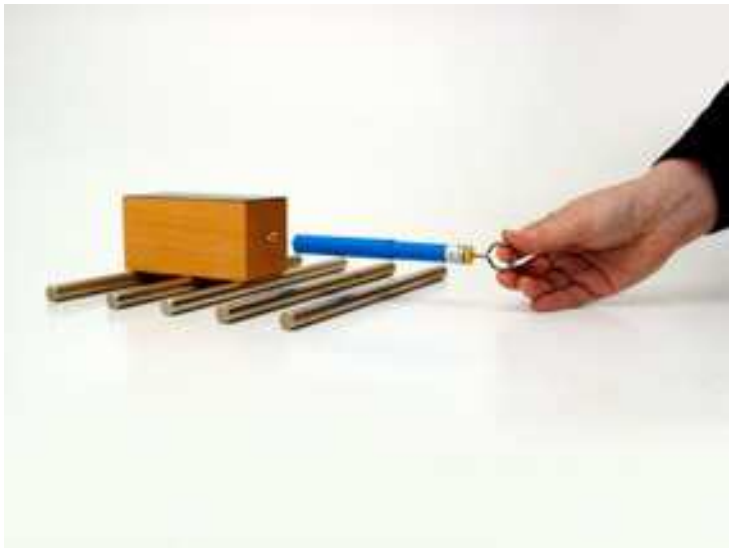
Investigating the relation between load and force.

Investigating the relation between the load path and the force path.

consisting of:

2	340921	Pulley Ø 100 mm, plug-in
2	340911	Pulley Ø 50 mm, plug-in
2	340930	Pulley bridge
1	34087	Load hook
2	31404	Support clip, for plugging in
1	340811	Plug-in axle
1	31539	Weight with hook 1 kg
1	31538	Weight with hook 0.5 kg
1	68311	Weight with hook 0.2 kg
1	314161	Precision dynamometer, 5.0 N
1	46097	Metal rule, 0.5 m
2	30129	Pointer, pair
3	30121	Stand base MF
1	608052	Stand tube, 1000 mm x 10 mm Ø
2	608051	Stand tube, 750 mm x 10 mm Ø
1	30127	Stand rod 50 cm, 10 mm Ø
2	30125	Support block
1	30950	Demonstration line, l = 20 m

D1.2.4 Friction
D1.2.4.1 Kinds of friction



Demonstration of different kinds of friction and comparison of the occurring frictional forces.

consisting of:

1	34210	Wooden blocks for friction experiments, pair
1	314141	Precision dynamometer, 1 N
1	314111	Precision dynamometer, 0.1 N
5	30126	Stand rod 25 cm, 10 mm Ø

D1.2.4 Friction
D1.2.4.2 Sliding friction force

Investigating the dependence of the sliding friction force on the gravitational force of the body.

Investigating the dependence of the sliding friction force on the surface condition of the body.

Investigating the dependence of the sliding friction force on the size of the bearing area of the body.

consisting of:

1	34210	Wooden blocks for friction experiments, pair
3	68311	Weight with hook 0.2 kg
1	314141	Precision dynamometer, 1 N
1	314151	Precision dynamometer, 2.0 N

D1.3.1 Uniform motion
D1.3.1.1 Velocity - Trolley with electric drive

Measuring the time *t* required by a body for covering a given path *s*.

Deriving statements related to the velocity of the body.

consisting of:

1	33707	Trolley with electric drive
1	313052	Table stop-clock 0-60 1/100
1	31178	Tape measure
2	30126	Stand rod 25 cm, 10 mm Ø
2	30125	Support block
1	30129	Pointer, pair
2	68544	Battery 1.5 V (AA)

D1.3.1 Uniform motion
D1.3.1.2 Relation of path, time and velocity

Measure the time *t* a body requires to cover a distance *s*.

Calculate velocities of a body.

consisting of:

1	33707	Trolley with electric drive
2	68544	Battery 1.5 V (AA)
1	313052	Table stop-clock 0-60 1/100
1	31178	Tape measure
4	30126	Stand rod 25 cm, 10 mm Ø
4	30125	Support block
2	30129	Pointer, pair

D1.3.1 Uniform motion
D1.3.1.3.a Relation between path, time and velocity - Track and electronic stopclock

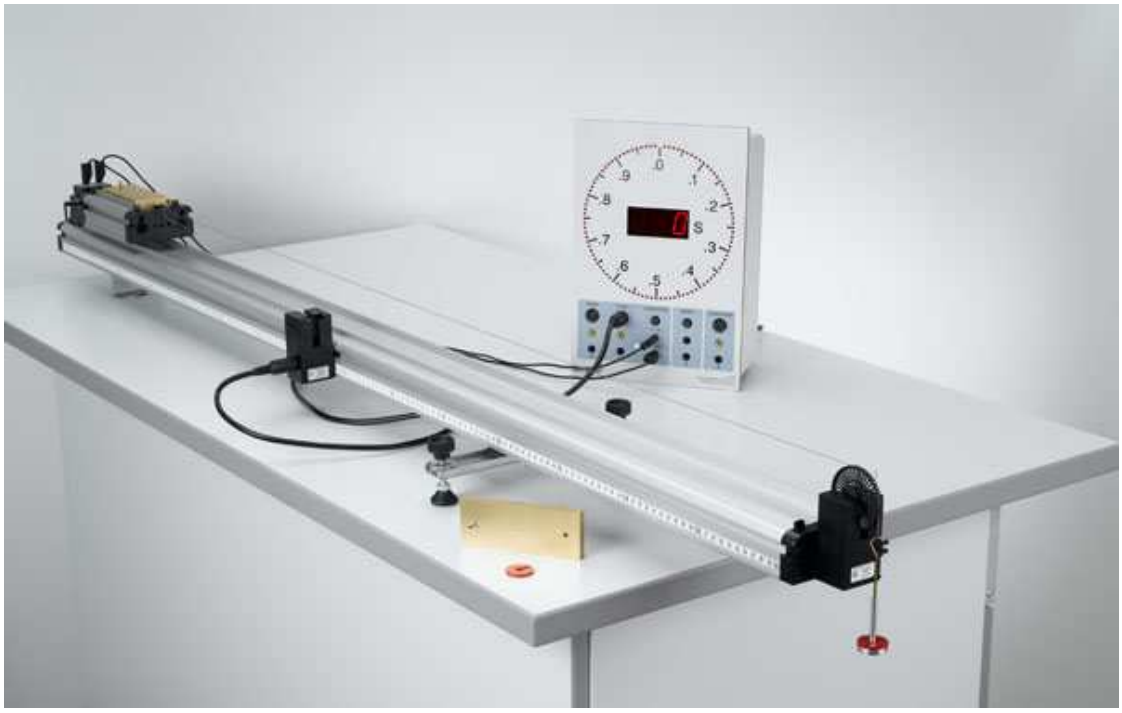
Measuring the time *t* required by a body for covering a given path *s*.

Calculating the velocity of the body.

consisting of:

1	337130	Track, 1.5 m
1	337110	Trolley
1	337463	Holder for combination spoked wheel
1	337464	Combination spoked wheel
2	337462	Combination light barrier
1	315411	Slotted mass hanger 10 g
2	315417	Slotted weight 10 g
2	31404	Support clip, for plugging in
1	313033	Electronic time clock P
2	50116	Multi-core cable, 6-pole, 1.5 m
1	30948	Fishing line

D1.3.2 Uniformly accelerated motion
D1.3.2.1.a Relation between path and time - Track and electronic stopclock



Measuring the time *t* required by a body for covering a path *s*.

Representing the relation between path and time in an s-t-diagram.

consisting of:

1	337130	Track, 1.5 m
1	337110	Trolley
1	337114	Additional weights, pair
1	68341	Holding magnet
1	337463	Holder for combination spoked wheel
1	337464	Combination spoked wheel
1	337462	Combination light barrier
1	315411	Slotted mass hanger 10 g
2	315417	Slotted weight 10 g
1	313033	Electronic time clock P
1	501451	Connecting lead 19 A, 50 cm, black, pair
1	50116	Multi-core cable, 6-pole, 1.5 m
1	30948	Fishing line

D1.3.3 Free fall
D1.3.3.1 Influence of aerodynamic drag on the falling

Demonstrating the falling of different bodies in air and vacuum.

consisting of:

1	379001	Guinea-and-feather apparatus
1	37873	Vacuum pump S 1.5
1	378031	Hose nozzle DN 16 KF
1	667186	Vacuum rubber tubing, 8 mm Ø

D1.3.3 Free fall
D1.3.3.2.a Determining the acceleration of gravity - Baffle plate and electronic stopclock

Measuring the time of fall *t* of a body for different distances of fall *s*.

Calculating the acceleration of gravity *g*.

consisting of:

1	33621	Holding magnet with clamp
1	33623	Contact plate, large
1	313033	Electronic time clock P
1	31102	Metal rule, 1 m
1	30001	Stand base, V-shaped, large
1	30046	Stand rod 150 cm, 12 mm Ø
1	30041	Stand rod 25 cm, 12 mm Ø
2	30101	Leybold multiclamp
2	50135	Connecting lead 32 A, 200 cm, red
2	50138	Connecting lead 32 A, 200 cm, black
1	667019	Felt tip pen, black, medium

D1.3.3 Free fall
D1.3.3.2.b Determining the acceleration of gravity - Light barrier and electronic stopclock

Measuring the time of fall *t* of a body for different distances of fall *s.*

Calculating the acceleration of gravity *g.*

consisting of:

1	33621	Holding magnet with clamp
1	35254	Steel ball 16 mm
1	33746	Forked light barrier
1	313033	Electronic time clock P
1	31102	Metal rule, 1 m
1	30001	Stand base, V-shaped, large
1	30046	Stand rod 150 cm, 12 mm Ø
1	30041	Stand rod 25 cm, 12 mm Ø
1	30101	Leybold multiclamp
2	50138	Connecting lead 32 A, 200 cm, black
1	50116	Multi-core cable, 6-pole, 1.5 m
1	667019	Felt tip pen, black, medium

D1.3.4 Inertia and Newton's law
D1.3.4.2.a Relation between acceleration, force and mass - Track and electronic time clock

Measuring the time *t* required by a body of mass m_1 or m_2, respectively, to cover a certain path *s* if the force *F* acting on the body is changed.

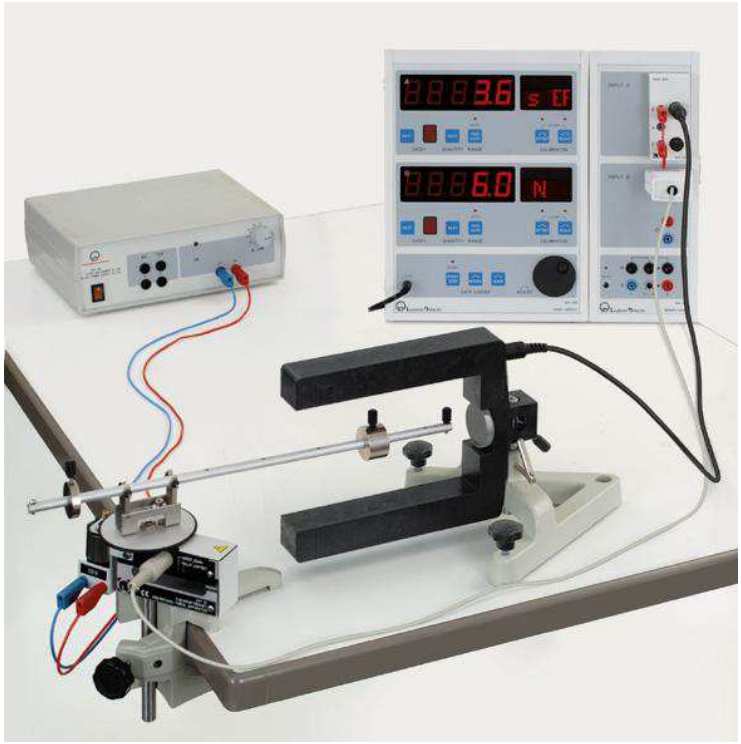
Calculating the acceleration *a* of the body.

Representing the relation between acceleration and force in an *a*-*F*-diagram.

consisting of:

1	337130	Track, 1.5 m
1	337110	Trolley
1	337114	Additional weights, pair
1	68341	Holding magnet
1	337463	Holder for combination spoked wheel
1	337464	Combination spoked wheel
1	337462	Combination light barrier
1	315411	Slotted mass hanger 10 g
4	315417	Slotted weight 10 g
1	313033	Electronic time clock P
1	501451	Connecting lead 19 A, 50 cm, black, pair
1	50116	Multi-core cable, 6-pole, 1.5 m
1	30948	Fishing line
1	340811	Plug-in axle

D1.3.5 Circular motion and rotation
D1.3.5.4 Dependence of the centrifugal force on the mass of the test body

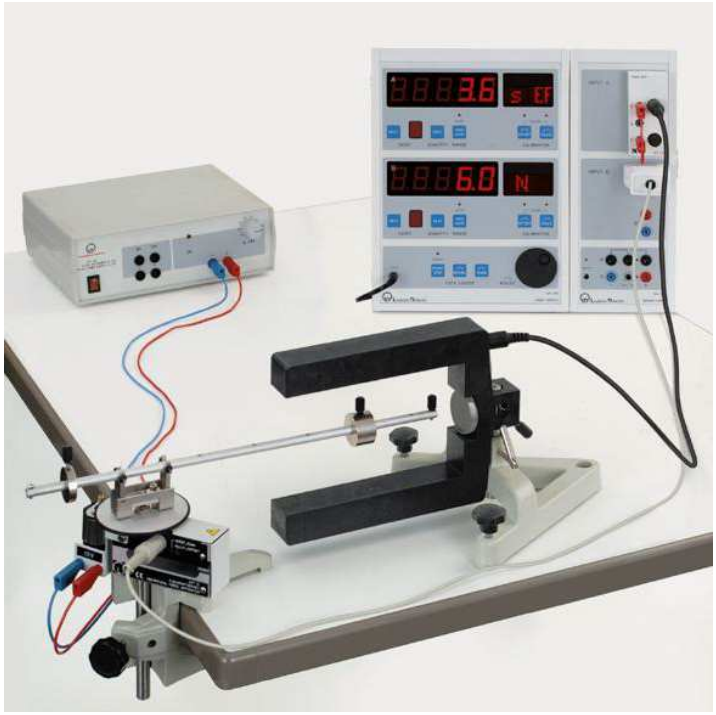


Investigating the relation between the centrifugal force and the mass of the rotating body.

consisting of:

1	524068	Centrifugal force apparatus S
1	33746	Forked light barrier
1	524034	Timer box
1	50116	Multi-core cable, 6-pole, 1.5 m
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
	alternatively the following device can also be used:	
1	531835	Universal Measuring Instrument Physics
1	50146	Connecting lead 19 A, 100 cm, red/blue, pair
1	50123	Connecting lead 32 A, 25 cm, black
1	30106	Bench clamp
1	30002	Stand base, V-shaped, small
1	30041	Stand rod 25 cm, 12 mm Ø
1	521491	AC/DC power supply 0...12 V/3 A

D1.3.5 Circular motion and rotation
D1.3.5.5 Dependence of the centrifugal force on the distance of the test body



Investigating the relation between the centrifugal force and the distance of the test body from the centre of rotation.

consisting of:

1	524068	Centrifugal force apparatus S
1	33746	Forked light barrier
1	524034	Timer box
1	50116	Multi-core cable, 6-pole, 1.5 m
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
1	521491	AC/DC power supply 0...12 V/3 A
1	50146	Connecting lead 19 A, 100 cm, red/blue, pair
1	50123	Connecting lead 32 A, 25 cm, black
1	30106	Bench clamp
1	30002	Stand base, V-shaped, small
1	30041	Stand rod 25 cm, 12 mm Ø

D1.3.5 Circular motion and rotation
D1.3.5.6 Dependence of the centrifugal force on the angular velocity

Investigating the relation between the centrifugal force and the angular velocity of the test body.

consisting of:

1	524068	Centrifugal force apparatus S
1	33746	Forked light barrier
1	524034	Timer box
1	50116	Multi-core cable, 6-pole, 1.5 m
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
1	521491	AC/DC power supply 0...12 V/3 A
1	50146	Connecting lead 19 A, 100 cm, red/blue, pair
1	50123	Connecting lead 32 A, 25 cm, black
1	30106	Bench clamp
1	30002	Stand base, V-shaped, small
1	30041	Stand rod 25 cm, 12 mm Ø

D1.4.1 Recording of mechanical oscillations
D1.4.1.2.a Recording the oscillation of a string pendulum - Sensor-CASSY and Ultrasonic motion sensor S

Record the oscillation of a string pendulum as a graph of distance against time.

Determine the amplitude and period of oscillation for a string pendulum.

consisting of:

1	315450	Slotted mass hanger, 50 g, large
2	315460	Slotted weight 500 g
1	30948	Fishing line
1	524013	Sensor-CASSY 2
1	524220	CASSY Lab 2
1	5240701	Ultrasonic motion sensor S
2	30106	Bench clamp
2	30046	Stand rod 150 cm, 12 mm Ø
1	30044	Stand rod 100 cm, 12 mm Ø
2	30101	Leybold multiclamp

additionally required: 1 PC with Windows XP or higher

D1.4.1 Recording of mechanical oscillations
D1.4.1.3.a Recording the oscillation of a spring pendulum - Sensor-CASSY and Ultrasonic motion sensor S

Record the oscillation of a spring pendulum as a graph of distance against time.

Determine the amplitude and period of oscillation for a spring pendulum.

consisting of:

1	35212	Helical spring 32 N/m
1	315450	Slotted mass hanger, 50 g, large
2	315460	Slotted weight 500 g
1	524013	Sensor-CASSY 2
1	524220	CASSY Lab 2
1	5240701	Ultrasonic motion sensor S
1	30106	Bench clamp
1	30044	Stand rod 100 cm, 12 mm Ø
1	30041	Stand rod 25 cm, 12 mm Ø
2	30101	Leybold multiclamp

additionally required: 1 PC with Windows XP or higher

D1.5.2 Detecting and recording of acoustic noise
D1.5.2.2.a Sound, combination sound, noise, bang - Oscilloscope

Demonstrating the characteristic oscillograms of sound, combination sound, noise, and bang.

consisting of:

1	58626	Multi-purpose microphone
1	41442	Resonance tuning fork
1	41432	Tambourine
1	57535	Adapter BNC/4 mm, 2-pole
1	30011	Saddle base
1	575302	Oscilloscope 30 MHz, digital, PT1265

D1.5.2 Detecting and recording of acoustic noise
D1.5.2.2.b Sound, combination sound, noise, bang - Sensor-CASSY

Demonstrating the characteristic oscillograms of sound, combination sound, noise, and bang.

consisting of:

1	58626	Multi-purpose microphone
1	41442	Resonance tuning fork
1	41432	Tambourine
1	524013	Sensor-CASSY 2
1	524220	CASSY Lab 2
1	30011	Saddle base

additionally required: 1 PC with Windows XP or higher

D1.5.2 Detecting and recording of acoustic noise
D1.5.2.3.a Recording of the oscillation of a tuning fork - Tuning fork model, Sensor-CASSY and Laser motion sensor S

Record the oscillation of a model tuning fork as a graph of distance against time.

Determine the period of oscillation *T* and the frequency *f* of the model tuning fork.

consisting of:

1	411844	Tuning fork model
1	524073	Laser motion sensor S
1	524013	Sensor-CASSY 2
1	524220	CASSY Lab 2
1	30106	Bench clamp
1	30001	Stand base, V-shaped, large
1	30044	Stand rod 100 cm, 12 mm Ø
1	30101	Leybold multiclamp

additionally required: 1 PC with Windows XP or higher

D1.5.3 Propagation of sound
D1.5.3.1.b Propagation of the sound as pressure variation - Sensor-CASSY, Pressure sensor S, ± 70 hPa

Investigate the Propagation of sound in the form of fluctuations in air pressure.

consisting of:

1	41442	Resonance tuning fork
1	41432	Tambourine
1	524066	Pressure sensor S, ±70 hPa
1	524013	Sensor-CASSY 2
1	524220	CASSY Lab 2
1	50111	Extension cable, 15-pole
1	665010	Funnel, plastic, 100 mm Ø
1	604434	Silicone tubing, 8 mm diam., 1 m
2	30011	Saddle base
1	688808	Stand rod, 10 x 223 mm, with thread M6
1	666555	Universal clamp 0...80 mm
1	30076	Laboratory stand II

additionally required: 1 PC with Windows XP or higher

D1.5.3 Propagation of sound
D1.5.3.2 Propagation of sound in air and in vacuum

Investigating the propagation of sound in air and in vacuum.

consisting of:

1	56105	Bell, electric
1	37889	Vacuum experiment plate
1	378562	Vacuum bell jar (D = 180 mm)
1	37873	Vacuum pump S 1.5
1	378510	Pointer manometer DN 16 KF
1	378771	Air inlet valve with DN 10 KF
1	378015	Cross DN 16 KF
1	378031	Hose nozzle DN 16 KF
3	378045	Centering ring DN 16 KF
1	378040	Centering ring (adapter) DN 10/16 KF
4	378050	Clamping ring DN 10/16 KF
1	667186	Vacuum rubber tubing, 8 mm Ø
1	521210	Transformer 6/12 V
1	50145	Connecting lead 19 A, 50 cm, red/blue, pair

D1.5.3 Propagation of sound
D1.5.3.3.a Velocity of sound in air - Measurement with Sensor-CASSY and CASSY-Display

Determining the time *t* required by a sound pulse for covering the distance *s*.

Calculating the velocity of sound *v*.

consisting of:

1	58626	Multi-purpose microphone
1	524034	Timer box
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
1	31178	Tape measure
2	30107	Simple bench clamp
2	30041	Stand rod 25 cm, 12 mm Ø
2	59002	Small clip plug
1	50135	Connecting lead 32 A, 200 cm, red
1	50136	Connecting lead 32 A, 200 cm, blue

D1.5.4 Pitch and volume
D1.5.4.1.a Relationship between pitch and frequency - Panpipes

Investigating the relation between the pitches and frequencies when the individual pipes of panpipes are blown.

Investigating the relation between the lengths of the pipes of panpipes and the frequencies of the notes.

consisting of:

1	58626	Multi-purpose microphone
1	524034	Timer box
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
1	46097	Metal rule, 0.5 m
1	30011	Saddle base

additionally required: a musical instrument, e.g. a flute or set of tuning forks, monochord, ...

D1.6.1 Structure of substances and particle motion
D1.6.1.6 Diffusion of liquids

Demonstrating diffusion in copper sulphate and water.

consisting of:

1	664214	Self-supporting cylinder, 200 ml, 200 x 40 mm Ø
1	664218	Cover plate, 50 mm Ø
1	6729610	Copper(II) sulfate-5-hydrate, 250 g
1	59008	Measuring cylinder 100 ml
1	604211	Measuring beaker, 1000 ml
1	603020	Disposable syringe, 20 ml
1	665213	Glass stirring rod 300 mm x 8 mm Ø
1	6753410	Water, pure, 5 l

D1.6.1 Structure of substances and particle motion
D1.6.1.8 Brownian motion in gases

Demonstrating Brownian motion in a smoke chamber.

consisting of:

1	37251	Smoke chamber
1	MIK5738870	Microscop EduLed FLArQ mono
1	MIK74708	BMS SyncCam 8Mp
1	604451	Tubing clamp Q-Fix 1...5 mm, pack of 4
1	45060	Lamp housing with cable
1	450521	Bulb 12 V/30 W, E14, set of 2
1	46020	Condenser with diaphragm holder
1	521210	Transformer 6/12 V
1	30011	Saddle base
1	664181	Petri dish 60 mm
1	665004	Funnel, Glass, 80 mm Ø
1	665957	Disposable syringe, 1 ml, with Luer fitting

additionally required: 1 Monitor

D1.6.2 Forces between the particles
D1.6.2.1.a Cohesion and adhesion - Precision micrometer

Demonstrating the action of cohesion and adhesion forces in a drop of water.

consisting of:

1	31183	Precision micrometer
1	MIK74708	BMS SyncCam 8Mp
1	602020	Beaker, Boro 3.3, 25 ml, squat
1	665953	Dropping pipette, 7 x 150 mm, 10 pcs.
1	665954	Rubber bulbs, 10 pcs
1	30041	Stand rod 25 cm, 12 mm Ø
1	30101	Leybold multiclamp
1	30011	Saddle base
1	68650	Metal plate

additionally required: 1 Monitor

D1.7.1 Pressure in liquids
D1.7.1.1 Propagation of pressure

Demonstrating the uniform transmission of pressure in all directions in a liquid.

consisting of:

1	36125	Transmission of pressure apparatus
1	604211	Measuring beaker, 1000 ml

D1.7.1 Pressure in liquids
D1.7.1.4.a Pressure due to gravity - Liquid pressure gauge with U-tube manometer

Measuring the gravity pressure as a function of the depth of immersion.

Investigating the pressure from below, from the side and from above at a constant depth of immersion.

consisting of:

1	36157	Liquid pressure gauge with U-tube manometer
1	664134	Beaker, TPX, 3000 ml
1	31178	Tape measure
1	664121	Beaker PP, 100 ml, squat
1	30001	Stand base, V-shaped, large
1	30041	Stand rod 25 cm, 12 mm Ø
1	30042	Stand rod 47 cm, 12 mm Ø
2	30101	Leybold multiclamp
1	30942	Colouring, red, 10 g

D1.7.1 Pressure in liquids
D1.7.1.4.b Pressure due to gravity - Pressure sensor with CASSY-Display

Measuring the gravity pressure as a function of the depth of immersion

consisting of:

1	524066	Pressure sensor S, ±70 hPa
1	664134	Beaker, TPX, 3000 ml
1	665201	Glass tubes, 80 mm x 8mm diam., set of 10 pieces
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
1	31178	Tape measure
1	30001	Stand base, V-shaped, large
1	666609	Stand tube 45 cm x 10 mm Ø
1	666607	Stand tube, 400 mm, 13 mm diam.
1	30041	Stand rod 25 cm, 12 mm Ø
2	30101	Leybold multiclamp
1	666615	Universal bosshead
1	604502	PVC tubing, 8 mm diam., 1 m
1	30945	Universal pencil

D1.7.1 Pressure in liquids
D1.7.1.7 Buoyancy

Demonstrating the effect of buoyancy.

consisting of:

1	36161	Buoyancy apparatus
1	664134	Beaker, TPX, 3000 ml
1	30942	Colouring, red, 10 g

D1.7.1 Pressure in liquids
D1.7.1.8 Connected vessels

Investigate the water levels in vessels which are joined together.

consisting of:

1	361411	Liquid level apparatus
1	604211	Measuring beaker, 1000 ml
1	30942	Colouring, red, 10 g

D1.7.2 Pressure in gases
D1.7.2.4.a Effects of air pressure - Boiling water in a canister

Demonstrating the effect of the outside air pressure on a metal canister.

consisting of:

1	37927	Metal canisters, set of 3
1	604212	Measuring beaker, 2000 ml
1	666711	Butane gas burner
1	666712ET3	Butane cartridge, 190 g, set of 3
1	666683	Tripod, 26 cm x 14 cm diam.
1	666685	Wire gauze 160 mm x 160 mm
1	64945	Tray, 552 mm x 459 mm x 48 mm

D1.7.2 Pressure in gases
D1.7.2.8 Suction and pressure pump made of glass

Demonstrating the method of operation of a suction and pressure pump.

consisting of:

1	375111	Suction and pressure pump
1	664194	Pneumatic tank
1	664250	Erlenmeyer flask, 250 ml, narrow neck
1	604433	Silicone tubing, 7 mm Ø
1	665222ET10	Connector, straight, 8 mm diam., 10 pieces
1	30942	Colouring, red, 10 g
1	30001	Stand base, V-shaped, large
1	30042	Stand rod 47 cm, 12 mm Ø
2	30101	Leybold multiclamp
2	666555	Universal clamp 0...80 mm

D1.7.3 Buoyancy
D1.7.3.1.a Detecting the effect of a buoyancy force in liquids - Measurement with a precision dynamometer

Detecting the effect of a buoyancy force when a body is immersed in a liquid step by step.

Demonstrating the independence of the buoyancy force of a completely immersed body on the depth of immersion.

consisting of:

1	36232	Aluminium block
1	59006	Plastic beaker, 1000 ml
1	314141	Precision dynamometer, 1 N
1	30002	Stand base, V-shaped, small
1	666609	Stand tube 45 cm x 10 mm Ø
1	666607	Stand tube, 400 mm, 13 mm diam.
1	666615	Universal bosshead
1	30108	Clamp with hook
1	30948	Fishing line
1	667019	Felt tip pen, black, medium

D1.7.3 Buoyancy
D1.7.3.1.b Detecting the effect of a buoyancy force in liquids - Measurement with a force sensor and CASSY-Display

Detecting the effect of a buoyancy force when a body is immersed in a liquid step by step.

Demonstrating the independence of the buoyancy force of a completely immersed body on the depth of immersion.

consisting of:

1	36232	Aluminium block
1	59006	Plastic beaker, 1000 ml
1	524042	Force sensor S, ±50 N
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
1	30002	Stand base, V-shaped, small
1	666609	Stand tube 45 cm x 10 mm Ø
1	666607	Stand tube, 400 mm, 13 mm diam.
1	30041	Stand rod 25 cm, 12 mm Ø
1	666615	Universal bosshead
1	30101	Leybold multiclamp
1	30948	Fishing line
1	667019	Felt tip pen, black, medium

D1.7.3 Buoyancy
D1.7.3.2.a Independence of the buoyancy force of the mass of the body - Measurement with a precision dynamometer

Measuring and comparing the buoyancy forces acting on bodies of different masses.

consisting of:

1	36202	Archimedes' cylinder
1	59006	Plastic beaker, 1000 ml
1	314141	Precision dynamometer, 1 N
1	OHCR221	Compact Balance CR221, 220 g : 0.1 g
5	315417	Slotted weight 10 g
1	30001	Stand base, V-shaped, large
1	666609	Stand tube 45 cm x 10 mm Ø
1	666607	Stand tube, 400 mm, 13 mm diam.
1	666615	Universal bosshead
1	30108	Clamp with hook
1	667019	Felt tip pen, black, medium

D1.7.3 Buoyancy
D1.7.3.3.a Dependence of the buoyancy force on the volume of the immersed body - Measurement with a precision dynamometer

Investigating the dependence of the buoyancy force on the volume of the immersed body.

consisting of:

1	36228	Bodies of equal mass, Set of 3
1	59006	Plastic beaker, 1000 ml
1	314141	Precision dynamometer, 1 N
1	665754	Measuring cylinder 100 ml, with plastic base
1	30002	Stand base, V-shaped, small
1	666609	Stand tube 45 cm x 10 mm Ø
1	666607	Stand tube, 400 mm, 13 mm diam.
1	666615	Universal bosshead
1	30108	Clamp with hook
1	30948	Fishing line

D1.7.3 Buoyancy
D1.7.3.3.b Dependence of the buoyancy force on the volume of the immersed body - Measurement with a force sensor and CASSY-Display

Investigating the dependence of the buoyancy force on the volume of the immersed body.

consisting of:

1	36228	Bodies of equal mass, Set of 3
1	59006	Plastic beaker, 1000 ml
1	524042	Force sensor S, ±50 N
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
1	665754	Measuring cylinder 100 ml, with plastic base
1	30002	Stand base, V-shaped, small
1	666609	Stand tube 45 cm x 10 mm Ø
1	666607	Stand tube, 400 mm, 13 mm diam.
1	30041	Stand rod 25 cm, 12 mm Ø
1	666615	Universal bosshead
1	30101	Leybold multiclamp
1	30948	Fishing line

D1.7.3 Buoyancy
D1.7.3.4.a Dependence of the buoyancy force on the kind of liquid - Measurement with a precision dynamometer

Investigating the dependence of the buoyancy force on the kind of liquid.

consisting of:

1	36232	Aluminium block
1	59006	Plastic beaker, 1000 ml
1	6735720	Sodium chloride, 1 kg
1	6709990	Methylated spirits, 1 l
1	314141	Precision dynamometer, 1 N
1	30002	Stand base, V-shaped, small
1	666609	Stand tube 45 cm x 10 mm Ø
1	666607	Stand tube, 400 mm, 13 mm diam.
1	666615	Universal bosshead
1	30108	Clamp with hook
1	30948	Fishing line
1	665213	Glass stirring rod 300 mm x 8 mm Ø

D1.7.3 Buoyancy
D1.7.3.4.b Dependence of the buoyancy force on the kind of liquid - Measurement with a force sensor and CASSY-Display

Investigating the dependence of the buoyancy force on the kind of liquid.

consisting of:

1	36232	Aluminium block
1	59006	Plastic beaker, 1000 ml
1	6735720	Sodium chloride, 1 kg
1	6709990	Methylated spirits, 1 l
1	524042	Force sensor S, ±50 N
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
1	30002	Stand base, V-shaped, small
1	666609	Stand tube 45 cm x 10 mm Ø
1	666607	Stand tube, 400 mm, 13 mm diam.
1	30041	Stand rod 25 cm, 12 mm Ø
1	30101	Leybold multiclamp
1	666615	Universal bosshead
1	30948	Fishing line
1	665213	Glass stirring rod 300 mm x 8 mm Ø

D1.7.3 Buoyancy
D1.7.3.5.a Archimedes' principle - Measurement with a precision dynamometer

Investigating the relation between the buoyancy force acting on a body and the amount of liquid displaced by the body.

consisting of:

1	36202	Archimedes' cylinder
1	36204	Overflow vessel
1	59008	Measuring cylinder 100 ml
1	6735720	Sodium chloride, 1 kg
1	6709990	Methylated spirits, 1 l
1	59006	Plastic beaker, 1000 ml
1	314151	Precision dynamometer, 2.0 N
1	30002	Stand base, V-shaped, small
1	666609	Stand tube 45 cm x 10 mm Ø
1	666607	Stand tube, 400 mm, 13 mm diam.
1	666615	Universal bosshead
1	30108	Clamp with hook
1	30948	Fishing line
1	665213	Glass stirring rod 300 mm x 8 mm Ø

D1.7.3 Buoyancy
D1.7.3.5.b Archimedes' principle - Measurement with a hydrostatic balance

Investigating the relation between the buoyancy force acting on a body and the gravitational force of the liquid displaced by the body.

consisting of:

1	36202	Archimedes' cylinder
1	315011	Hydrostatic precision balance
1	31531	Set of weights 10 mg to 200 g
1	6735720	Sodium chloride, 1 kg
1	6709990	Methylated spirits, 1 l
1	664137	Beaker, Boro3.3, 100 ml, tall
1	664138	Beaker, Boro3.3, 250 ml, tall
1	30948	Fishing line
1	665213	Glass stirring rod 300 mm x 8 mm Ø

D1.7.3 Buoyancy
D1.7.3.5.c Archimedes' principle - Measurement with Sensor-CASSY and CASSY-Display

Investigating the relation between the buoyancy force acting on a body and the gravitational force of the liquid displaced by the body.

consisting of:

1	36202	Archimedes' cylinder
1	36204	Overflow vessel
1	59008	Measuring cylinder 100 ml
1	6735720	Sodium chloride, 1 kg
1	6709990	Methylated spirits, 1 l
1	59006	Plastic beaker, 1000 ml
1	524042	Force sensor S, ±50 N
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
1	30002	Stand base, V-shaped, small
1	666609	Stand tube 45 cm x 10 mm Ø
1	666607	Stand tube, 400 mm, 13 mm diam.
1	30041	Stand rod 25 cm, 12 mm Ø
1	666615	Universal bosshead
1	30101	Leybold multiclamp
1	30948	Fishing line
1	665213	Glass stirring rod 300 mm x 8 mm Ø

D1.7.3 Buoyancy
D1.7.3.6 Falling, floating, rising

Demonstrating falling, floating, and rising of a Cartesian diver.

consisting of:

1	68362	Divers, glass, pair
1	664215	Self-supporting cylinder, 400 ml, 400 x 40 mm Ø
1	667270	Rubber stopper, 34 x 41 x 35 mm, solid

D1.7.3 Buoyancy
D1.7.3.7 Evidence of buoyancy in air

Demonstrating the action of a buoyancy force in air.

consisting of:

1	37910	Baroscope
1	37889	Vacuum experiment plate
1	378562	Vacuum bell jar (D = 180 mm)
1	37873	Vacuum pump S 1.5
1	378510	Pointer manometer DN 16 KF
1	378771	Air inlet valve with DN 10 KF
1	378015	Cross DN 16 KF
1	378031	Hose nozzle DN 16 KF
3	378045	Centering ring DN 16 KF
1	378040	Centering ring (adapter) DN 10/16 KF
4	378050	Clamping ring DN 10/16 KF
1	667186	Vacuum rubber tubing, 8 mm Ø

D2.1.2 Solid bodies
D2.1.2.2.b Longitudinal expansion of tubes when the temperature rises - Longitudinal expansion apparatus D

Investigating the longitudinal expansion of copper, steel and glass tubes when they are warmed.

consisting of:

1	381341	Longitudinal expansion apparatus D
1	664251	Erlenmeyer flask, 500 ml, narrow neck
1	602740	Petri dish, 120 mm
1	667265	Rubber stopper, 28 x 34 x 35 mm, 1 hole 7 mm Ø
1	665222ET10	Connector, straight, 8 mm diam., 10 pieces
1	604433	Silicone tubing, 7 mm Ø
1	30001	Stand base, V-shaped, large
1	30043	Stand rod 75 cm, 12 mm Ø
2	30101	Leybold multiclamp
1	666555	Universal clamp 0...80 mm
1	666573	Stand ring with stem 100 mm Ø
1	608120	Wire gauze 120 mm x 120 mm
1	666711	Butane gas burner
1	666712ET3	Butane cartridge, 190 g, set of 3

D2.1.2 Solid bodies
D2.1.2.4 Forces acting when solid bodies are cooled

Demonstrating the force exerted by a cooling metal rod on a bolt.

consisting of:

1	38116	Tyndall's bar breaker with 10 bolts
1	666711	Butane gas burner
1	666712ET3	Butane cartridge, 190 g, set of 3
1	30042	Stand rod 47 cm, 12 mm Ø
1	30101	Leybold multiclamp
1	30001	Stand base, V-shaped, large
	Alternative:	
1	30106	Bench clamp

D2.2.1 Change of the thermal energy
D2.2.1.1.a Thermal energy and increase of temperature - Universal Measuring Instrument Physics

Investigate the relationship between a rise in the temperature of water and the rise in thermal energy for constant mass.

consisting of:

1	524044	Temperature sensor S, NTC
1	531835	Universal Measuring Instrument Physics
1	30325	Immersion heater
1	59006	Plastic beaker, 1000 ml
1	531831	Joule and Wattmeter
1	30002	Stand base, V-shaped, small
1	30041	Stand rod 25 cm, 12 mm Ø
1	666555	Universal clamp 0...80 mm
1	30101	Leybold multiclamp

D2.2.1 Change of the thermal energy
D2.2.1.2.a Thermal energy and mass - Universal Measuring Instrument Physics

Investigate the relationship between the change in thermal energy and the mass of water at constant temperature.

consisting of:

1	524044	Temperature sensor S, NTC
1	531835	Universal Measuring Instrument Physics
1	30325	Immersion heater
1	59006	Plastic beaker, 1000 ml
1	531831	Joule and Wattmeter
1	30002	Stand base, V-shaped, small
1	30041	Stand rod 25 cm, 12 mm Ø
1	666555	Universal clamp 0...80 mm
1	30101	Leybold multiclamp

D2.2.1 Change of the thermal energy
D2.2.1.3.a Thermal energy and substance - Universal Measuring Instrument Physics

Investigate the relationship between rise in temperature and the material when an equal amount of thermal energy is supplied.

consisting of:

1	524044	Temperature sensor S, NTC
1	531835	Universal Measuring Instrument Physics
1	30325	Immersion heater
1	59006	Plastic beaker, 1000 ml
1	531831	Joule and Wattmeter
1	30002	Stand base, V-shaped, small
1	30041	Stand rod 25 cm, 12 mm Ø
1	666555	Universal clamp 0...80 mm
1	30101	Leybold multiclamp

Additionally recommended: Other liquids, such as white spirit, vegetable oil and milk.

D2.2.1 Change of the thermal energy
D2.2.1.4.a Specific heat capacity of water - Universal Measuring Instrument Physics

Determination of specific heat of water.

consisting of:

1	524044	Temperature sensor S, NTC
1	531835	Universal Measuring Instrument Physics
1	30325	Immersion heater
1	59006	Plastic beaker, 1000 ml
1	531831	Joule and Wattmeter
1	30002	Stand base, V-shaped, small
1	30041	Stand rod 25 cm, 12 mm Ø
1	666555	Universal clamp 0...80 mm
1	30101	Leybold multiclamp

D2.2.2 Heat exchange
D2.2.2.1.a Mixing temperature - Universal Measuring Instrument Physics

Measurement of the mixing temperature of hot and cold water.

Generation of the energy balance of the mixing process.

consisting of:

1	524044	Temperature sensor S, NTC
1	531835	Universal Measuring Instrument Physics
1	602011	Beaker, 400 ml, tall form
2	59008	Measuring cylinder 100 ml
1	59006	Plastic beaker, 1000 ml
1	30325	Immersion heater

D2.3.1 Thermal conduction
D2.3.1.1.a Thermal conduction in solid bodies - Copper tube

Proof the thermal conduction in solid bodies

consisting of:

1	413651	Metal rods, 1.5 m, set of 3
1	45932	Candle, set of 20
1	30041	Stand rod 25 cm, 12 mm Ø
1	30101	Leybold multiclamp
1	30002	Stand base, V-shaped, small
1	666711	Butane gas burner
1	666712ET3	Butane cartridge, 190 g, set of 3

D2.3.1 Thermal conduction
D2.3.1.2.a Thermal conduction in solid bodies as a function of the material - Simple heat conductivity apparatus

Investigation into the dependence of heat conduction in solid bodies upon material.

consisting of:

1	38910	Simple heat conductivity apparatus
1	30041	Stand rod 25 cm, 12 mm Ø
1	30101	Leybold multiclamp
1	30002	Stand base, V-shaped, small
1	666711	Butane gas burner
1	666712ET3	Butane cartridge, 190 g, set of 3

D2.3.1 Thermal conduction
D2.3.1.2.b Thermal conduction in solid bodies as a function of the material - Apparatus for demonstrating heat conduction

Investigation into the dependence of heat conduction in solid bodies upon material.

consisting of:

1	389031	Apparatus for demonstrating heat conduction
1	666767	Hotplate, 1500 W, 180 mm Ø

D2.3.2 Heat convection
D2.3.2.1 Demonstrating heat convection in water

Demonstrating the heat convection in a liquid caused by uneven warming.

consisting of:

1	38918	Convection apparatus
1	30942	Colouring, red, 10 g
1	666963	Spatula, spoon-ended, stainless steel, 120 mm
1	604211	Measuring beaker, 1000 ml
1	30043	Stand rod 75 cm, 12 mm Ø
1	30101	Leybold multiclamp
1	666555	Universal clamp 0...80 mm
1	30002	Stand base, V-shaped, small
1	666711	Butane gas burner
1	666712ET3	Butane cartridge, 190 g, set of 3

D2.3.2 Heat convection
D2.3.2.2 Model experiment on the operation of a hot-water heating system

Demonstrating the operation of a hot-water heating system.

consisting of:

1	38920	Central heating model
1	30043	Stand rod 75 cm, 12 mm Ø
1	30101	Leybold multiclamp
1	30002	Stand base, V-shaped, small
1	666711	Butane gas burner
1	666712ET3	Butane cartridge, 190 g, set of 3
1	604211	Measuring beaker, 1000 ml
1	666966	Spoon-ended spatula, PP, 180 mm

D2.3.3 Heat radiation
D2.3.3.1.a Absorption of heat radiation - Radiation probes

Investigating the absorption of heat radiation by a black and a metallic-lustrous surface.

consisting of:

1	384531	Radiation probes, pair
2	666193	Temperature probe NiCr-Ni, 1.5 mm
2	524045	Temperature box NiCr-Ni/NTC
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
1	666711	Butane gas burner
1	666712ET3	Butane cartridge, 190 g, set of 3
1	30002	Stand base, V-shaped, small
1	30043	Stand rod 75 cm, 12 mm Ø
2	30101	Leybold multiclamp
2	59013	Insulated stand rod, 25 cm
4	59121	Large clip plug

D2.3.3 Heat radiation
D2.3.3.2 Emission of heat

Investigating the emission of heat from bodies with different surface characteristics.

consisting of:

1	389261	Leslie's cube
1	55736	Moll's thermopile
1	5240401	µV sensor S
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
1	50146	Connecting lead 19 A, 100 cm, red/blue, pair
1	30325	Immersion heater
1	59006	Plastic beaker, 1000 ml
1	602670	Funnel, Glass, 60 mm Ø
1	30076	Laboratory stand II
1	30040	Stand rod 10 cm, 12 mm Ø
1	666615	Universal bosshead
1	30011	Saddle base
	Additionally recommended:	
1	667614	Heat protective gloves

D2.3.4 Heat insulation
D2.3.4.1 Heat insulation in dependence on the material

Investigation of the thermal insulation of different insulating materials.

consisting of:

1	664249	Erlenmeyer flask, 100 ml, narrow neck
1	667258	Rubber stopper, one 7-mm hole, 19...24 mm Ø
1	664131	Beaker Boro 3.3, 400 ml, squat
1	661081	Aluminium, foil, 1 roll
1	6748210	Sea sand, purified, 1 kg
1	30325	Immersion heater
1	59006	Plastic beaker, 1000 ml
1	524044	Temperature sensor S, NTC
1	524013	Sensor-CASSY 2
1	524220	CASSY Lab 2
2	30121	Stand base MF
1	30126	Stand rod 25 cm, 10 mm Ø
1	30127	Stand rod 50 cm, 10 mm Ø
1	30101	Leybold multiclamp
1	666555	Universal clamp 0...80 mm

additionally required: 1 PC with Windows XP or higher

D2.3.4 Heat insulation
D2.3.4.2 Heat insulation in a thermos flask

Investigation of the principle of thermal insulation in a thermos flask.

consisting of:

1	664249	Erlenmeyer flask, 100 ml, narrow neck
1	667258	Rubber stopper, one 7-mm hole, 19...24 mm Ø
1	664131	Beaker Boro 3.3, 400 ml, squat
1	661081	Aluminium, foil, 1 roll
1	30325	Immersion heater
1	59006	Plastic beaker, 1000 ml
1	524044	Temperature sensor S, NTC
1	524013	Sensor-CASSY 2
1	524220	CASSY Lab 2
2	30121	Stand base MF
1	30126	Stand rod 25 cm, 10 mm Ø
1	30127	Stand rod 50 cm, 10 mm Ø
1	30101	Leybold multiclamp
1	666555	Universal clamp 0...80 mm

additionally required: 1 PC with Windows XP or higher

D2.4.1 Melting and solidification

D2.4.1.1.a Determining the melting and the solidification temperature - Candle wax

Determining the melting and the solidification temperature of candle wax.

consisting of:

1	45932	Candle, set of 20
1	666193	Temperature probe NiCr-Ni, 1.5 mm
1	524045	Temperature box NiCr-Ni/NTC
	Alternative:	
1	524044	Temperature sensor S, NTC
	.	
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
1	666711	Butane gas burner
1	666712ET3	Butane cartridge, 190 g, set of 3
1	664131	Beaker Boro 3.3, 400 ml, squat
1	664045	Test tubes, 200 X 30 mm dia.
1	30002	Stand base, V-shaped, small
1	30044	Stand rod 100 cm, 12 mm Ø
2	30101	Leybold multiclamp
1	666555	Universal clamp 0...80 mm
1	666573	Stand ring with stem 100 mm Ø
1	608120	Wire gauze 120 mm x 120 mm
1	602782	Glass rod, 200 mm, Ø 5 mm
1	667018	Laboratory knife

D2.4.1 Melting and solidification
D2.4.1.1.b Determining the melting and the solidification temperature - Wood's alloy

Determining the melting and the solidification temperature of Wood’s alloy.

consisting of:

1	6754200	Wood's Alloy, 50 g
1	666193	Temperature probe NiCr-Ni, 1.5 mm
1	524045	Temperature box NiCr-Ni/NTC
	Alternative:	
1	524044	Temperature sensor S, NTC
	.	
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
1	666711	Butane gas burner
1	666712ET3	Butane cartridge, 190 g, set of 3
1	664131	Beaker Boro 3.3, 400 ml, squat
1	664045	Test tubes, 200 X 30 mm dia.
1	30002	Stand base, V-shaped, small
1	30044	Stand rod 100 cm, 12 mm Ø
2	30101	Leybold multiclamp
1	666555	Universal clamp 0...80 mm
1	666573	Stand ring with stem 100 mm Ø
1	608120	Wire gauze 120 mm x 120 mm
1	602782	Glass rod, 200 mm, Ø 5 mm
1	667018	Laboratory knife

D2.4.2 Boiling and condensation
D2.4.2.1.c Warming up water until it boils - Sensor-CASSY and PC

Observing the warming of water until it boils.

Recording a temperature-time diagram.

consisting of:

1	524044	Temperature sensor S, NTC
1	524013	Sensor-CASSY 2
1	524220	CASSY Lab 2
1	664131	Beaker Boro 3.3, 400 ml, squat
1	602782	Glass rod, 200 mm, Ø 5 mm
1	666711	Butane gas burner
1	666712ET3	Butane cartridge, 190 g, set of 3
1	30002	Stand base, V-shaped, small
1	30043	Stand rod 75 cm, 12 mm Ø
2	30101	Leybold multiclamp
1	666555	Universal clamp 0...80 mm
1	666573	Stand ring with stem 100 mm Ø
1	608120	Wire gauze 120 mm x 120 mm
1	30942	Colouring, red, 10 g

additionally required: 1 PC with Windows XP or higher

D2.4.2 Boiling and condensation
D2.4.2.4.a Boiling at reduced pressure - Pressure reduction by means of a vacuum pump

Investigating the boiling temperature of water at reduced pressure.

consisting of:

1	37873	Vacuum pump S 1.5
1	378510	Pointer manometer DN 16 KF
1	378771	Air inlet valve with DN 10 KF
1	378015	Cross DN 16 KF
1	378031	Hose nozzle DN 16 KF
3	378045	Centering ring DN 16 KF
1	378040	Centering ring (adapter) DN 10/16 KF
4	378050	Clamping ring DN 10/16 KF
1	37889	Vacuum experiment plate
1	378562	Vacuum bell jar (D = 180 mm)
1	667186	Vacuum rubber tubing, 8 mm Ø
1	59006	Plastic beaker, 1000 ml
1	666160	Chemical thermometer, -10 °C ... +110 °C/1 K
1	30325	Immersion heater

D2.4.2 Boiling and condensation
D2.4.2.5.a Boiling at increased pressure - Pressure cooker

Investigating the boiling temperature of water at increased pressure.

consisting of:

1	388612	Pressure cooker
1	666767	Hotplate, 1500 W, 180 mm Ø

D2.4.2 Boiling and condensation
D2.4.2.5.b Boiling at increased pressure - Pressure cooker - Recording of a vapour pressure graph

Investigating the boiling temperature of water at increased pressure.

consisting of:

1	388612	Pressure cooker
1	666767	Hotplate, 1500 W, 180 mm Ø

D2.4.2 Boiling and condensation
D2.4.2.8 Distillation

Demonstrating the isolation of strong alcohol by distilling red wine.

consisting of:

1	665338	Distillation bridge after Claisen 250 mm
1	664301	Round-bottom flask, 250 ml, ST 19/26
1	664300	Round-bottom flask, 100 ml, ST 19/26
1	666160	Chemical thermometer, -10 °C ... +110 °C/1 K
1	666711	Butane gas burner
1	666712ET3	Butane cartridge, 190 g, set of 3
1	30765	Rubber Tubing 7 mm Ø
2	30121	Stand base MF
4	30127	Stand rod 50 cm, 10 mm Ø
3	30101	Leybold multiclamp
2	666555	Universal clamp 0...80 mm
1	666573	Stand ring with stem 100 mm Ø
1	608120	Wire gauze 120 mm x 120 mm
1	602022	Beaker Boro 3.3, 100 ml, squat
2	664153	Watch glass dish 60 mm Ø
2	665953	Dropping pipette, 7 x 150 mm, 10 pcs.
2	665954	Rubber bulbs, 10 pcs
1	661082	Stopcock grease, 60 g
	Additionally recommended:	
1	388181	Immersion pump 12 V
1	521231	Low-voltage power supply 3/6/9/12 V
1	664134	Beaker, TPX, 3000 ml

D2.5.1 Transformation of mechanical energy into thermal energy
D2.5.1.1.a Transformation of energy during the compression of air - Thermocouple and CASSY-Display

Measuring the increase in temperature in a gas syringe when the enclosed air is compressed quickly.

consisting of:

1	665912	Gas syringe 100 ml
1	667312	Glass connector, 2 x GL 18
1	667306	Silicone gaskets, GL 18/6, set of 10
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
1	524045	Temperature box NiCr-Ni/NTC
1	666216	Temperature probe NiCr-Ni, fast

D3.1.2 Electric charges
D3.1.2.1.a Charge separation - Electrometer amplifier

Investigating charge separation when two friction rods are hit together.

consisting of:

1	53214	Electrometer amplifier
1	53216	Connecting rod
1	54612	Faraday's cup
1	590011	Clamping plug
1	57825	Capacitor 1 nF, STE 2/19
1	57810	Capacitor 10 nF, STE 2/19
1	54100	Friction rods, PVC and acrylic
1	666711	Butane gas burner
1	666712ET3	Butane cartridge, 190 g, set of 3
1	531906	Demo Multimeter, passive
1	52227	Power supply 450 V
1	501451	Connecting lead 19 A, 50 cm, black, pair
1	50145	Connecting lead 19 A, 50 cm, red/blue, pair
1	500420	Connecting lead 19 A, 50 cm, yellow/green

D3.1.2 Electric charges
D3.1.2.1.b Charge separation - Electrometer amplifier and friction foils

Detecting charge separation when a friction rod is rubbed with a friction foil.

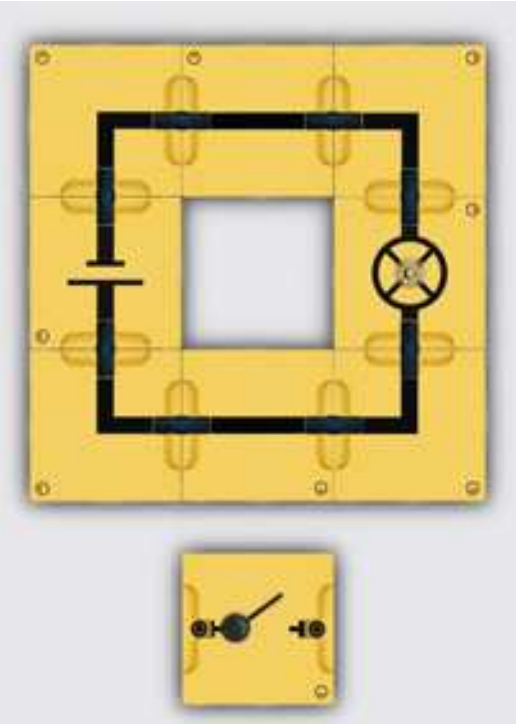
Investigating the polarity of charged friction rods after they have been rubbed with various friction foils.

consisting of:

1	53214	Electrometer amplifier
1	53216	Connecting rod
1	54612	Faraday's cup
1	590011	Clamping plug
1	57825	Capacitor 1 nF, STE 2/19
1	57810	Capacitor 10 nF, STE 2/19
1	54100	Friction rods, PVC and acrylic
1	54122	Leather cloth
1	68663	Polyethylene friction foils, set of 10
1	666711	Butane gas burner
1	666712ET3	Butane cartridge, 190 g, set of 3
1	531906	Demo Multimeter, passive
1	52227	Power supply 450 V
1	501451	Connecting lead 19 A, 50 cm, black, pair
1	50145	Connecting lead 19 A, 50 cm, red/blue, pair
1	500420	Connecting lead 19 A, 50 cm, yellow/green

D3.4.1 Simple circuit

D3.4.1.1.a Simple circuit - Function of a switch - Set-up with connector blocks and bridging plugs

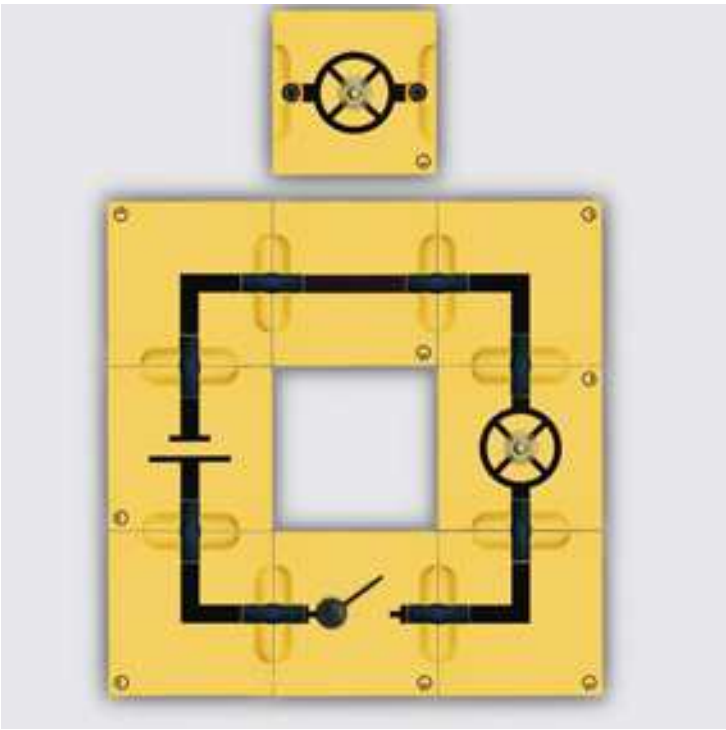


To investigate a simple circuit.

consisting of:

1	539024	Lamp socket E10, BST D
1	50511	Bulb 2.5 V/0.25 W, E10, set of 10
1	539025	Toggle switch, BST D
1	539053	Battery element, BST D
2	539001	Connector blocks, straight, BST D
4	539004	Connector blocks 90° angle, BST D
8	539000	Bridging plug, BST
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.1 Simple circuit
D3.4.1.2.a Connecting lamps in series - Set-up with connector blocks and bridging plugs

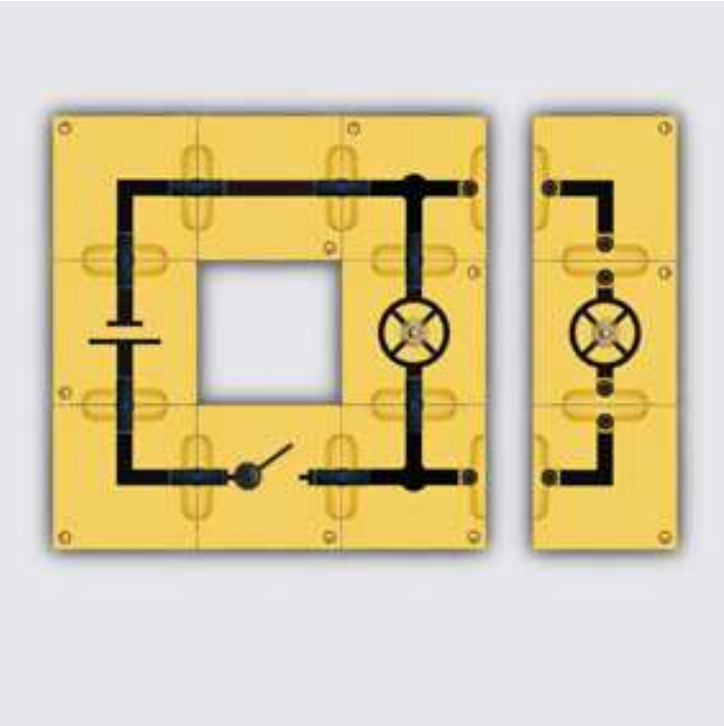


To investigate the series connection of two lamps.

consisting of:

2	539024	Lamp socket E10, BST D
1	50511	Bulb 2.5 V/0.25 W, E10, set of 10
1	539025	Toggle switch, BST D
1	539053	Battery element, BST D
1	539001	Connector blocks, straight, BST D
4	539004	Connector blocks 90° angle, BST D
8	539000	Bridging plug, BST
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.1 Simple circuit
D3.4.1.3.a Connecting lamps in parallel - Set-up with connector blocks and bridging plugs



To investigate the parallel connection of two lamps.

consisting of:

2	539024	Lamp socket E10, BST D
1	50511	Bulb 2.5 V/0.25 W, E10, set of 10
1	539025	Toggle switch, BST D
1	539053	Battery element, BST D
1	539001	Connector blocks, straight, BST D
4	539004	Connector blocks 90° angle, BST D
2	539006	Connector blocks, T branch, BST D
12	539000	Bridging plug, BST
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

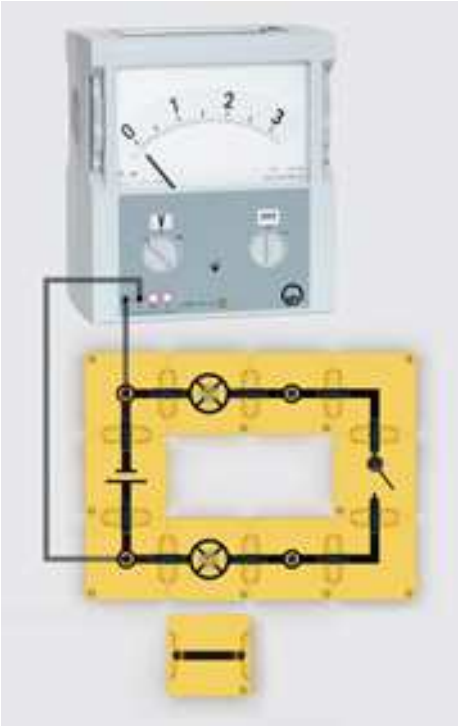
D3.4.1 Simple circuit
D3.4.1.4.a Measuring current in a simple circuit - Set-up with connector blocks and bridging plugs

To measure the current at different points in a simple circuit.

consisting of:

1	539024	Lamp socket E10, BST D
1	50511	Bulb 2.5 V/0.25 W, E10, set of 10
1	539025	Toggle switch, BST D
1	539053	Battery element, BST D
3	539003	Connector blocks straight with 2 sockets, BST D
4	539004	Connector blocks 90° angle, BST D
10	539000	Bridging plug, BST
1	531906	Demo Multimeter, passive
2	500644	Safety connection lead 100 cm, black
2	500604	Safety connection cead 10 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.1 Simple circuit
D3.4.1.5.a Measuring voltage in a simple circuit - Set-up with connector blocks and bridging plugs

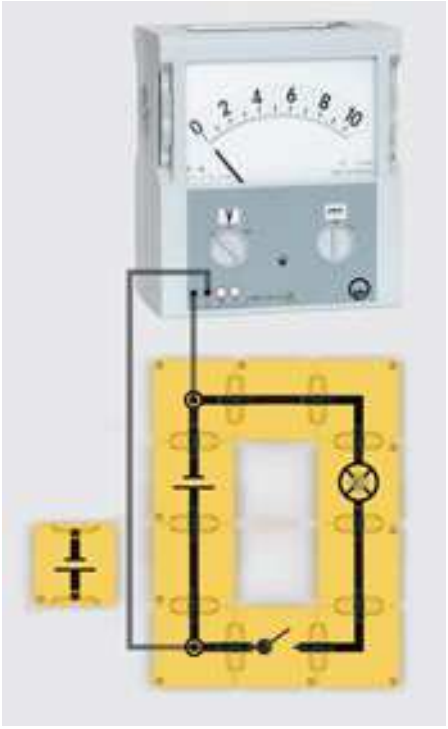


To measure the current at different points in a simple circuit.

consisting of:

2	539024	Lamp socket E10, BST D
1	50511	Bulb 2.5 V/0.25 W, E10, set of 10
1	539025	Toggle switch, BST D
1	539053	Battery element, BST D
1	539001	Connector blocks, straight, BST D
2	539002	Connector blocks straight with socket, BST D
2	539004	Connector blocks 90° angle, BST D
2	539005	Connector blocks 90° angle with socket, BST D
10	539000	Bridging plug, BST
1	531906	Demo Multimeter, passive
2	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.1 Simple circuit
D3.4.1.6.a Connecting batteries in series - Set-up with connector blocks and bridging plugs

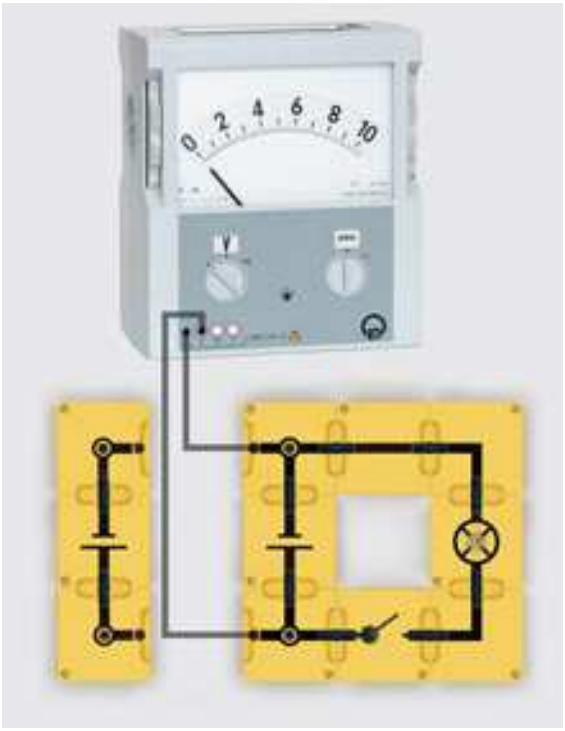


To investigate the series connection of two batteries.

consisting of:

1	539024	Lamp socket E10, BST D
1	50515	Bulb 6 V/0.05 A, E10, set of 10
1	539025	Toggle switch, BST D
2	539053	Battery element, BST D
3	539001	Connector blocks, straight, BST D
2	539004	Connector blocks 90° angle, BST D
2	539005	Connector blocks 90° angle with socket, BST D
10	539000	Bridging plug, BST
1	531906	Demo Multimeter, passive
2	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.1 Simple circuit
D3.4.1.7.a Connecting batteries in parallel - Set-up with connector blocks and bridging plugs

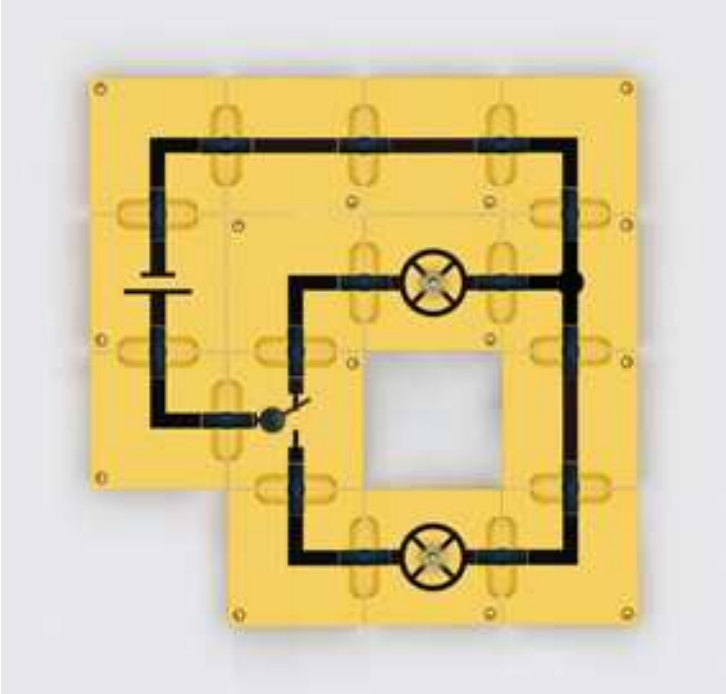


To investigate the parallel connection of two batteries.

consisting of:

1	539024	Lamp socket E10, BST D
1	50515	Bulb 6 V/0.05 A, E10, set of 10
1	539025	Toggle switch, BST D
2	539053	Battery element, BST D
1	539001	Connector blocks, straight, BST D
2	539004	Connector blocks 90° angle, BST D
2	539005	Connector blocks 90° angle with socket, BST D
2	539007	Connector blocks, T branch with socket, BST D
12	539000	Bridging plug, BST
1	531906	Demo Multimeter, passive
2	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.2 Switches in circuits
D3.4.2.1.a Switching over - Set-up with connector blocks and bridging plugs

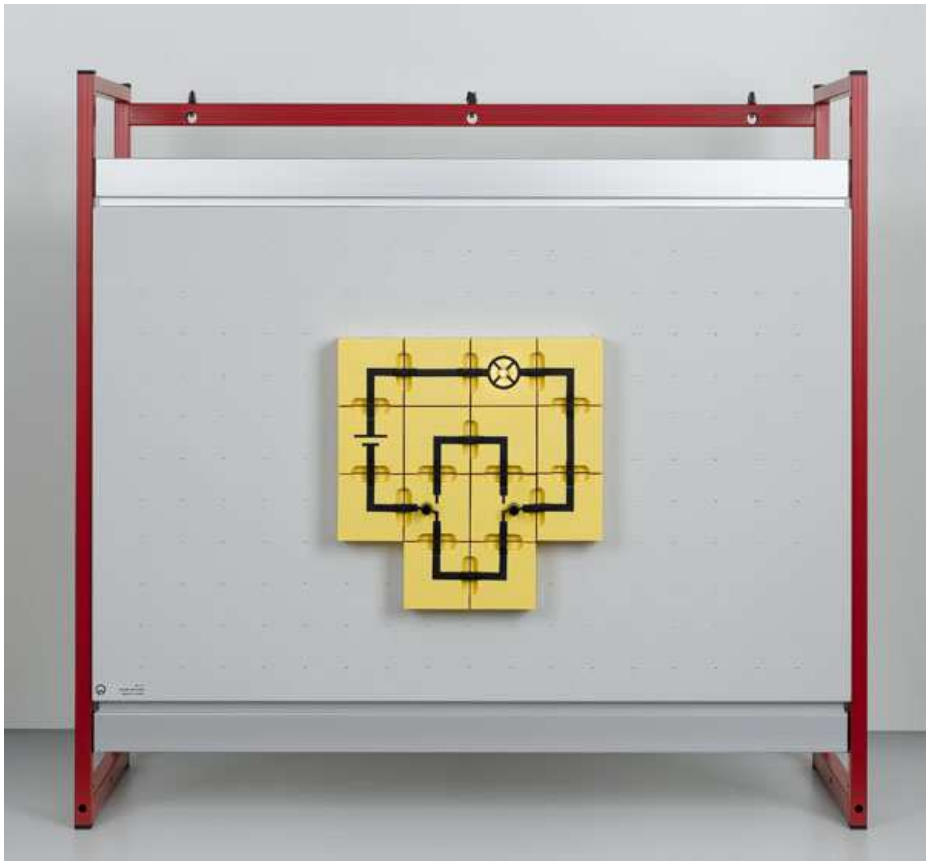


To demonstrate the operating mode of a change-over switch.

consisting of:

2	539024	Lamp socket E10, BST D
1	50511	Bulb 2.5 V/0.25 W, E10, set of 10
1	539026	Change-over switch, BST D
1	539053	Battery element, BST D
3	539001	Connector blocks, straight, BST D
6	539004	Connector blocks 90° angle, BST D
1	539006	Connector blocks, T branch, BST D
15	539000	Bridging plug, BST
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.2 Switches in circuits
D3.4.2.2.a Two-way circuit - Set-up with connector blocks and bridging plugs

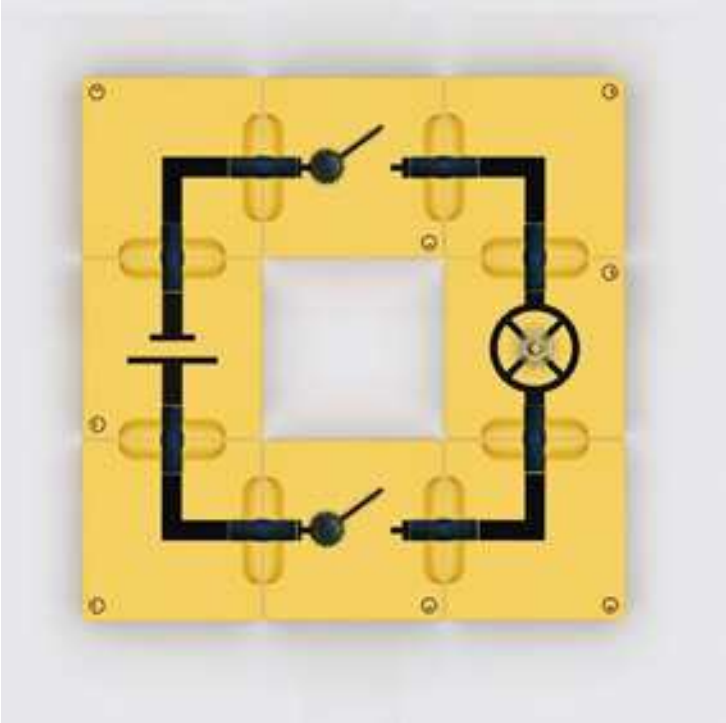


To demonstrate the operating mode of a two-way circuit.

consisting of:

1	539024	Lamp socket E10, BST D
1	50511	Bulb 2.5 V/0.25 W, E10, set of 10
2	539026	Change-over switch, BST D
1	539053	Battery element, BST D
2	539001	Connector blocks, straight, BST D
8	539004	Connector blocks 90° angle, BST D
15	539000	Bridging plug, BST
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.2 Switches in circuits
D3.4.2.3.a AND gate - Set-up with connector blocks and bridging plugs

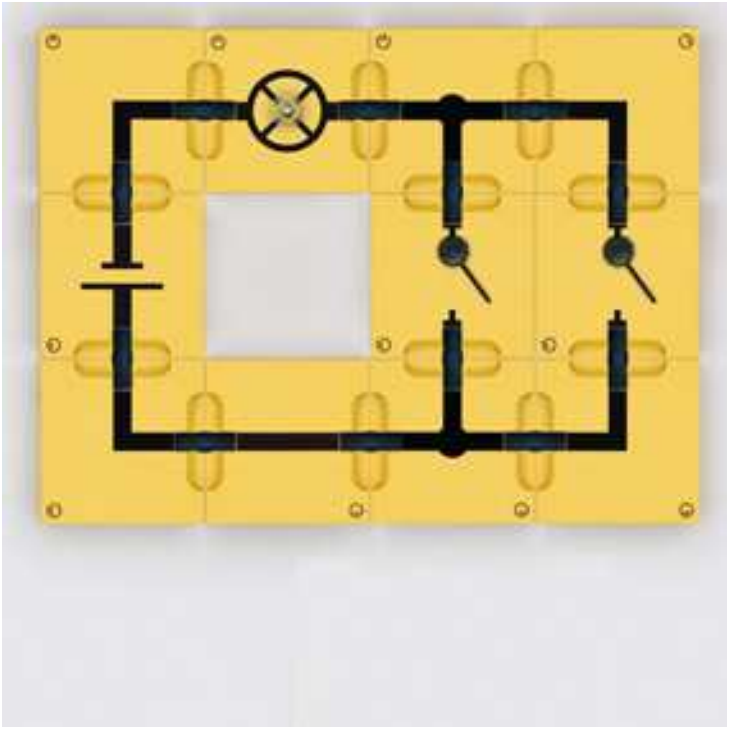


To demonstrate the working principle of an AND circuit.

consisting of:

1	539024	Lamp socket E10, BST D
1	50511	Bulb 2.5 V/0.25 W, E10, set of 10
2	539025	Toggle switch, BST D
1	539053	Battery element, BST D
4	539004	Connector blocks 90° angle, BST D
8	539000	Bridging plug, BST
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.2 Switches in circuits
D3.4.2.4.a OR gate - Set-up with connector blocks and bridging plugs

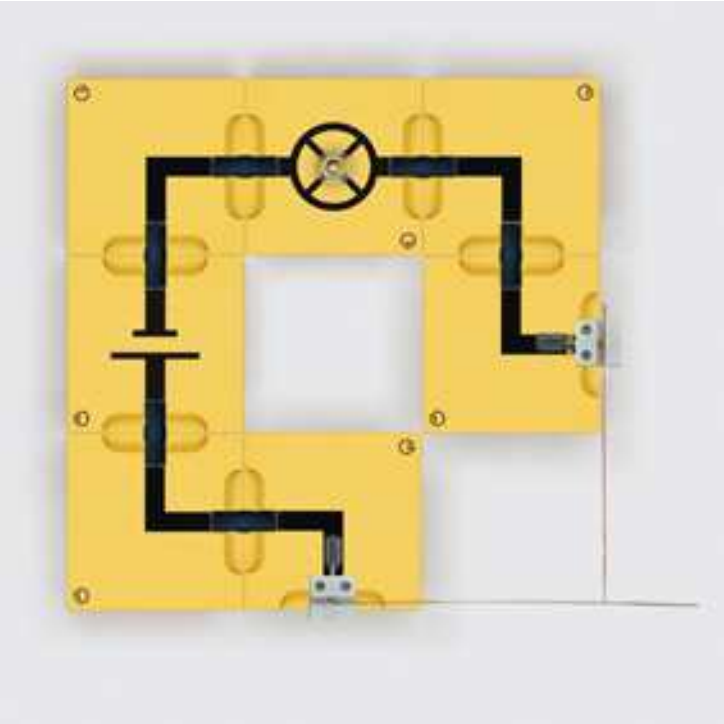


To demonstrate the operating mode of an OR circuit.

consisting of:

1	539024	Lamp socket E10, BST D
1	50511	Bulb 2.5 V/0.25 W, E10, set of 10
2	539025	Toggle switch, BST D
1	539053	Battery element, BST D
1	539001	Connector blocks, straight, BST D
4	539004	Connector blocks 90° angle, BST D
2	539006	Connector blocks, T branch, BST D
12	539000	Bridging plug, BST
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.2 Switches in circuits
D3.4.2.5.a Bimetallic-element switches - Set-up with connector blocks and bridging plugs

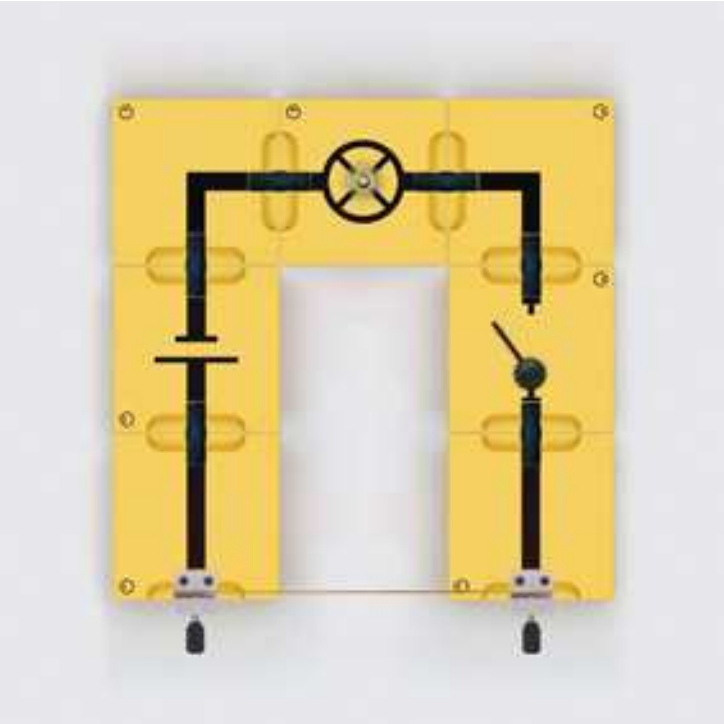


To demonstrate the operating mode of an OR circuit.

consisting of:

1	539024	Lamp socket E10, BST D
1	50511	Bulb 2.5 V/0.25 W, E10, set of 10
2	539060	Adapter plug, BST
1	539062	Bimetallic strip, BST
1	539061	Contact strip, BST
1	539053	Battery element, BST D
5	539004	Connector blocks 90° angle, BST D
6	539000	Bridging plug, BST
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.3 Conductors and non-conductors
D3.4.3.1.a Current conduction in solid bodies - Set-up with connector blocks and bridging plugs

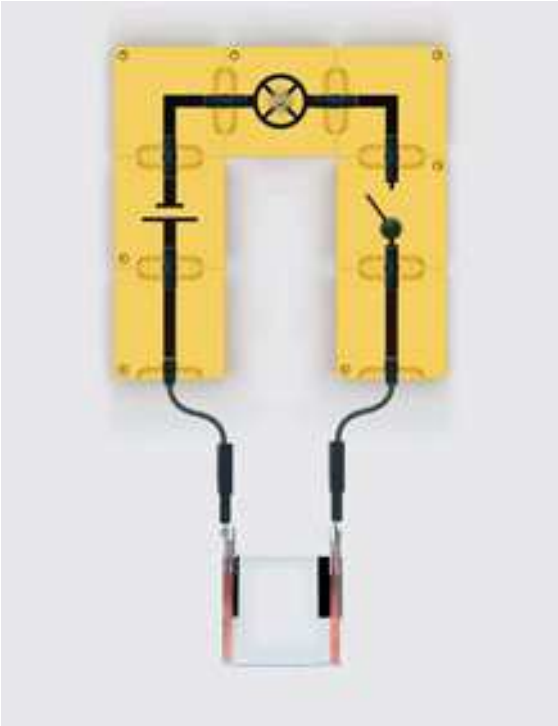


To investigate current flow in solid bodies of different materials.

consisting of:

1	539024	Lamp socket E10, BST D
1	50511	Bulb 2.5 V/0.25 W, E10, set of 10
1	539025	Toggle switch, BST D
1	539053	Battery element, BST D
2	539001	Connector blocks, straight, BST D
2	539004	Connector blocks 90° angle, BST D
2	539060	Adapter plug, BST
1	539063	Conductors/insulators, BST, set
6	539000	Bridging plug, BST
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.3 Conductors and non-conductors
D3.4.3.2.a Current conduction in liquids - Set-up with connector blocks and bridging plugs

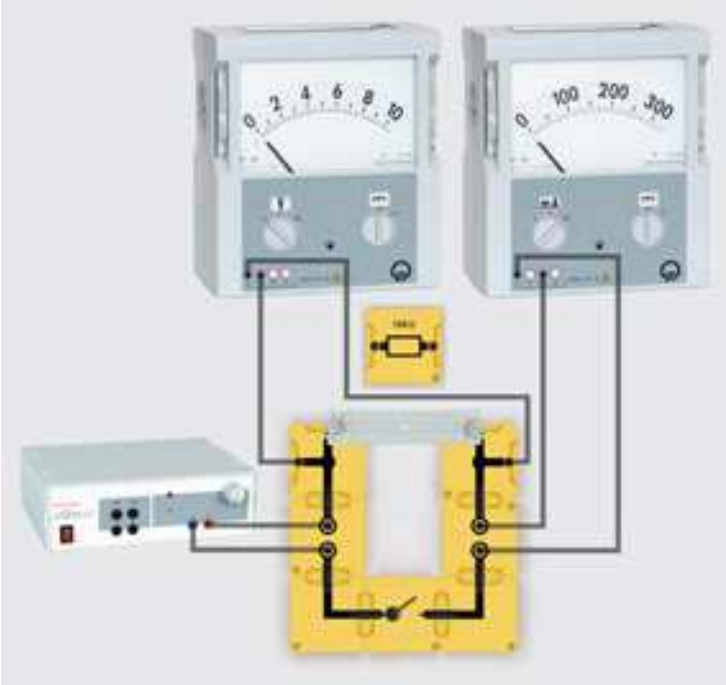


To investigate current flow in liquids.

consisting of:

1	539024	Lamp socket E10, BST D
1	50511	Bulb 2.5 V/0.25 W, E10, set of 10
1	539025	Toggle switch, BST D
1	539053	Battery element, BST D
2	539001	Connector blocks, straight, BST D
2	539004	Connector blocks 90° angle, BST D
1	539065	Cell, BST D
1	539066	Electrodes, BST, pair
1	501861	Crocodile-clips, polished, set of 6
2	500614	Safety connection lead 25 cm, black
6	539000	Bridging plug, BST
1	6753400	Water, pure, 1 l
1	6735720	Sodium chloride, 1 kg
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.4 Electric Resistance
D3.4.4.1.a Ohm's law - Set-up with connector blocks and bridging plugs

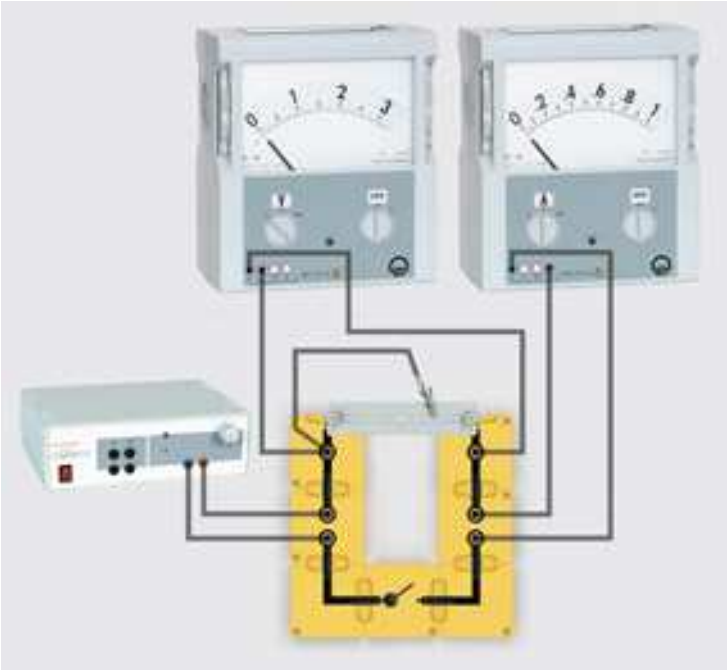


To investigate the relationship between current and voltage in an electrical conductor.

consisting of:

1	56718	Wrapping plate for wires
1	55046	Chrome-nickel wire, 0.25 mm Ø, 100 m
2	539060	Adapter plug, BST
1	539009	Resistor 100 Ω, BST D
1	539025	Toggle switch, BST D
2	539003	Connector blocks straight with 2 sockets, BST D
2	539004	Connector blocks 90° angle, BST D
2	539006	Connector blocks, T branch, BST D
8	539000	Bridging plug, BST
2	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
6	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.4 Electric Resistance
D3.4.4.2.a Correlation between resistance and length of a wire - Set-up with connector blocks and bridging plugs



To investigate the relationship between resistance and length of a wire.

consisting of:

1	56718	Wrapping plate for wires
1	55046	Chrome-nickel wire, 0.25 mm Ø, 100 m
2	539060	Adapter plug, BST
1	539025	Toggle switch, BST D
2	539002	Connector blocks straight with socket, BST D
2	539003	Connector blocks straight with 2 sockets, BST D
2	539004	Connector blocks 90° angle, BST D
6	539000	Bridging plug, BST
2	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
6	500644	Safety connection lead 100 cm, black
1	500411	Connecting lead 19 A, 25 cm, red
1	501861	Crocodile-clips, polished, set of 6
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

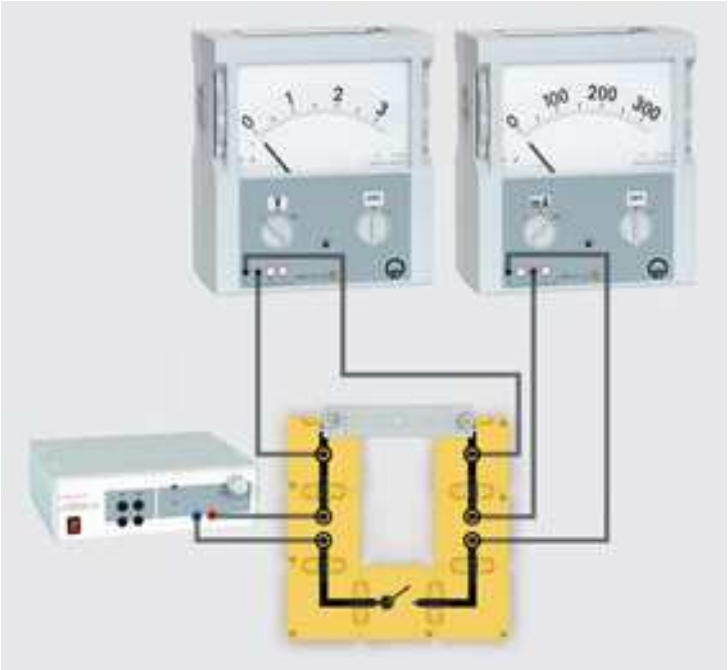
D3.4.4 Electric Resistance
D3.4.4.2.b Correlation between resistance and length of a wire - Set-up with the apparatus for resistance measurements

Investigating the correlation between resistance and length of a wire.

consisting of:

1	55057	Apparatus for resistance measurements
2	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
6	500444	Connecting lead 19 A, 100 cm, black
1	500414	Connecting lead 19 A, 25 cm, black
1	667489	Crocodile-clips, insulated, set of 2
1	31102	Metal rule, 1 m
1	667019	Felt tip pen, black, medium
2	30002	Stand base, V-shaped, small
2	30041	Stand rod 25 cm, 12 mm Ø
2	30101	Leybold multiclamp
2	68650	Metal plate

D3.4.4 Electric Resistance
D3.4.4.3.a Correlation between resistance and cross-sectional area of a wire - Set-up with connector blocks and bridging plugs



To investigate the relationship between resistance and cross-section of a wire.

consisting of:

1	56718	Wrapping plate for wires
1	55046	Chrome-nickel wire, 0.25 mm Ø, 100 m
1	55047	Chrome-nickel wire, 0.35 mm Ø, 100 m
1	55048	Chrome-nickel wire, 0.40 mm Ø, 50 m
1	55049	Chrome-nickel wire, 0.50 mm Ø, 50 m
2	539060	Adapter plug, BST
1	539025	Toggle switch, BST D
2	539002	Connector blocks straight with socket, BST D
2	539003	Connector blocks straight with 2 sockets, BST D
2	539004	Connector blocks 90° angle, BST D
6	539000	Bridging plug, BST
2	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
6	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

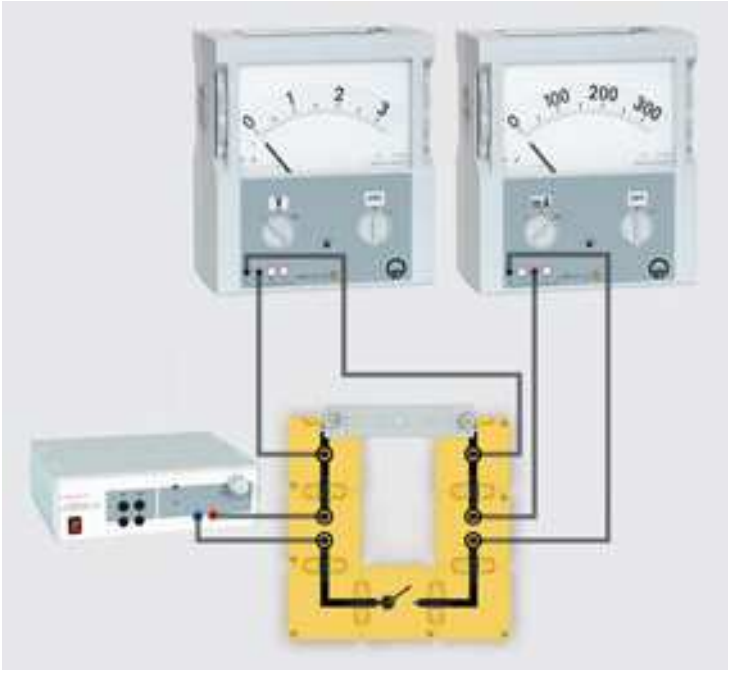
D3.4.4 Electric Resistance
D3.4.4.3.b Correlation between resistance and cross-sectional area of a wire - Set-up with the apparatus for resistance measurements

Investigating the correlation between resistance and cross-sectional area of a wire.

consisting of:

1	55057	Apparatus for resistance measurements
2	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
5	500444	Connecting lead 19 A, 100 cm, black
2	30002	Stand base, V-shaped, small
2	30041	Stand rod 25 cm, 12 mm Ø
2	30101	Leybold multiclamp
2	68650	Metal plate

D3.4.4 Electric Resistance
D3.4.4.4.a Correlation between the resistance and the material of a wire - Set-up with connector blocks and bridging plugs



To investigate how a wire's resistance depends on its material.

consisting of:

1	56718	Wrapping plate for wires
1	55047	Chrome-nickel wire, 0.35 mm Ø, 100 m
1	55042	Constantan wire, 0.35 mm Ø, 100 m
2	539060	Adapter plug, BST
1	539025	Toggle switch, BST D
2	539002	Connector blocks straight with socket, BST D
2	539003	Connector blocks straight with 2 sockets, BST D
2	539004	Connector blocks 90° angle, BST D
6	539000	Bridging plug, BST
2	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
6	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

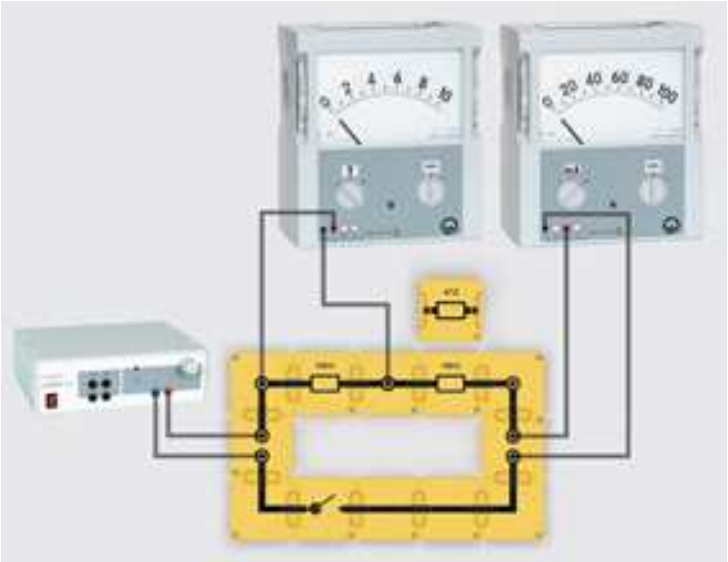
D3.4.4 Electric Resistance
D3.4.4.4.b Correlation between the resistance and the material of a wire - Set-up with the apparatus for resistance measurements

Investigating the dependence of the resistance of a wire from its material.

consisting of:

1	55057	Apparatus for resistance measurements
2	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
5	500444	Connecting lead 19 A, 100 cm, black
2	30002	Stand base, V-shaped, small
2	30041	Stand rod 25 cm, 12 mm Ø
2	30101	Leybold multiclamp
2	68650	Metal plate

D3.4.4 Electric Resistance
D3.4.4.5.a Connecting resistors in series - Set-up with connector blocks and bridging plugs



To investigate the relationship between the total voltage U and voltages U_1 and U_2.

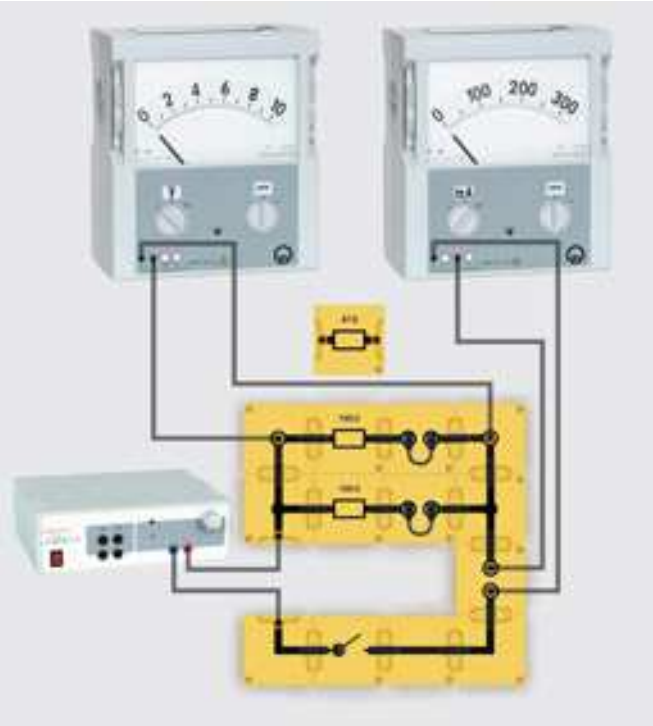
To determine the relationship between the total resistance R and the resistances R_1 and R_2.

To determine the relationship between the voltages U_1 and U_2, and the resistances R_1 and R_2.

consisting of:

1	539008	Resistor 47 Ω, BST D
2	539009	Resistor 100 Ω, BST D
1	539025	Toggle switch, BST D
2	539001	Connector blocks, straight, BST D
1	539002	Connector blocks straight with socket, BST D
2	539003	Connector blocks straight with 2 sockets, BST D
2	539004	Connector blocks 90° angle, BST D
2	539005	Connector blocks 90° angle with socket, BST D
12	539000	Bridging plug, BST
2	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
6	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.4 Electric Resistance
D3.4.4.6.a Connecting resistors in parallel - Set-up with connector blocks and bridging plugs



To investigate the relationship between the total current I and the currents I_1 and I_2.

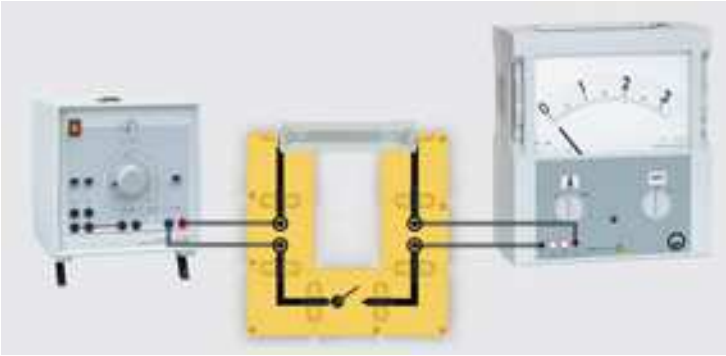
To determine the relationship between the total resistance R and the resistors R_1 and R_2.

To determine the relationship between the currents I_1 and I_2, and the resistances R_2 and R_1.

consisting of:

1	539008	Resistor 47 Ω, BST D
2	539009	Resistor 100 Ω, BST D
1	539025	Toggle switch, BST D
1	539001	Connector blocks, straight, BST D
3	539003	Connector blocks straight with 2 sockets, BST D
2	539004	Connector blocks 90° angle, BST D
2	539005	Connector blocks 90° angle with socket, BST D
2	539006	Connector blocks, T branch, BST D
13	539000	Bridging plug, BST
2	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
6	500644	Safety connection lead 100 cm, black
2	500604	Safety connection cead 10 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.4 Electric Resistance
D3.4.4.7.a Heat and light effect of the electrical current - Set-up with connector blocks and bridging plugs

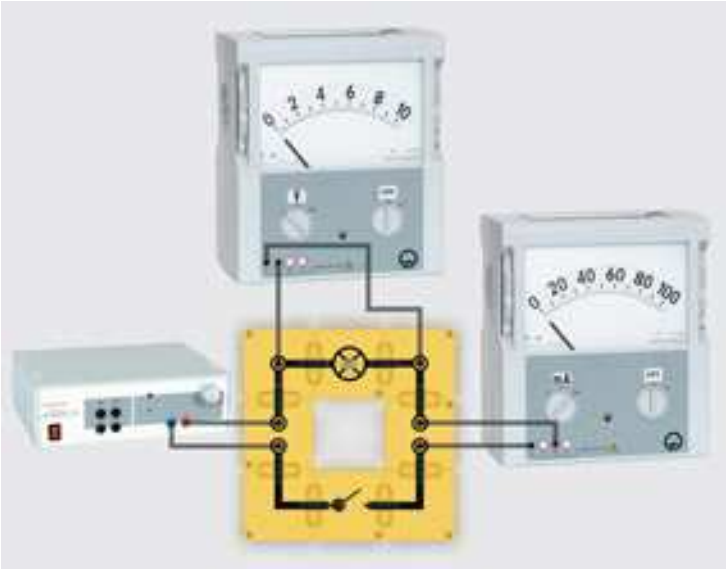


To demonstrate the thermal and luminous effect of the electric current in a coiled wire.

consisting of:

1	56718	Wrapping plate for wires
1	55047	Chrome-nickel wire, 0.35 mm Ø, 100 m
2	539060	Adapter plug, BST
1	539025	Toggle switch, BST D
2	539001	Connector blocks, straight, BST D
2	539003	Connector blocks straight with 2 sockets, BST D
2	539004	Connector blocks 90° angle, BST D
6	539000	Bridging plug, BST
1	531906	Demo Multimeter, passive
1	521391	AC/DC power supply 0...24 V/5 A
4	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.4 Electric Resistance
D3.4.4.8.a Resistance behavior of an incandescent lamp - Set-up with connector blocks and bridging plugs



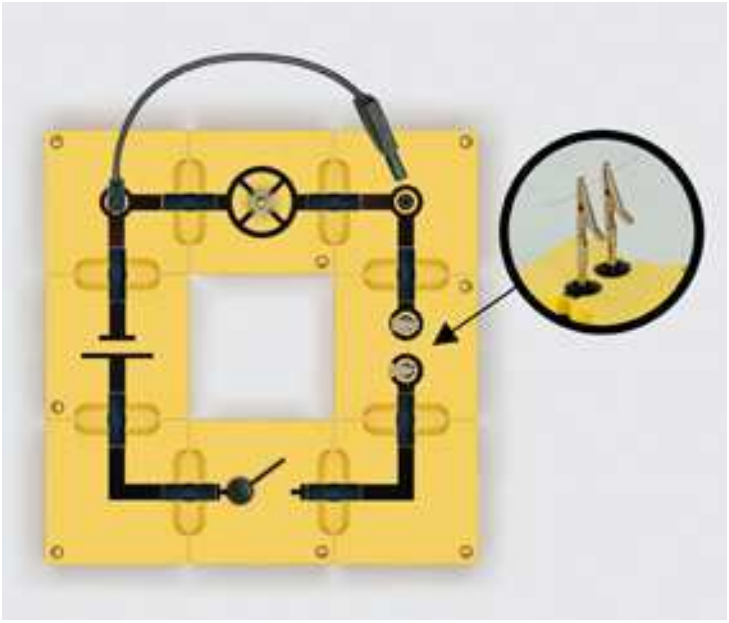
To investigate the relationship between current and voltage in an incandescent lamp.

To determine the resistance characteristics of an incandescent lamp.

consisting of:

1	539024	Lamp socket E10, BST D
1	50515	Bulb 6 V/0.05 A, E10, set of 10
1	539025	Toggle switch, BST D
2	539003	Connector blocks straight with 2 sockets, BST D
2	539004	Connector blocks 90° angle, BST D
2	539005	Connector blocks 90° angle with socket, BST D
8	539000	Bridging plug, BST
2	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
6	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.4 Electric Resistance
D3.4.4.9.a Fuse - Set-up with connector blocks and bridging plugs



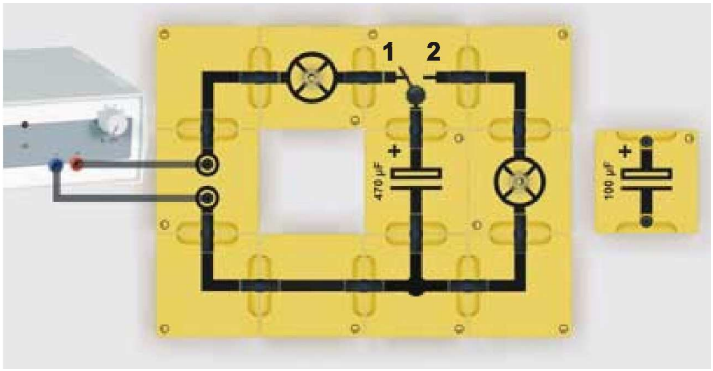
To demonstrate the layout and working principle of a melting fuse.

consisting of:

1	539024	Lamp socket E10, BST D
1	50511	Bulb 2.5 V/0.25 W, E10, set of 10
1	539025	Toggle switch, BST D
1	539053	Battery element, BST D
1	539003	Connector blocks straight with 2 sockets, BST D
2	539004	Connector blocks 90° angle, BST D
2	539005	Connector blocks 90° angle with socket, BST D
8	539000	Bridging plug, BST
1	501861	Crocodile-clips, polished, set of 6
2	34089	Coupling plug 4 mm
1	55051	Iron wire, 0.20 mm Ø, 100 m
1	500624	Safety connecting lead 50 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.5 Capacitors

D3.4.5.1.a Charging and discharging of a capacitor - Set-up with connector blocks and bridging plugs

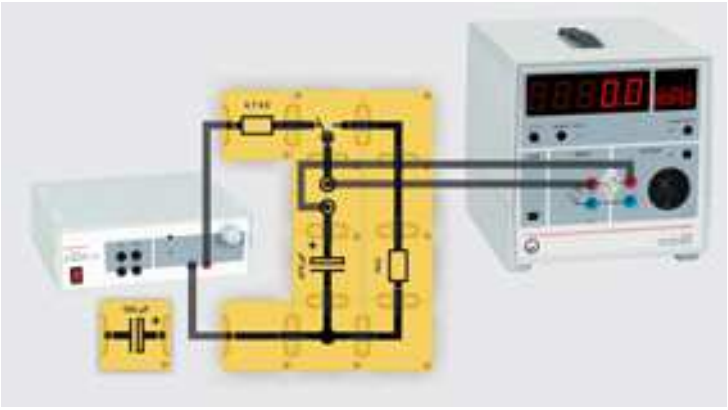


To demonstrate the capacitor's charge and discharge process.

consisting of:

1	539030	Electrolytic capacitor 470 µF, BST D
1	539029	Electrolytic capacitor 100 µF, BST D
2	539024	Lamp socket E10, BST D
1	50515	Bulb 6 V/0.05 A, E10, set of 10
1	539026	Change-over switch, BST D
1	539001	Connector blocks, straight, BST D
1	539003	Connector blocks straight with 2 sockets, BST D
4	539004	Connector blocks 90° angle, BST D
1	539006	Connector blocks, T branch, BST D
12	539000	Bridging plug, BST
1	521491	AC/DC power supply 0...12 V/3 A
2	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.5 Capacitors
D3.4.5.1.b Charging and discharging of a capacitor - Joule and Wattmeter

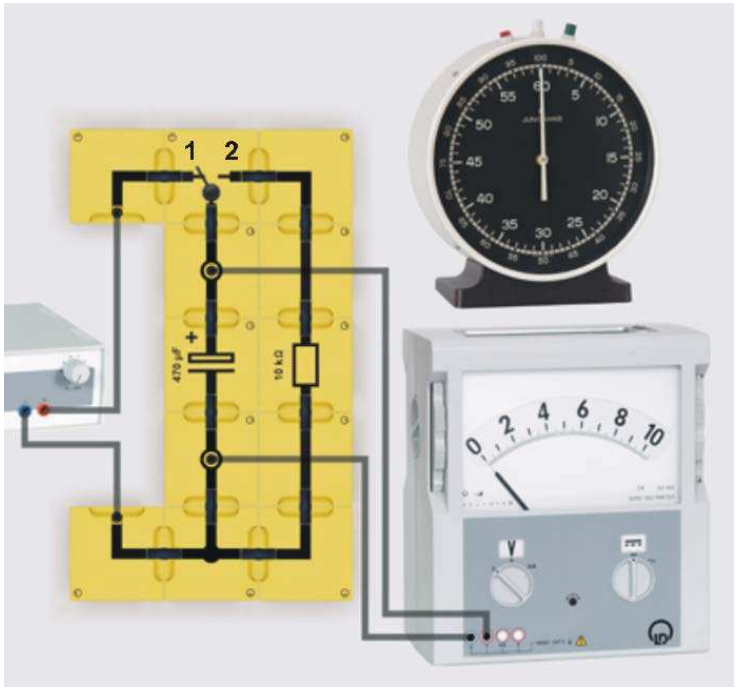


To demonstrate the capacitor's charge and discharge process.

consisting of:

1	539030	Electrolytic capacitor 470 µF, BST D
1	539029	Electrolytic capacitor 100 µF, BST D
1	539011	Resistor 1 kΩ, BST D
1	539012	Resistor 4.7 kΩ, BST D
1	539026	Change-over switch, BST D
2	539001	Connector blocks, straight, BST D
1	539003	Connector blocks straight with 2 sockets, BST D
2	539004	Connector blocks 90° angle, BST D
1	539007	Connector blocks, T branch with socket, BST D
10	539000	Bridging plug, BST
1	531831	Joule and Wattmeter
1	521491	AC/DC power supply 0...12 V/3 A
5	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.4.5 Capacitors
D3.4.5.2.a Discharge curve of a capacitor - Set-up with connector blocks and bridging plugs



To investigate the relationship between the voltage *U* and the discharge time *t* of a capacitor.

consisting of:

1	539030	Electrolytic capacitor 470 µF, BST D
1	539013	Resistor 10 kΩ, BST D
1	539026	Change-over switch, BST D
2	539001	Connector blocks, straight, BST D
2	539002	Connector blocks straight with socket, BST D
4	539004	Connector blocks 90° angle, BST D
1	539006	Connector blocks, T branch, BST D
12	539000	Bridging plug, BST
1	313052	Table stop-clock 0-60 1/100
1	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
4	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

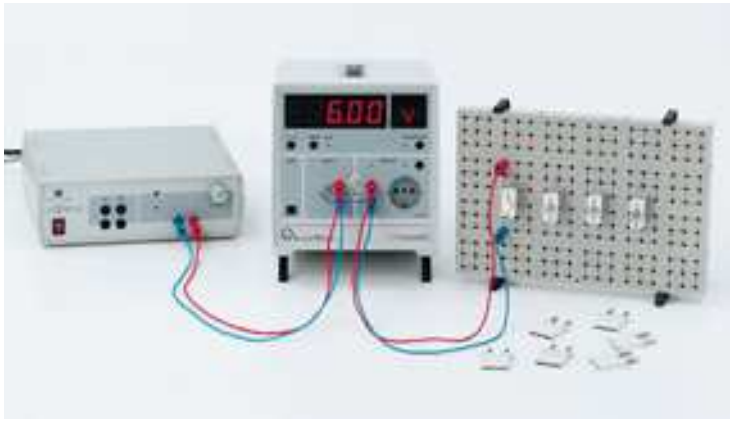
D3.4.6 Work, energy and power
D3.4.6.1.a Electrical power of different consumer - Joule and Wattmeter

Determination of the electrical power of different electrical consumers.

consisting of:

1	30325	Immersion heater
1	666767	Hotplate, 1500 W, 180 mm Ø
1	602025	Beaker, Boro 3.3, 2000 ml, squat
1	667100	Cover plate,20 cm x 20 cm
1	45117	Lamp socket, E27, Euro plug
1	505302	Halogen Bulb 230 V/46 W, E27
1	5053181	Energy saving lamp 230 V/11 W, E 27
1	30011	Saddle base
1	666735	Hot-air blower
1	531831	Joule and Wattmeter

D3.4.6 Work, energy and power
D3.4.6.2.b Electrical power depends on the intensity of current - Joule and Wattmeter

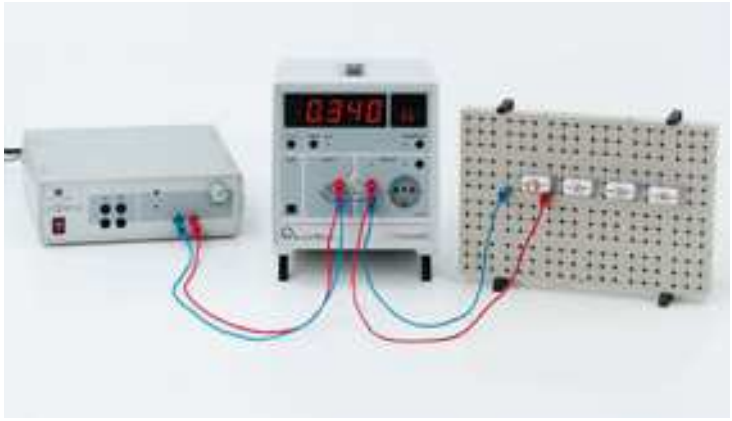


Investigation of the dependence of the electrical power on the intensity of current.

consisting of:

4	57906	Lamp holder E10, top, STE 2/19
4	50514	Bulb 6 V/3 W, E10, set of 10
1	57674	Plug-in board, DIN A4, STE
1	57677	Board holders STE, pair
1	50148	Bridging plugs STE 2/19, set of 10
1	531831	Joule and Wattmeter
1	521491	AC/DC power supply 0...12 V/3 A
2	50146	Connecting lead 19 A, 100 cm, red/blue, pair

D3.4.6 Work, energy and power
D3.4.6.3.b Electrical power depends on the voltage - Joule and Wattmeter



Investigation of the dependence of the electrical power on the voltage.

consisting of:

4	57906	Lamp holder E10, top, STE 2/19
4	50514	Bulb 6 V/3 W, E10, set of 10
1	57674	Plug-in board, DIN A4, STE
1	57677	Board holders STE, pair
1	531831	Joule and Wattmeter
1	521491	AC/DC power supply 0...12 V/3 A
2	50146	Connecting lead 19 A, 100 cm, red/blue, pair

D3.4.6 Work, energy and power
D3.4.6.4.a Electrical power and luminous intensity of lamps - Joule and Wattmeter, Sensor-CASSY, Lux sensor

Investigation of the relationship between luminous intenstiy *E* and electrical power *P* of different incandescent lamps.

Comparison of electrical power and luminous intenstiy of incandescent lamps energy saving lamps.

consisting of:

1	45117	Lamp socket, E27, Euro plug
1	505302	Halogen Bulb 230 V/46 W, E27
1	5053181	Energy saving lamp 230 V/11 W, E 27
1	46875	Infrared barrier filter
1	46022	Holder with spring clips
1	44153	Screen, translucent
1	666243	Lux sensor
1	5240511	Lux adapter S
1	524013	Sensor-CASSY 2
1	524220	CASSY Lab 2
1	531831	Joule and Wattmeter
1	460310	Optical bench, S1 profile, 1 m
3	460311	Clamp rider with clamp 45/65
1	30011	Saddle base

additionally required: 1 PC with Windows XP or higher

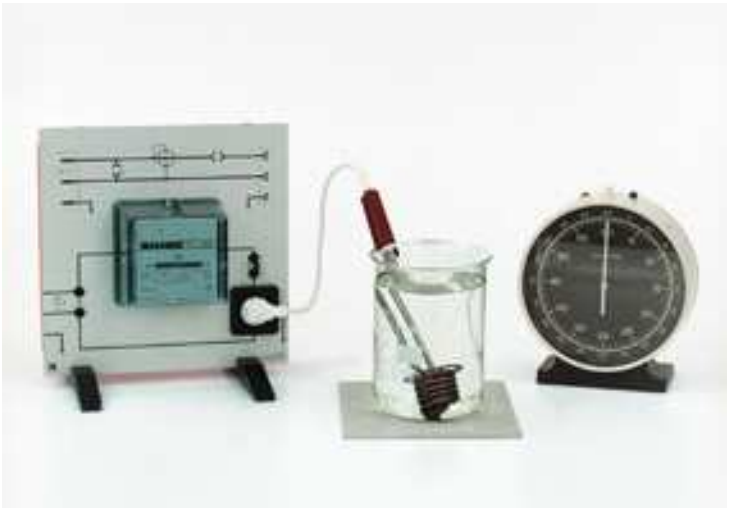
D3.4.6 Work, energy and power
D3.4.6.5.a Electrical work depends on the time - Joule and Wattmeter

Investigation of the dependence of the electrical work on the time at constant power.

consisting of:

1	30325	Immersion heater
1	602025	Beaker, Boro 3.3, 2000 ml, squat
1	531831	Joule and Wattmeter
1	313052	Table stop-clock 0-60 1/100
1	667100	Cover plate,20 cm x 20 cm

D3.4.6 Work, energy and power
D3.4.6.6.a Electrical work and power of an immersion heater - Alternating current meter



Determination of the performed electrical work *W* and power *P* of an immersion heater from the number of turns of the counter disc, the meter constant and the time.

Investigate of the results obtained.

consisting of:

1	560331	Alternating current meter
1	301339	Stand bases, pair
1	313052	Table stop-clock 0-60 1/100
1	30325	Immersion heater
1	602025	Beaker, Boro 3.3, 2000 ml, squat
1	667100	Cover plate,20 cm x 20 cm

D3.4.6 Work, energy and power
D3.4.6.7.a Electrical work of an immersion heater - Alternating current meter, Demo-Multimeter

Determination of the electrical work required for heating a immersion heater with an alternating current meter.

Investigate the measurement result by calculating the electrical work from current, voltage and time.

consisting of:

1	560331	Alternating current meter
1	313052	Table stop-clock 0-60 1/100
2	531906	Demo Multimeter, passive
1	38221	Stirring thermometer -10...+110 °C
1	30325	Immersion heater
1	602025	Beaker, Boro 3.3, 2000 ml, squat
1	301300	Demonstration-experiment-frame
2	301310	Equipment shelf
1	667100	Cover plate,0 cm x 20 cm
4	500644	Safety connection lead 100 cm, black

D3.4.6 Work, energy and power
D3.4.6.7.b Electrical work of an immersion heater - Joule and Wattmeter

Determination of the electrical work required for heating a immersion heater with a Joule and wattmeter.

consisting of:

1	531831	Joule and Wattmeter
1	38221	Stirring thermometer -10...+110 °C
1	30325	Immersion heater
1	602025	Beaker, Boro 3.3, 2000 ml, squat
1	667100	Cover plate,20 cm x 20 cm

D3.4.6 Work, energy and power
D3.4.6.8.a Electrical work at cooking - Joule and Wattmeter, Hot plate

Investigation of the electrical work when boiling water in a vessel with and without a lid.

Investigation of the electrical work when boiling water in vessels of different diameters.

consisting of:

1	664178	Crystallization dish, 190 mm Ø
1	664177	Crystallisation dish, 140 mm diam., 900 ml
1	667100	Cover plate,20 cm x 20 cm
1	6735700	Sodium chloride 250 g
1	666767	Hotplate, 1500 W, 180 mm Ø
1	663609	Working gloves
1	531831	Joule and Wattmeter

D3.4.7 Interchange and transmission of energy
D3.4.7.1.b Efficiency of a d.c. motor - Motor and tachogenerator

Determine the efficiency of a DC motor.

consisting of:

1	57943	Motor and tachogenerator, STE 4/19/50
1	30948	Fishing line
1	667265	Rubber stopper, 28 x 34 x 35 mm, 1 hole 7 mm Ø
1	57671	Plug-in board section STE
1	57910	Key switch (NO), STE 2/19
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
1	46097	Metal rule, 0.5 m
1	313052	Table stop-clock 0-60 1/100
1	315234	Electronic balance MAULtronic S
1	30001	Stand base, V-shaped, large
1	30043	Stand rod 75 cm, 12 mm Ø
1	30125	Support block
1	30129	Pointer, pair
2	50146	Connecting lead 19 A, 100 cm, red/blue, pair
1	50145	Connecting lead 19 A, 50 cm, red/blue, pair

D3.4.7 Interchange and transmission of energy
D3.4.7.1.c Efficiency of a d.c. motor - Joule and Wattmeter

Determine the efficiency of a DC motor.

consisting of:

1	57943	Motor and tachogenerator, STE 4/19/50
1	30948	Fishing line
1	667265	Rubber stopper, 28 x 34 x 35 mm, 1 hole 7 mm Ø
1	57671	Plug-in board section STE
1	57910	Key switch (NO), STE 2/19
1	531831	Joule and Wattmeter
1	521491	AC/DC power supply 0...12 V/3 A
1	31102	Metal rule, 1 m
1	315234	Electronic balance MAULtronic S
1	30001	Stand base, V-shaped, large
1	30046	Stand rod 150 cm, 12 mm Ø
1	30125	Support block
1	30129	Pointer, pair
2	50136	Connecting lead 32 A, 200 cm, blue
2	50130	Connecting lead 32 A, 100 cm, red
1	50126	Connecting lead 32 A, 50 cm, blue

D3.4.7 Interchange and transmission of energy
D3.4.7.2.a Efficiency of a motor-tachogenerator - Motor and tachogenerator

Determine the efficiency of a tachogenerator.

consisting of:

1	57943	Motor and tachogenerator, STE 4/19/50
1	30948	Fishing line
1	667265	Rubber stopper, 28 x 34 x 35 mm, 1 hole 7 mm Ø
1	57671	Plug-in board section STE
1	57720	Resistor 10 Ohm, STE 2/19
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
1	46097	Metal rule, 0.5 m
1	313052	Table stop-clock 0-60 1/100
1	315234	Electronic balance MAULtronic S
1	30001	Stand base, V-shaped, large
1	30043	Stand rod 75 cm, 12 mm Ø
1	30125	Support block
1	30129	Pointer, pair
2	50146	Connecting lead 19 A, 100 cm, red/blue, pair
1	500422	Connecting lead 19 A, 50 cm, blue

D3.4.7 Interchange and transmission of energy
D3.4.7.2.b Efficiency of a motor-tachogenerator - Joule and Wattmeter

Determine the efficiency of a tachogenerator.

consisting of:

1	57943	Motor and tachogenerator, STE 4/19/50
1	30948	Fishing line
1	667265	Rubber stopper, 28 x 34 x 35 mm, 1 hole 7 mm Ø
1	57720	Resistor 10 Ohm, STE 2/19
1	531831	Joule and Wattmeter
1	31102	Metal rule, 1 m
1	315234	Electronic balance MAULtronic S
1	30001	Stand base, V-shaped, large
1	30046	Stand rod 150 cm, 12 mm Ø
1	30125	Support block
1	30129	Pointer, pair
2	50136	Connecting lead 32 A, 200 cm, blue

D3.4.7 Interchange and transmission of energy
D3.4.7.3.a Converting electrical energy into thermal energy - Alternating current meter, Immersion heater

Demonstrate how electrical energy is converted into thermal energy in an immersion heater.

Compare the electrical energy and thermal energy.

consisting of:

1	560331	Alternating current meter
1	31523	Single-pan suspension balance 610 Tara
1	31525	Additional weights
1	38242	Demonstration thermometer -60...+160°C
1	30325	Immersion heater
1	602025	Beaker, Boro 3.3, 2000 ml, squat
1	667100	Cover plate,20 cm x 20 cm
1	301350	CASSY frame
1	666470	Holder with clamp, height-adjustable, CPS
1	666555	Universal clamp 0...80 mm

D3.4.7 Interchange and transmission of energy
D3.4.7.3.b Converting electrical energy into thermal energy - Joule and Wattmeter, Immersion heater

Demonstrate how electrical energy is converted into thermal energy in an immersion heater.

Compare the electrical energy and thermal energy.

consisting of:

1	531831	Joule and Wattmeter
1	31523	Single-pan suspension balance 610 Tara
1	31525	Additional weights
1	38242	Demonstration thermometer -60...+160°C
1	30325	Immersion heater
1	602025	Beaker, Boro 3.3, 2000 ml, squat
1	667100	Cover plate,20 cm x 20 cm
1	30002	Stand base, V-shaped, small
1	30042	Stand rod 47 cm, 12 mm Ø
1	30101	Leybold multiclamp
1	666555	Universal clamp 0...80 mm

D3.4.7 Interchange and transmission of energy
D3.4.7.7.a Power characteristic of a solar cell - Joule and Wattmeter

Investigate the power of a solar cell as a function of the load resistance.

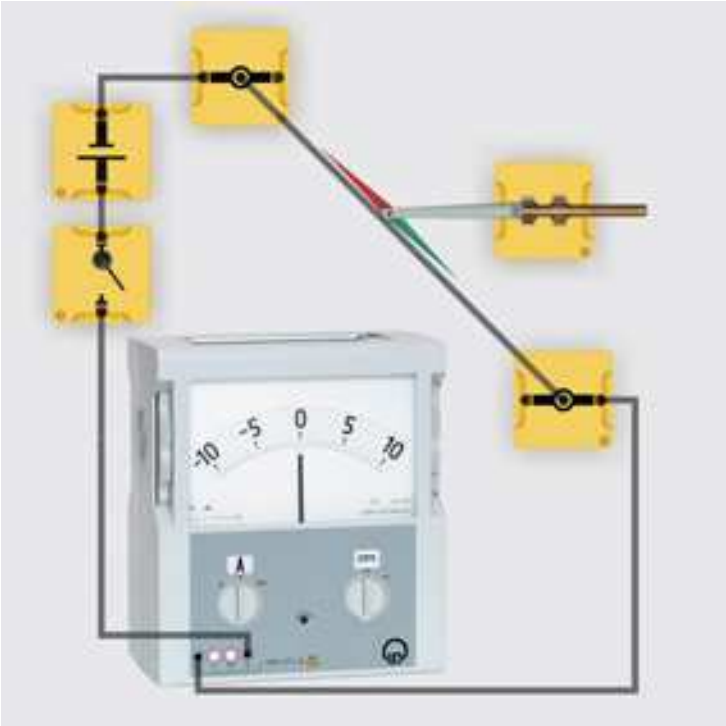
Compare the optimum load resistance with the internal resistance of the solar cell.

consisting of:

1	664431	Solar module 10 V/0.3 A
1	45073	Halogen lamp 1000 W
1	53734	Rheostat 100 Ohm
1	531831	Joule and Wattmeter
1	30001	Stand base, V-shaped, large
1	30040	Stand rod 10 cm, 12 mm Ø
1	30101	Leybold multiclamp
2	50146	Connecting lead 19 A, 100 cm, red/blue, pair

additionally required: 1 PC with Windows 2000/XP/Vista

D3.5.1 Electromagnetism
D3.5.1.1.a Magnetic effect of electric current - Set-up with the modular block system

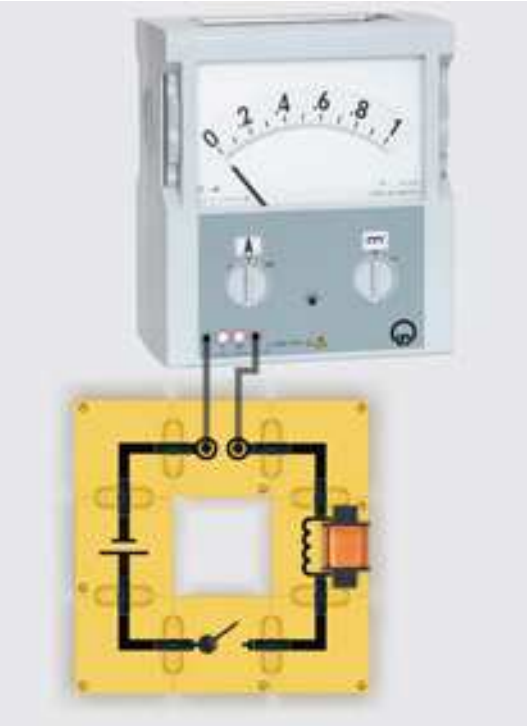


To demonstrate the magnetic effect of an electric current.

consisting of:

1	514011	Magnetic field indicator
1	59002	Small clip plug
1	539025	Toggle switch, BST D
2	539002	Connector blocks straight with socket, BST D
1	539003	Connector blocks straight with 2 sockets, BST D
1	531906	Demo Multimeter, passive
1	539053	Battery element, BST D
1	500604	Safety connection cead 10 cm, black
1	500624	Safety connecting lead 50 cm, black
2	500644	Safety connection lead 100 cm, black
1	500424	Connecting lead 19 A, 50 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.5.2 Electromagnetic applications
D3.5.2.1.a Model of an electromagnet - Set-up with connector blocks and bridging plugs

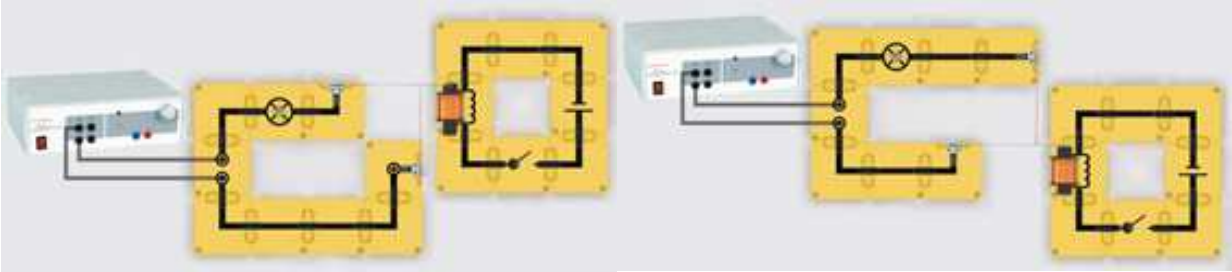


To demonstrate the layout and working principle of an electromagnet.

consisting of:

1	539052	Coil holder, BST D
1	59083	Coil 500 turns STE 2/50
1	59321	Transformer core, demountable
1	51054	Magnetizable rods, set of 4
1	31539	Weight with hook 1 kg
1	539025	Toggle switch, BST D
1	539053	Battery element, BST D
1	539003	Connector blocks straight with 2 sockets, BST D
4	539004	Connector blocks 90° angle, BST D
8	539000	Bridging plug, BST
1	531906	Demo Multimeter, passive
2	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.5.2 Electromagnetic applications
D3.5.2.2.a Model of a relay - Set-up with connector blocks and bridging plugs

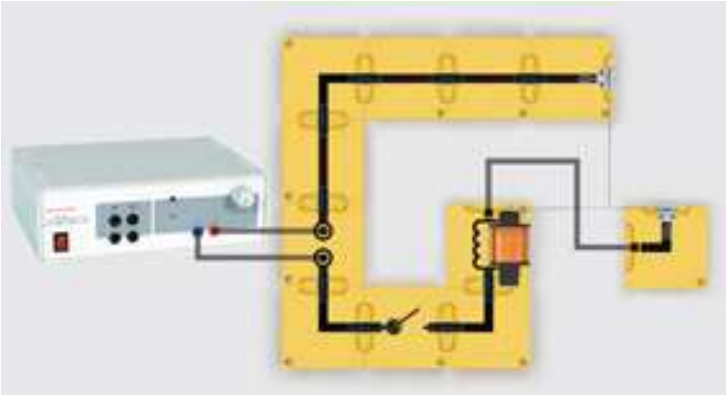


To demonstrate the layout and working principle of a relay with normally open and normally closed contact.

consisting of:

1	539052	Coil holder, BST D
1	59083	Coil 500 turns STE 2/50
1	59321	Transformer core, demountable
1	539024	Lamp socket E10, BST D
1	50515	Bulb 6 V/0.05 A, E10, set of 10
1	539025	Toggle switch, BST D
1	539053	Battery element, BST D
2	539060	Adapter plug, BST
1	539061	Contact strip, BST
1	539064	Leaf spring, BST
4	539001	Connector blocks, straight, BST D
1	539003	Connector blocks straight with 2 sockets, BST D
8	539004	Connector blocks 90° angle, BST D
1	539005	Connector blocks 90° angle with socket, BST D
16	539000	Bridging plug, BST
1	521491	AC/DC power supply 0...12 V/3 A
2	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.5.2 Electromagnetic applications
D3.5.2.3.a Model of an electric bell - Set-up with connector blocks and bridging plugs

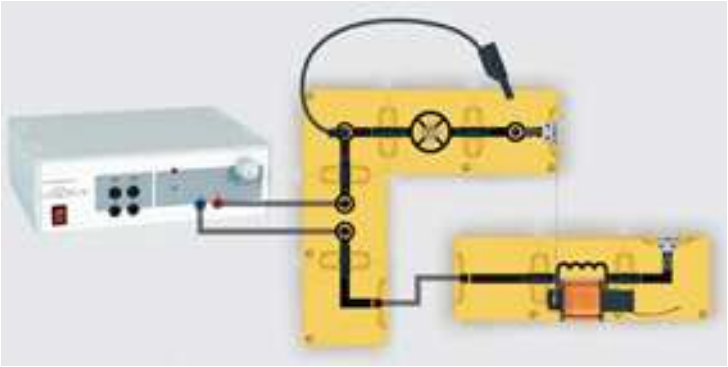


To demonstrate the layout and working principle of an electric bell.

consisting of:

1	539052	Coil holder, BST D
1	59083	Coil 500 turns STE 2/50
1	59321	Transformer core, demountable
1	539025	Toggle switch, BST D
2	539060	Adapter plug, BST
1	539061	Contact strip, BST
1	539064	Leaf spring, BST
4	539001	Connector blocks, straight, BST D
1	539003	Connector blocks straight with 2 sockets, BST D
4	539004	Connector blocks 90° angle, BST D
9	539000	Bridging plug, BST
1	521491	AC/DC power supply 0...12 V/3 A
1	500624	Safety connecting lead 50 cm, black
2	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.5.2 Electromagnetic applications
D3.5.2.4.a Magnetic circuit breaker - Set-up with connector blocks and bridging plugs

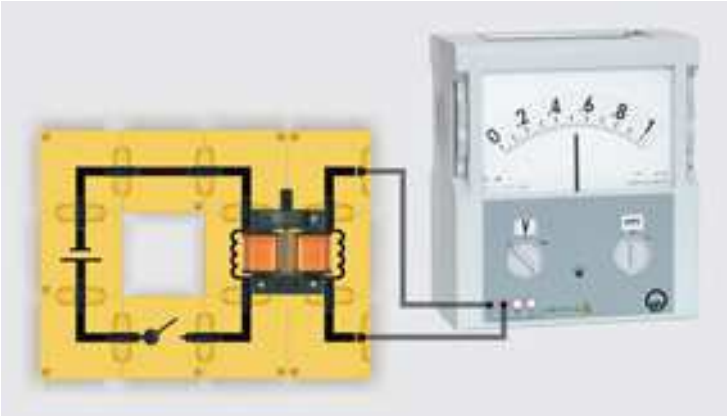


To demonstrate the layout and working principle of a magnetic circuit breaker.

consisting of:

1	539052	Coil holder, BST D
1	59083	Coil 500 turns STE 2/50
1	59321	Transformer core, demountable
1	539024	Lamp socket E10, BST D
1	50515	Bulb 6 V/0.05 A, E10, set of 10
2	539060	Adapter plug, BST
1	539061	Contact strip, BST
1	539064	Leaf spring, BST
1	539001	Connector blocks, straight, BST D
1	539002	Connector blocks straight with socket, BST D
1	539003	Connector blocks straight with 2 sockets, BST D
2	539004	Connector blocks 90° angle, BST D
1	539005	Connector blocks 90° angle with socket, BST D
6	539000	Bridging plug, BST
1	521491	AC/DC power supply 0...12 V/3 A
2	500624	Safety connecting lead 50 cm, black
2	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.5.5 Transformer
D3.5.5.1.a Electromagnetic induction with two coils - Set-up with connector blocks and bridging plugs

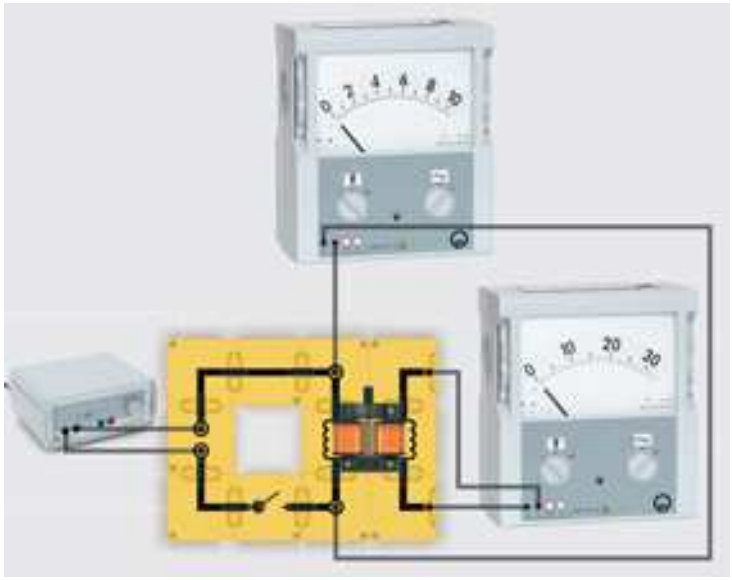


To demonstrate the occurrence of an induction voltage at two coils connected by an iron core.

consisting of:

2	539052	Coil holder, BST D
1	59083	Coil 500 turns STE 2/50
1	59084	Coil 1000 turns STE 2/50
1	59321	Transformer core, demountable
1	539025	Toggle switch, BST D
1	539053	Battery element, BST D
1	539001	Connector blocks, straight, BST D
6	539004	Connector blocks 90° angle, BST D
10	539000	Bridging plug, BST
1	531906	Demo Multimeter, passive
2	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.5.5 Transformer
D3.5.5.2.a Voltage transformation - Set-up with connector blocks and bridging plugs

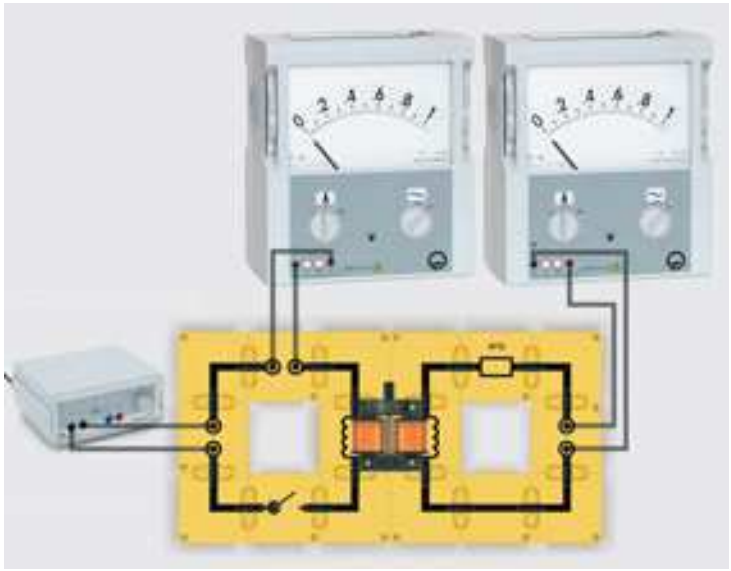


To investigate the relationship between voltage *U* and the number of turns *N* in the primary and secondary circuits of an unloaded transformer.

consisting of:

2	539052	Coil holder, BST D
1	59083	Coil 500 turns STE 2/50
1	59084	Coil 1000 turns STE 2/50
1	59321	Transformer core, demountable
1	539025	Toggle switch, BST D
1	539001	Connector blocks, straight, BST D
1	539003	Connector blocks straight with 2 sockets, BST D
4	539004	Connector blocks 90° angle, BST D
2	539005	Connector blocks 90° angle with socket, BST D
10	539000	Bridging plug, BST
2	531906	Demo Multimeter, passive
1	521231	Low-voltage power supply 3/6/9/12 V
6	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.5.5 Transformer
D3.5.5.3.a Current transformation - Set-up with connector blocks and bridging plugs

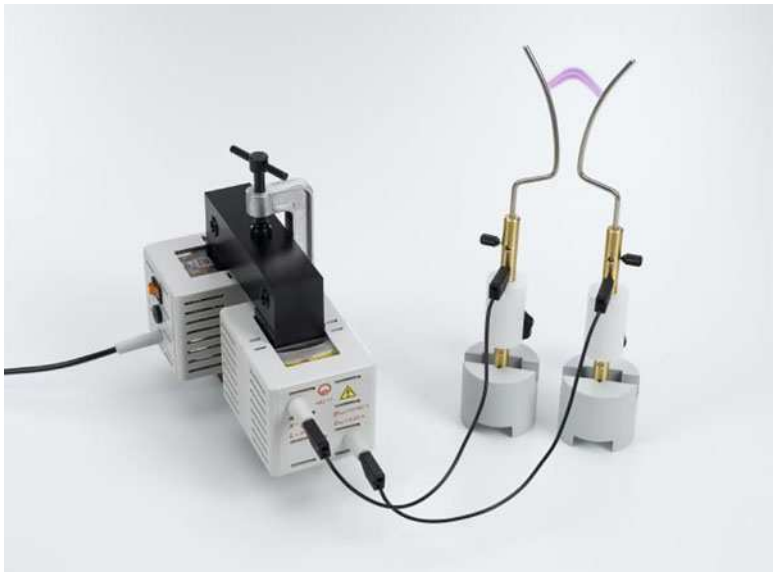


To investigate the relationship between the currents *I* and the number of turns *N* in the primary and secondary circuits of a loaded transformer.

consisting of:

2	539052	Coil holder, BST D
1	59083	Coil 500 turns STE 2/50
1	59084	Coil 1000 turns STE 2/50
1	59321	Transformer core, demountable
1	539025	Toggle switch, BST D
1	539008	Resistor 47 Ω, BST D
1	539001	Connector blocks, straight, BST D
3	539003	Connector blocks straight with 2 sockets, BST D
8	539004	Connector blocks 90° angle, BST D
16	539000	Bridging plug, BST
2	531906	Demo Multimeter, passive
1	521231	Low-voltage power supply 3/6/9/12 V
6	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D3.5.6 Applications for transformer
D3.5.6.2 Model of a high-voltage transformer



Demonstrate the design and function of a high-voltage transformer with horn electrodes.

consisting of:

1	56211	U-core with yoke
1	562121	Clamping device with spring clip
1	56221	Mains coil 500 turns
1	56217	Coil, 23 000 turns
2	30011	Saddle base
2	54052	Experiment insulator
2	500414	Connecting lead 19 A, 25 cm, black

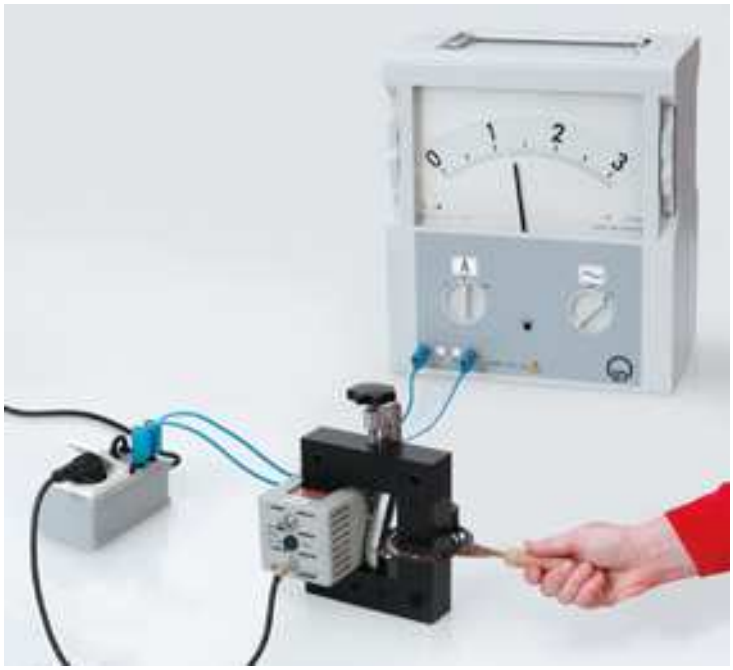
D3.5.6 Applications for transformer
D3.5.6.4.a Model of a high-current transformer - Melting a nail

Demonstrating the heating effect of a high-current transformer.

consisting of:

1	56221	Mains coil 500 turns
1	56219	Coil, 5 turns
1	56211	U-core with yoke
1	562121	Clamping device with spring clip
1	667104	Cover plate, 50 cm x 50 cm

D3.5.6 Applications for transformer
D3.5.6.4.c Model of a high-current transformer - Induction furnace



Demonstrating the operation of an induction furnace.

Measuring the primary current and estimating the secondary current.

consisting of:

1	56221	Mains coil 500 turns
1	56220	Ring-shaped melting ladle
1	56232	Melting ring
1	56211	U-core with yoke
1	562121	Clamping device with spring clip
1	531906	Demo Multimeter, passive
2	500644	Safety connection lead 100 cm, black
1	50205	Measuring junction box

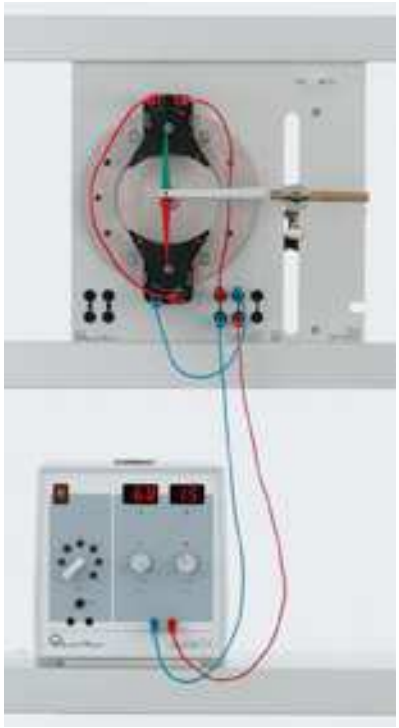
D3.6.1 Stator and rotor
D3.6.1.1 Magnetic field of a permanent magnet stator

Investigate the magnetic field of a permanent magnet stator.

consisting of:

1	72781	Basic Machine Unit
2	563091	ELM Pole piece for magnets
1	51048	Magnets, 35 mm Ø, pair
1	56316	Hex key
1	514011	Magnetic field indicator
1	666470	Holder with clamp, height-adjustable, CPS
1	666615	Universal bosshead
1	30041	Stand rod 25 cm, 12 mm Ø
1	301300	Demonstration-experiment-frame
2	30105	Bench clamp with pin

D3.6.1 Stator and rotor
D3.6.1.2 Magnetic field of an electromagnetic stator



Investigate the magnetic field of an electromagnetic stator.

consisting of:

1	72781	Basic Machine Unit
2	563101	ELM Wide pole piece for coils
2	56311	ELM Coil 250 turns
1	56316	Hex key
1	514011	Magnetic field indicator
1	521546	DC Power Supply 0...16 V/0...5 A
1	50145	Connecting lead 19 A, 50 cm, red/blue, pair
1	500411	Connecting lead 19 A, 25 cm, red
1	50144	Connecting lead 19 A, 25 cm, red/blue, pair
1	666470	Holder with clamp, height-adjustable, CPS
1	666615	Universal bosshead
1	30041	Stand rod 25 cm, 12 mm Ø
1	301300	Demonstration-experiment-frame
1	301311	Profile rail
1	301310	Equipment shelf
2	30105	Bench clamp with pin

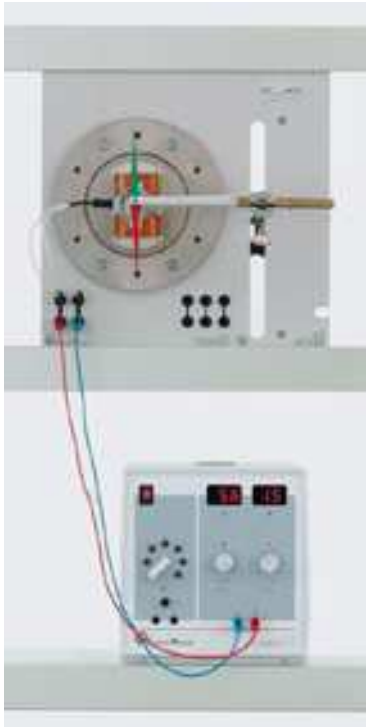
D3.6.1 Stator and rotor
D3.6.1.3 Magnetic field of a permanent magnet rotor

Investigate the magnetic field of a permanent magnet rotor.

consisting of:

1	72781	Basic Machine Unit
1	56319	ELM Magnet rotor
1	514011	Magnetic field indicator
1	666470	Holder with clamp, height-adjustable, CPS
1	666615	Universal bosshead
1	30041	Stand rod 25 cm, 12 mm Ø
1	301300	Demonstration-experiment-frame
2	30105	Bench clamp with pin

D3.6.1 Stator and rotor
D3.6.1.4 Magnetic field of an electromagnetic rotor with slip rings

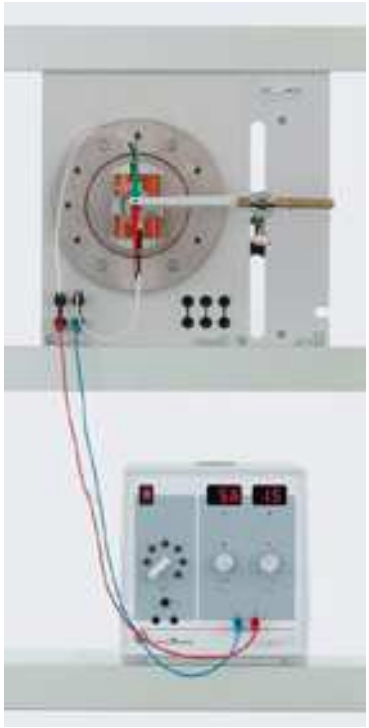


Investigate the magnetic field of an electromagnetic rotor with slip rings.

consisting of:

1	72781	Basic Machine Unit
1	56322	ELM Two-pole rotor
1	563181	ELM brush holder rack
2	56313	ELM Brush
1	514011	Magnetic field indicator
1	521546	DC Power Supply 0...16 V/0...5 A
1	50145	Connecting lead 19 A, 50 cm, red/blue, pair
1	666470	Holder with clamp, height-adjustable, CPS
1	666615	Universal bosshead
1	30041	Stand rod 25 cm, 12 mm Ø
1	301300	Demonstration-experiment-frame
1	301311	Profile rail
1	301310	Equipment shelf
2	30105	Bench clamp with pin

D3.6.1 Stator and rotor
D3.6.1.5 Magnetic field of an electromagnetic rotor with commutator

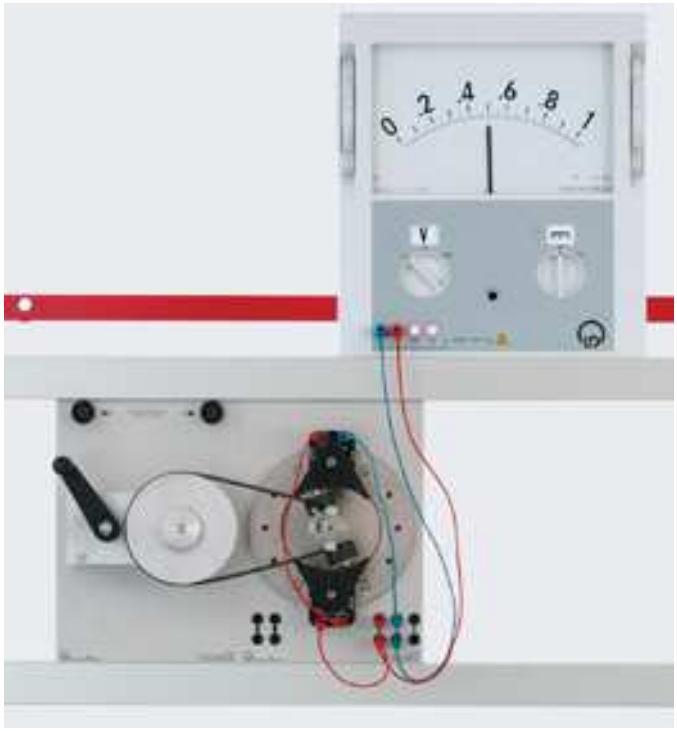


Investigate the magnetic field of an electromagnetic rotor with a commutator.

consisting of:

1	72781	Basic Machine Unit
1	56322	ELM Two-pole rotor
1	563181	ELM brush holder rack
2	56313	ELM Brush
1	514011	Magnetic field indicator
1	521546	DC Power Supply 0...16 V/0...5 A
1	50145	Connecting lead 19 A, 50 cm, red/blue, pair
1	666470	Holder with clamp, height-adjustable, CPS
1	666615	Universal bosshead
1	30041	Stand rod 25 cm, 12 mm Ø
1	301300	Demonstration-experiment-frame
1	301311	Profile rail
1	301310	Equipment shelf
2	30105	Bench clamp with pin

D3.6.2 Generator
D3.6.2.1.a Revolving-field generator - Measuring the voltage with a Demo-Multimeter



Demonstrate the design and investigate the function of a stationary armature generator.

consisting of:

1	72781	Basic Machine Unit
1	563303	ELM Hand cranked gear
1	56319	ELM Magnet rotor
1	563181	ELM brush holder rack
2	563101	ELM Wide pole piece for coils
2	56311	ELM Coil 250 turns
1	56317	ELM Centering disc
1	56316	Hex key
1	531906	Demo Multimeter, passive
1	500411	Connecting lead 19 A, 25 cm, red
1	50144	Connecting lead 19 A, 25 cm, red/blue, pair
1	50145	Connecting lead 19 A, 50 cm, red/blue, pair
1	301300	Demonstration-experiment-frame
1	301310	Equipment shelf
2	30105	Bench clamp with pin

D3.6.2 Generator
D3.6.2.1.b Revolving-field generator - Recording of AC voltage with Sensor-CASSY

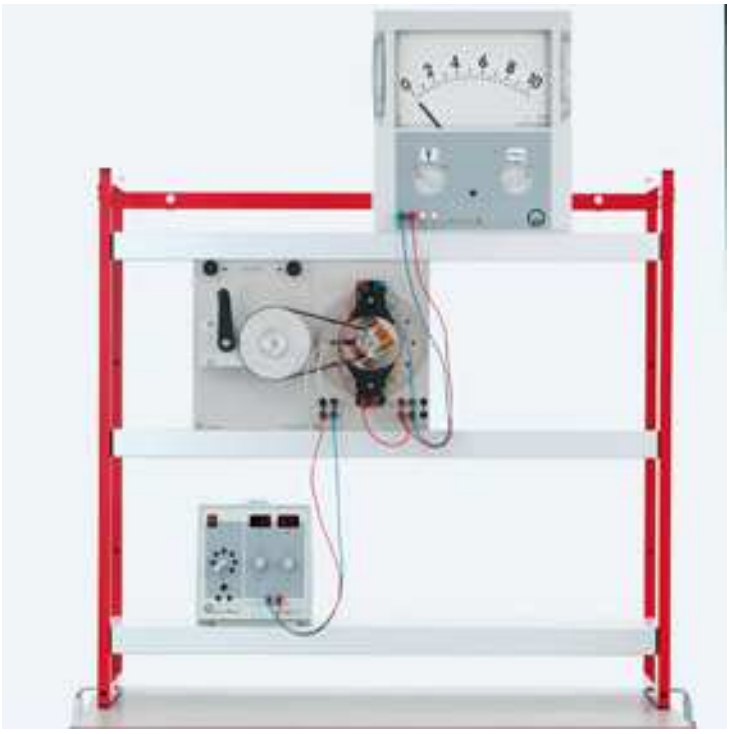
Demonstrate the design and investigate the function of a stationary armature generator.

consisting of:

1	72781	Basic Machine Unit
1	563303	ELM Hand cranked gear
1	56319	ELM Magnet rotor
1	563181	ELM brush holder rack
2	563101	ELM Wide pole piece for coils
2	56311	ELM Coil 250 turns
1	56317	ELM Centering disc
1	56316	Hex key
1	524013	Sensor-CASSY 2
1	524220	CASSY Lab 2
1	500411	Connecting lead 19 A, 25 cm, red
1	50144	Connecting lead 19 A, 25 cm, red/blue, pair
1	50145	Connecting lead 19 A, 50 cm, red/blue, pair
1	301300	Demonstration-experiment-frame
2	30105	Bench clamp with pin

additionally required: 1 PC with Windows XP or higher

D3.6.2 Generator
D3.6.2.2.a Revolving-field generator - dependence of the induced voltage - Measuring the voltage with a Demo-Multimeter



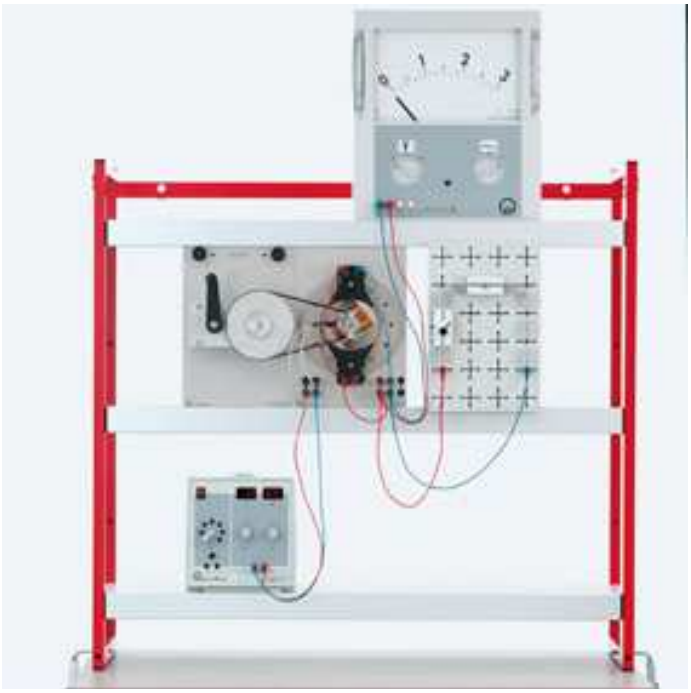
Investigate how the induced voltage depends on current in the rotor.

Investigate how the induced voltage depends on the speed of the rotor.

consisting of:

1	72781	Basic Machine Unit
1	563303	ELM Hand cranked gear
1	56322	ELM Two-pole rotor
1	563181	ELM brush holder rack
2	56313	ELM Brush
2	563101	ELM Wide pole piece for coils
2	56311	ELM Coil 250 turns
1	56317	ELM Centering disc
1	56316	Hex key
1	531906	Demo Multimeter, passive
1	521546	DC Power Supply 0...16 V/0...5 A
1	500411	Connecting lead 19 A, 25 cm, red
1	50144	Connecting lead 19 A, 25 cm, red/blue, pair
2	50145	Connecting lead 19 A, 50 cm, red/blue, pair
1	301300	Demonstration-experiment-frame
2	301310	Equipment shelf
1	301311	Profile rail
2	30105	Bench clamp with pin

D3.6.2 Generator
D3.6.2.3.a Revolving-field generator at load - Measuring the voltage with a Demo-Multimeter



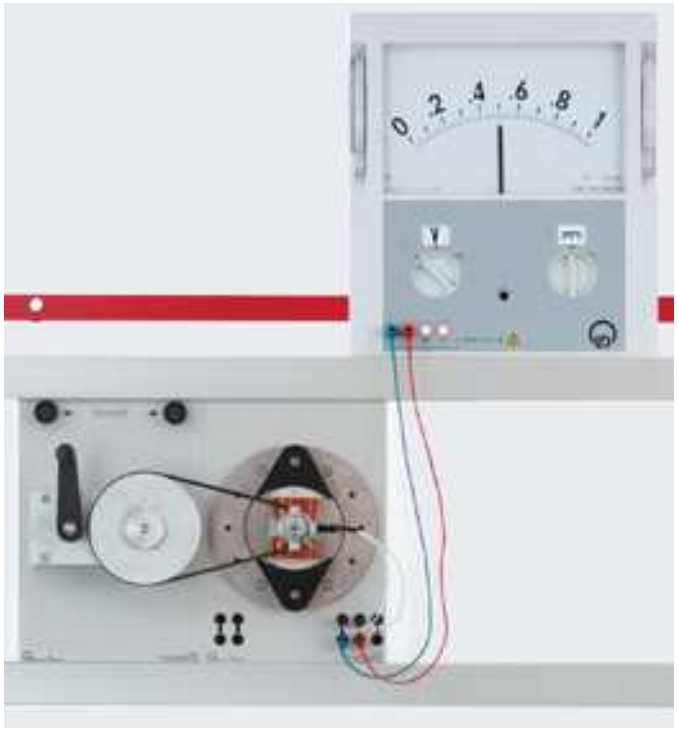
Investigate how the induced voltage depends on load.

Demonstrate generation of a constant alternating voltage by increasing the rotor current.

consisting of:

1	72781	Basic Machine Unit
1	563303	ELM Hand cranked gear
1	56322	ELM Two-pole rotor
1	563181	ELM brush holder rack
2	56313	ELM Brush
2	563101	ELM Wide pole piece for coils
2	56311	ELM Coil 250 turns
1	58270	Lamp holder E10, top, STE 2/50
1	50512	Bulb 3.5 V/0.2 A, E10, set of 10
1	58279	Toggle switch STE 2/50
1	50148	Bridging plugs STE 2/19, set of 10
1	57674	Plug-in board, DIN A4, STE
1	56317	ELM Centering disc
1	56316	Hex key
1	531906	Demo Multimeter, passive
1	521546	DC Power Supply 0...16 V/0...5 A
1	500411	Connecting lead 19 A, 25 cm, red
2	50144	Connecting lead 19 A, 25 cm, red/blue, pair
2	50145	Connecting lead 19 A, 50 cm, red/blue, pair
1	301300	Demonstration-experiment-frame
1	301320	Plug-in board holder STE
2	301310	Equipment shelf
1	301311	Profile rail
2	30105	Bench clamp with pin

D3.6.2 Generator
D3.6.2.4.a Revolving-armature generator for generating of AC voltage - Measuring the voltage with a Demo-Multimeter



Demonstration of the design and investigation of the function of a rotating armature generator for generating AC voltage.

consisting of:

1	72781	Basic Machine Unit
1	563303	ELM Hand cranked gear
1	56322	ELM Two-pole rotor
1	563181	ELM brush holder rack
2	56313	ELM Brush
2	563091	ELM Pole piece for magnets
1	51048	Magnets, 35 mm Ø, pair
1	56317	ELM Centering disc
1	56316	Hex key
1	531906	Demo Multimeter, passive
1	50145	Connecting lead 19 A, 50 cm, red/blue, pair
1	301300	Demonstration-experiment-frame
1	301310	Equipment shelf
2	30105	Bench clamp with pin

D3.6.2 Generator
D3.6.2.4.b Revolving-armature generator for generating of AC voltage - Recording of AC voltage with Sensor-CASSY

Demonstration of the design and investigation of the function of a rotating armature generator for generating AC voltage.

consisting of:

1	72781	Basic Machine Unit
1	563303	ELM Hand cranked gear
1	56322	ELM Two-pole rotor
1	563181	ELM brush holder rack
2	56313	ELM Brush
2	563091	ELM Pole piece for magnets
1	51048	Magnets, 35 mm Ø, pair
1	56317	ELM Centering disc
1	56316	Hex key
1	524013	Sensor-CASSY 2
1	524220	CASSY Lab 2
1	50145	Connecting lead 19 A, 50 cm, red/blue, pair
1	301300	Demonstration-experiment-frame
2	30105	Bench clamp with pin

additionally required: 1 PC with Windows XP or higher

D3.6.2 Generator
D3.6.2.5.a Revolving-armature generator for generating of DC voltage - Recording of pulsating DC voltage with Sensor-CASSY

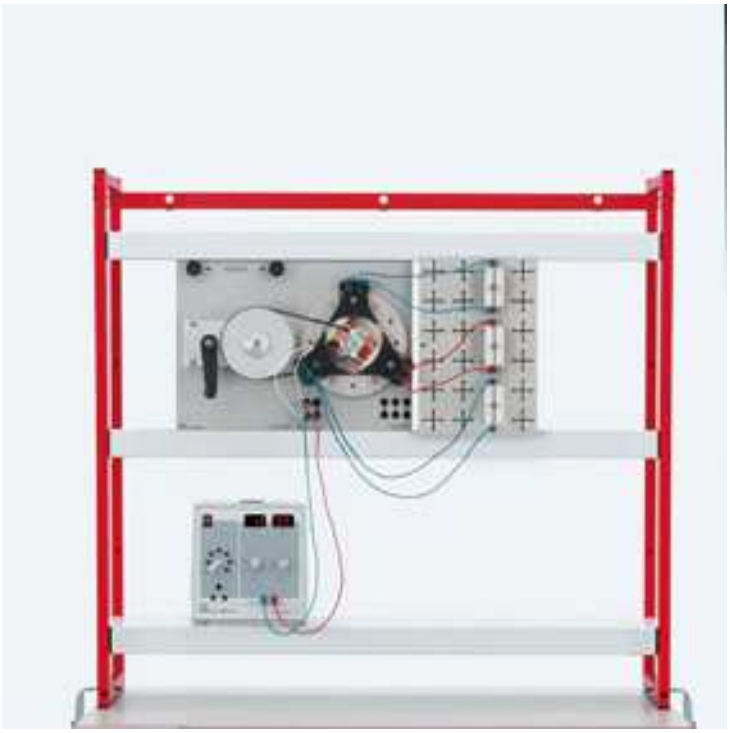
Demonstration of the design and investigation of the function of a rotating armature generator for generating DC voltage.

consisting of:

1	72781	Basic Machine Unit
1	563303	ELM Hand cranked gear
1	56322	ELM Two-pole rotor
1	563181	ELM brush holder rack
2	56313	ELM Brush
2	563091	ELM Pole piece for magnets
1	51048	Magnets, 35 mm Ø, pair
1	56317	ELM Centering disc
1	56316	Hex key
1	524013	Sensor-CASSY 2
1	524220	CASSY Lab 2
1	50145	Connecting lead 19 A, 50 cm, red/blue, pair
1	301300	Demonstration-experiment-frame
2	30105	Bench clamp with pin

additionally required: 1 PC with Windows XP or higher

D3.6.2 Generator
D3.6.2.6.a Generating of three-phase AC voltage - Demonstration of the voltage with incandescent lamps



Demonstration of the design and investigation of the function of a generator for generating three-phase alternating voltage.

consisting of:

1	72781	Basic Machine Unit
1	563303	ELM Hand cranked gear
1	56322	ELM Two-pole rotor
1	563181	ELM brush holder rack
2	56313	ELM Brush
3	563101	ELM Wide pole piece for coils
3	56311	ELM Coil 250 turns
3	58270	Lamp holder E10, top, STE 2/50
3	50511	Bulb 2.5 V/0.25 W, E10, set of 10
1	57674	Plug-in board, DIN A4, STE
1	56317	ELM Centering disc
1	56316	Hex key
1	521546	DC Power Supply 0...16 V/0...5 A
2	50144	Connecting lead 19 A, 25 cm, red/blue, pair
2	500412	Connecting lead 19 A, 25 cm, blue
1	50145	Connecting lead 19 A, 50 cm, red/blue, pair
1	301300	Demonstration-experiment-frame
1	301320	Plug-in board holder STE
1	301310	Equipment shelf
1	301311	Profile rail
2	30105	Bench clamp with pin

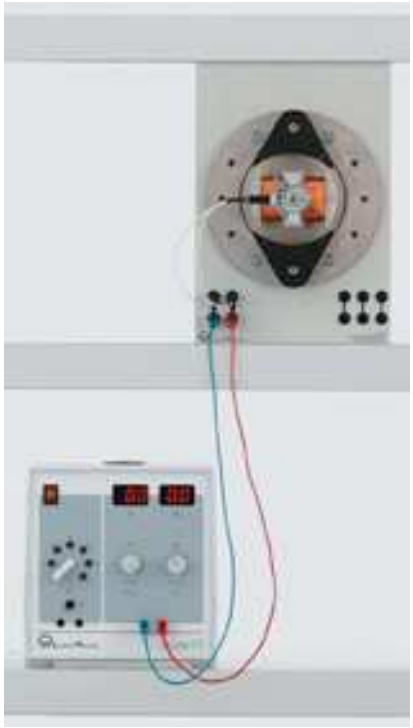
D3.6.2 Generator
D3.6.2.6.b Generating of three-phase AC voltage - Demonstration of the voltage with Demo-Multimeters

Demonstration of the design and investigation of the function of a generator for generating three-phase alternating voltage.

consisting of:

1	72781	Basic Machine Unit
1	563303	ELM Hand cranked gear
1	56322	ELM Two-pole rotor
1	563181	ELM brush holder rack
2	56313	ELM Brush
3	563101	ELM Wide pole piece for coils
3	56311	ELM Coil 250 turns
1	56317	ELM Centering disc
1	56316	Hex key
3	531902	Demo Multimeter, active
1	521546	DC Power Supply 0...16 V/0...5 A
2	500441	Connecting lead 19 A, 100 cm, red
3	50145	Connecting lead 19 A, 50 cm, red/blue, pair
1	301300	Demonstration-experiment-frame
2	301310	Equipment shelf
1	301311	Profile rail
2	30105	Bench clamp with pin

D3.6.3 Motor
D3.6.3.1.a Simple DC motor - Motor with two-pole rotor



Investigate the function of a DC motor with a two-pole rotor.

consisting of:

1	72781	Basic Machine Unit
1	56322	ELM Two-pole rotor
1	563181	ELM brush holder rack
2	56313	ELM Brush
2	563091	ELM Pole piece for magnets
1	51048	Magnets, 35 mm Ø, pair
1	56317	ELM Centering disc
1	56316	Hex key
1	521546	DC Power Supply 0...16 V/0...5 A
1	50145	Connecting lead 19 A, 50 cm, red/blue, pair
1	301300	Demonstration-experiment-frame
1	301310	Equipment shelf
1	301311	Profile rail
2	30105	Bench clamp with pin

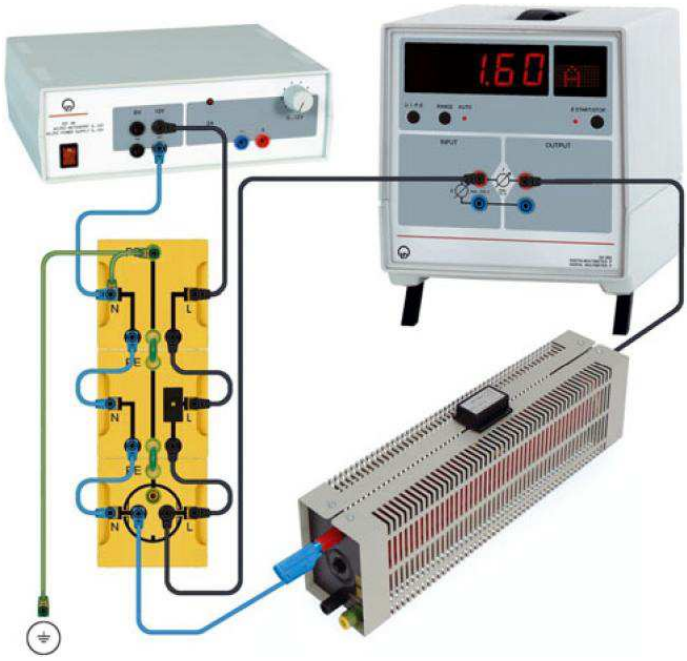
D3.6.3 Motor
D3.6.3.2.a Self-starting DC motor - Motor with three-pole rotor

Investigate the function of a DC motor with a three-pole rotor.

consisting of:

1	72781	Basic Machine Unit
1	56323	ELM Three-pole rotor
1	563181	ELM brush holder rack
2	56313	ELM Brush
2	563091	ELM Pole piece for magnets
1	51048	Magnets, 35 mm Ø, pair
1	56317	ELM Centering disc
1	56316	Hex key
1	531906	Demo Multimeter, passive
1	521546	DC Power Supply 0...16 V/0...5 A
1	50145	Connecting lead 19 A, 50 cm, red/blue, pair
1	301300	Demonstration-experiment-frame
1	301310	Equipment shelf
1	301311	Profile rail
2	30105	Bench clamp with pin

D3.8.1 Protection by fuses
D3.8.1.1.a Interruption of the electric circuit by a fuse - Electrical safety, supplementary set BST

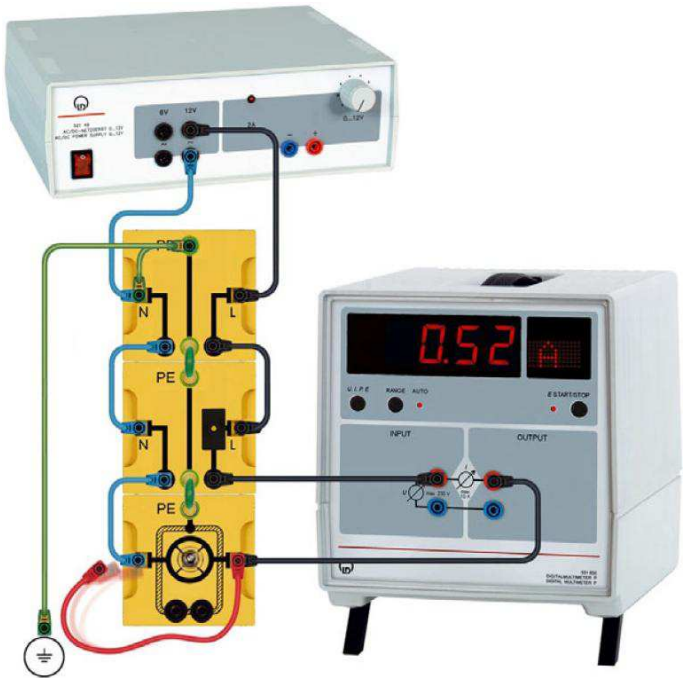


To investigate the relationship between the current and a circuit's disconnection time using a fuse.

consisting of:

1	539087	Model fuse, BST D
1	539086	Model wall outlet, BST D
1	539090	Lead component PE, N, L, BST D
1	53732	Rheostat 10 Ohm
1	531832	Digital Multimeter P
1	521491	AC/DC power supply 0...12 V/3 A
2	500602	Safety connection lead 10 cm, blue
2	500604	Safety connection cead 10 cm, black
1	500600	Safety connection lead 10 cm, yellow/green
1	500591	Safety bridging plugs, yellow/green, set of 10
2	500622	Safety connection lead 50 cm, blue
3	500624	Safety connecting lead 50 cm, black
1	500640	Safety connection lead 100 cm, yellow/green
	Additionally recommended:	
1	50204	Distribution box

D3.8.1 Protection by fuses
D3.8.1.2.a Overload by short circuit - Electrical safety, supplementary set BST

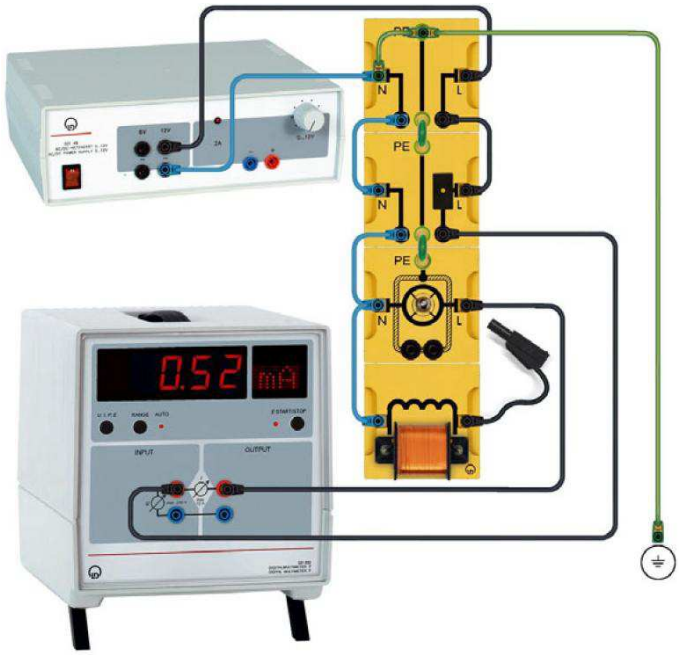


To demonstrate the protective function of a fuse in the event of a short circuit.

consisting of:

1	539087	Model fuse, BST D
1	539088	Load with housing, BST D
1	539090	Lead component PE, N, L, BST D
1	531832	Digital Multimeter P
1	521491	AC/DC power supply 0...12 V/3 A
2	500602	Safety connection lead 10 cm, blue
1	500604	Safety connection cead 10 cm, black
1	500601	Safety connection lead 10 cm, red
1	500600	Safety connection lead 10 cm, yellow/green
1	500591	Safety bridging plugs, yellow/green, set of 10
1	500622	Safety connection lead 50 cm, blue
3	500624	Safety connecting lead 50 cm, black
1	500640	Safety connection lead 100 cm, yellow/green
	Additionally recommended:	
1	50204	Distribution box

D3.8.1 Protection by fuses
D3.8.1.3.a Overload by electrical consumer - Electrical safety, supplementary set BST

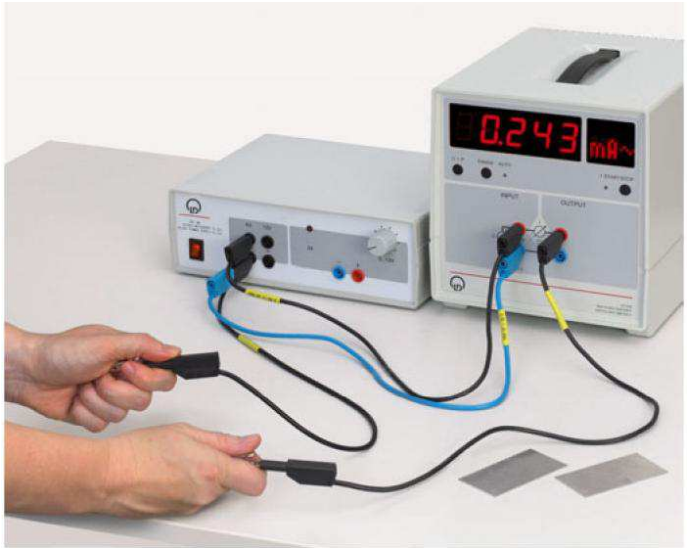


To demonstrate the protective function of a fuse in the event of overload due to an electrical load.

consisting of:

1	539087	Model fuse, BST D
1	539088	Load with housing, BST D
1	539090	Lead component PE, N, L, BST D
1	539052	Coil holder, BST D
1	59086	Coil 50 turns, STE 2/50
1	531832	Digital Multimeter P
1	521491	AC/DC power supply 0...12 V/3 A
3	500602	Safety connection lead 10 cm, blue
2	500604	Safety connection cead 10 cm, black
1	500600	Safety connection lead 10 cm, yellow/green
1	500591	Safety bridging plugs, yellow/green, set of 10
1	500622	Safety connection lead 50 cm, blue
3	500624	Safety connecting lead 50 cm, black
1	500640	Safety connection lead 100 cm, yellow/green
	Additionally recommended:	
1	50204	Distribution box

D3.8.2 The human body in the electric circuit
D3.8.2.1.a Current flow through a human body - Digital Multimeter P

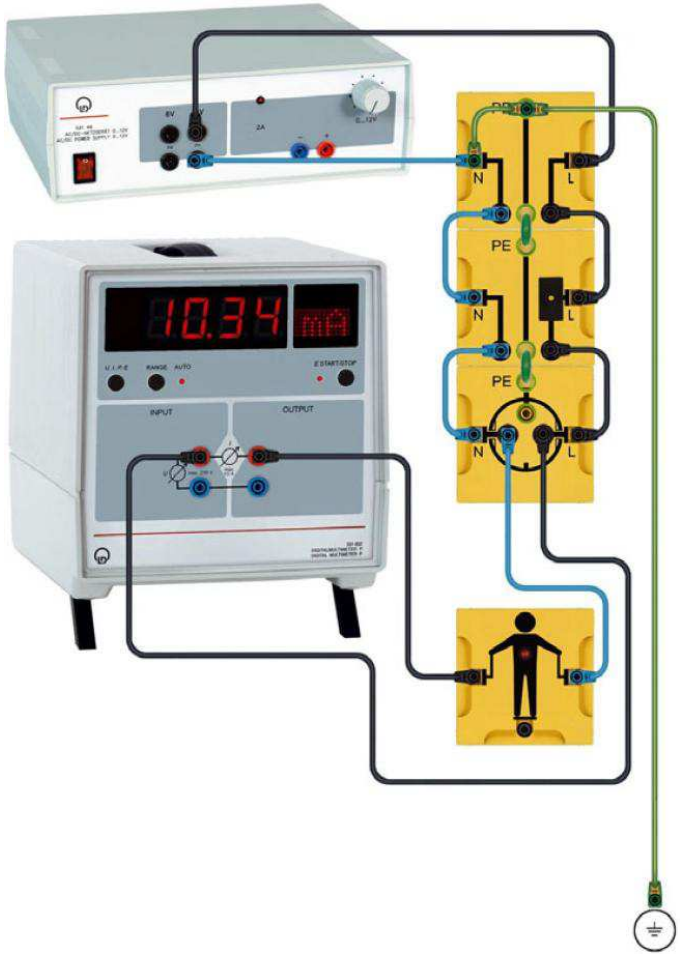


To investigate the relationship between current and voltage, skin moisture, and contact area when touching both poles of a voltage source.

consisting of:

1	59157	Plate electrode Aluminium, 76x40 mm, set of 10
1	501861	Crocodile-clips, polished, set of 6
1	521491	AC/DC power supply 0...12 V/3 A
1	531832	Digital Multimeter P
1	500622	Safety connection lead 50 cm, blue
3	500624	Safety connecting lead 50 cm, black

D3.8.2 The human body in the electric circuit
D3.8.2.2.a Two-pole contact - Electrical safety, supplementary set BST



To demonstrate an electric shock in the event of double-pole contact with a wall outlet.

consisting of:

1	539087	Model fuse, BST D
1	539086	Model wall outlet, BST D
1	539089	Model person, BST D
1	539090	Lead component PE, N, L, BST D
1	531832	Digital Multimeter P
1	521491	AC/DC power supply 0...12 V/3 A
2	500602	Safety connection lead 10 cm, blue
2	500604	Safety connection cead 10 cm, black
1	500600	Safety connection lead 10 cm, yellow/green
1	500591	Safety bridging plugs, yellow/green, set of 10
2	500622	Safety connection lead 50 cm, blue
3	500624	Safety connecting lead 50 cm, black
1	500640	Safety connection lead 100 cm, yellow/green
	Additionally recommended:	
1	50204	Distribution box

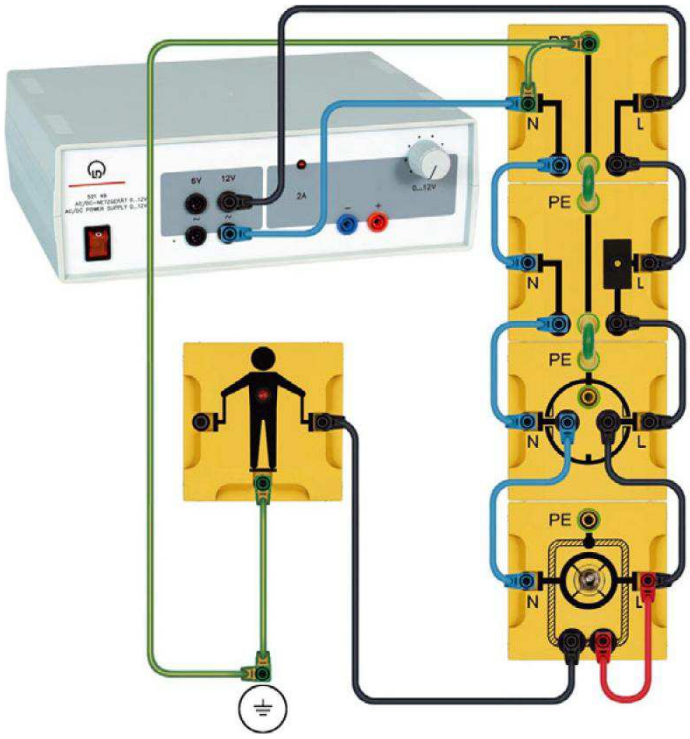
D3.8.2 The human body in the electric circuit
D3.8.2.3.a Single-pole contact - Electrical safety, supplementary set BST

To demonstrate an electric shock in the event of single-pole contact with a wall outlet or water pipe.

consisting of:

1	539087	Model fuse, BST D
1	539086	Model wall outlet, BST D
1	539089	Model person, BST D
1	539090	Lead component PE, N, L, BST D
1	539005	Connector blocks 90° angle with socket, BST D
1	30040	Stand rod 10 cm, 12 mm Ø
1	59002	Small clip plug
1	501861	Crocodile-clips, polished, set of 6
1	531832	Digital Multimeter P
1	521491	AC/DC power supply 0...12 V/3 A
2	500602	Safety connection lead 10 cm, blue
2	500604	Safety connection cead 10 cm, black
1	500600	Safety connection lead 10 cm, yellow/green
1	500591	Safety bridging plugs, yellow/green, set of 10
1	500622	Safety connection lead 50 cm, blue
3	500624	Safety connecting lead 50 cm, black
2	500640	Safety connection lead 100 cm, yellow/green
	Additionally recommended:	
1	50204	Distribution box

D3.8.2 The human body in the electric circuit
D3.8.2.4.a Frame short - Electrical safety, supplementary set BST

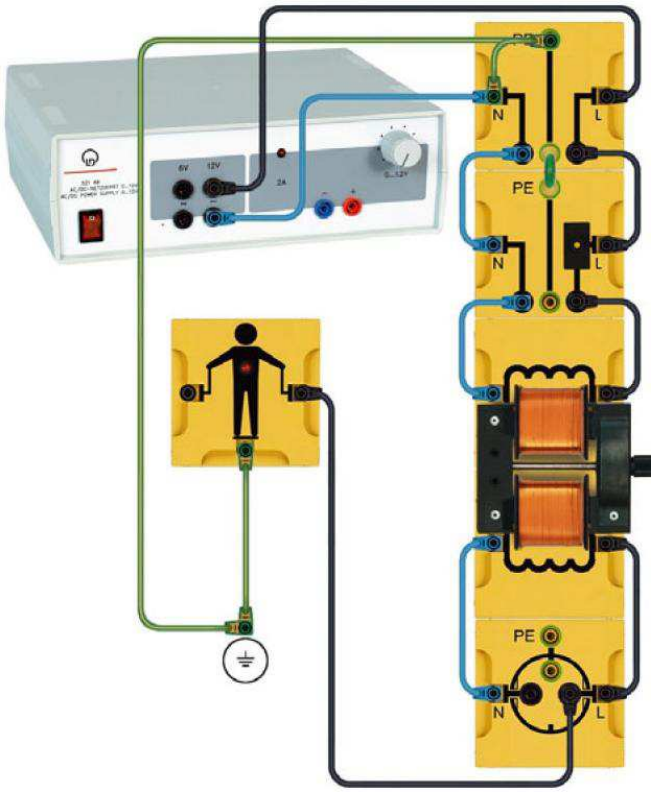


To demonstrate the effect of a fault to frame when touching an electrical load.

consisting of:

1	539087	Model fuse, BST D
1	539086	Model wall outlet, BST D
1	539089	Model person, BST D
1	539088	Load with housing, BST D
1	539090	Lead component PE, N, L, BST D
1	521491	AC/DC power supply 0...12 V/3 A
3	500602	Safety connection lead 10 cm, blue
3	500604	Safety connection cead 10 cm, black
1	500601	Safety connection lead 10 cm, red
1	500600	Safety connection lead 10 cm, yellow/green
1	500591	Safety bridging plugs, yellow/green, set of 10
1	500622	Safety connection lead 50 cm, blue
2	500624	Safety connecting lead 50 cm, black
2	500640	Safety connection lead 100 cm, yellow/green
	Additionally recommended:	
1	50204	Distribution box

D3.8.3 Safety controls
D3.8.3.1.a Protective separation - Electrical safety, supplementary set BST

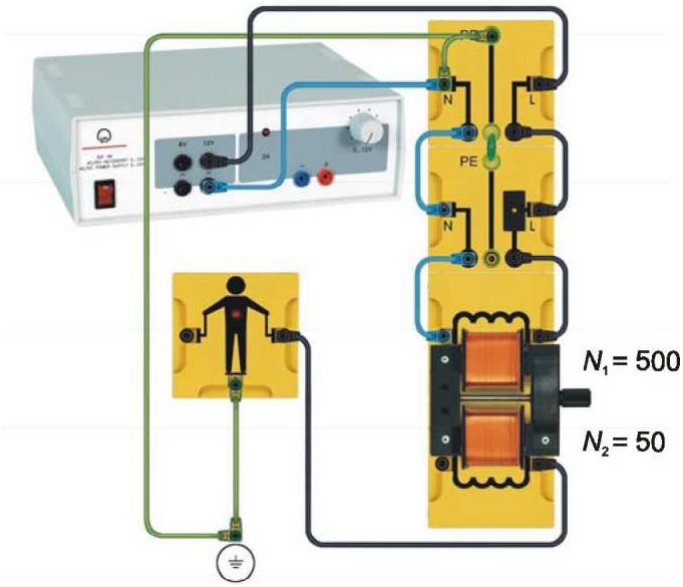


To demonstrate the effect of a protective separation in the event of single-pole and double pole contact.

consisting of:

1	539087	Model fuse, BST D
1	539086	Model wall outlet, BST D
1	539089	Model person, BST D
1	539090	Lead component PE, N, L, BST D
2	539052	Coil holder, BST D
2	59083	Coil 500 turns STE 2/50
1	59321	Transformer core, demountable
1	521491	AC/DC power supply 0...12 V/3 A
3	500602	Safety connection lead 10 cm, blue
3	500604	Safety connection cead 10 cm, black
1	500600	Safety connection lead 10 cm, yellow/green
1	500591	Safety bridging plugs, yellow/green, set of 10
1	500622	Safety connection lead 50 cm, blue
3	500624	Safety connecting lead 50 cm, black
2	500640	Safety connection lead 100 cm, yellow/green
	Additionally recommended:	
1	50204	Distribution box

D3.8.3 Safety controls
D3.8.3.2.a Safety extra-low voltage - Electrical safety, supplementary set BST

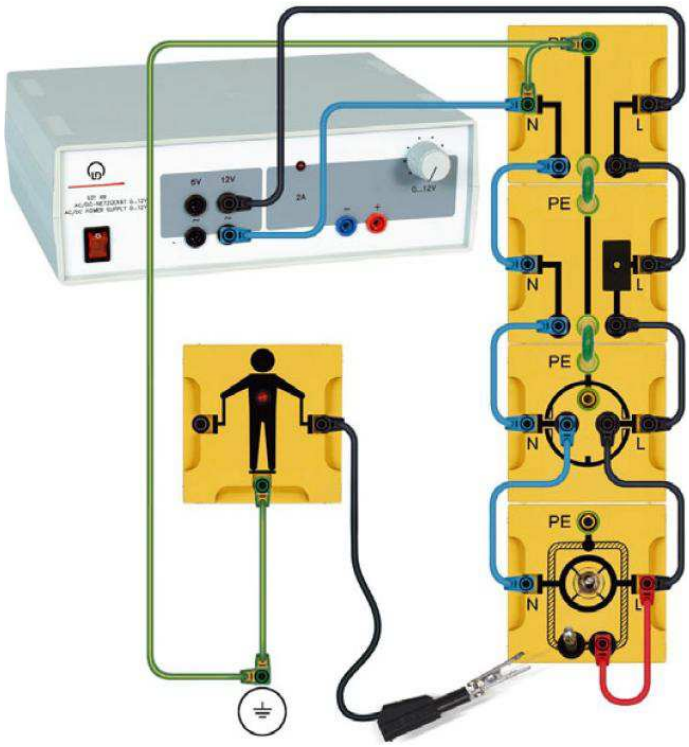


To demonstrate the effect of protective low voltage with single-pole and double-pole contact.

consisting of:

1	539087	Model fuse, BST D
1	539089	Model person, BST D
1	539090	Lead component PE, N, L, BST D
2	539052	Coil holder, BST D
1	59086	Coil 50 turns, STE 2/50
1	59083	Coil 500 turns STE 2/50
1	59321	Transformer core, demountable
1	521491	AC/DC power supply 0...12 V/3 A
2	500602	Safety connection lead 10 cm, blue
2	500604	Safety connection cead 10 cm, black
1	500600	Safety connection lead 10 cm, yellow/green
1	500591	Safety bridging plugs, yellow/green, set of 10
1	500622	Safety connection lead 50 cm, blue
3	500624	Safety connecting lead 50 cm, black
2	500640	Safety connection lead 100 cm, yellow/green
	Additionally recommended:	
1	50204	Distribution box

D3.8.3 Safety controls
D3.8.3.3.a Frame short and protective insulation - Electrical safety, supplementary set BST

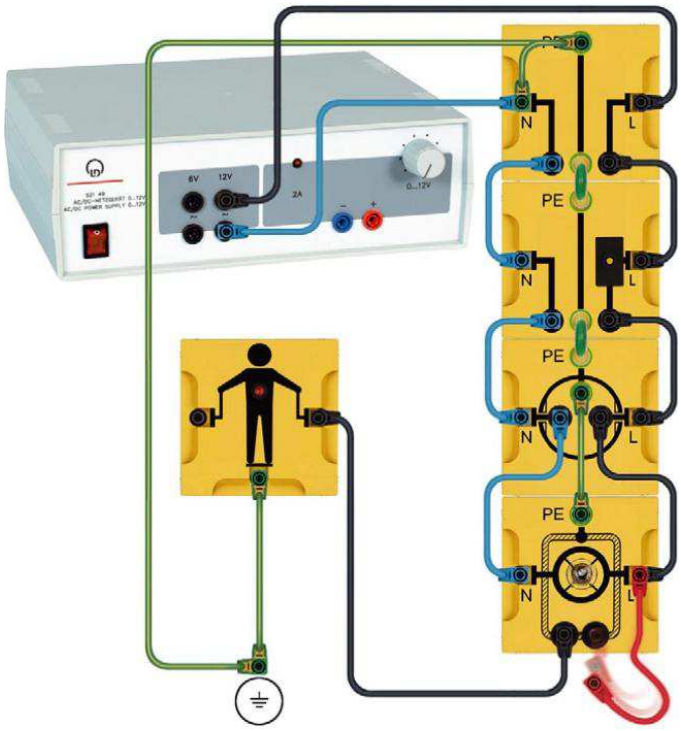


To demonstrate the mode of operation of a protective insulation in the event of a fault to frame.

consisting of:

1	539087	Model fuse, BST D
1	539086	Model wall outlet, BST D
1	539088	Load with housing, BST D
1	539089	Model person, BST D
1	539090	Lead component PE, N, L, BST D
1	340811	Plug-in axle
1	501861	Crocodile-clips, polished, set of 6
1	521491	AC/DC power supply 0...12 V/3 A
3	500602	Safety connection lead 10 cm, blue
3	500604	Safety connection cead 10 cm, black
1	500601	Safety connection lead 10 cm, red
1	500600	Safety connection lead 10 cm, yellow/green
1	500591	Safety bridging plugs, yellow/green, set of 10
1	500622	Safety connection lead 50 cm, blue
2	500624	Safety connecting lead 50 cm, black
2	500640	Safety connection lead 100 cm, yellow/green
	Additionally recommended:	
1	50204	Distribution box

D3.8.3 Safety controls
D3.8.3.4.a Frame short and protective conductor - Electrical safety, supplementary set BST

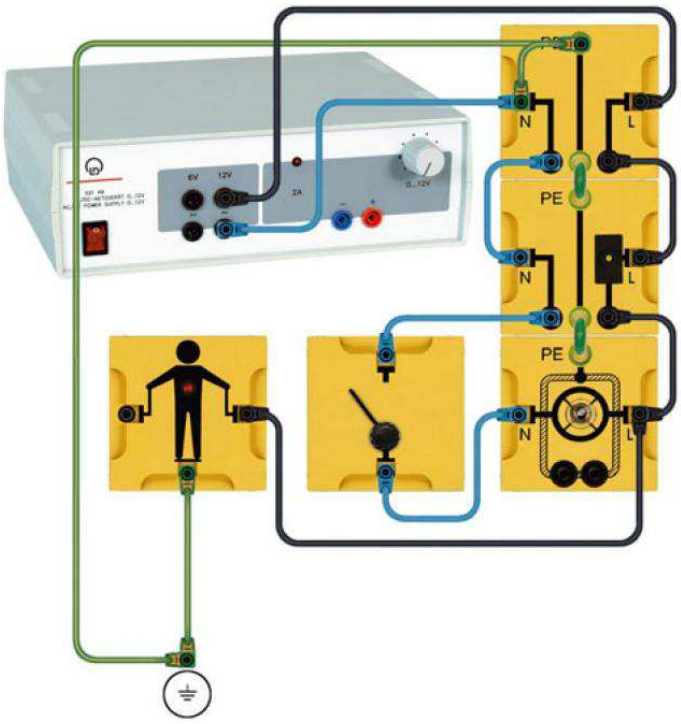


To demonstrate a protective conductor's mode of operation in the event of a fault to frame.

consisting of:

1	539087	Model fuse, BST D
1	539086	Model wall outlet, BST D
1	539089	Model person, BST D
1	539088	Load with housing, BST D
1	539090	Lead component PE, N, L, BST D
1	521491	AC/DC power supply 0...12 V/3 A
3	500602	Safety connection lead 10 cm, blue
3	500604	Safety connection cead 10 cm, black
1	500601	Safety connection lead 10 cm, red
2	500600	Safety connection lead 10 cm, yellow/green
1	500591	Safety bridging plugs, yellow/green, set of 10
1	500622	Safety connection lead 50 cm, blue
2	500624	Safety connecting lead 50 cm, black
2	500640	Safety connection lead 100 cm, yellow/green
	Additionally recommended:	
1	50204	Distribution box

D3.8.4 Interior installation and electrical safety
D3.8.4.1.a Light switch in the house distribution circuit - Electrical safety, supplementary set BST



To investigate electrical safety when installing a switch in the circuit.

consisting of:

1	539087	Model fuse, BST D
1	539089	Model person, BST D
1	539088	Load with housing, BST D
1	539090	Lead component PE, N, L, BST D
1	539025	Toggle switch, BST D
1	521491	AC/DC power supply 0...12 V/3 A
3	500602	Safety connection lead 10 cm, blue
3	500604	Safety connection cead 10 cm, black
1	500600	Safety connection lead 10 cm, yellow/green
1	500591	Safety bridging plugs, yellow/green, set of 10
1	500622	Safety connection lead 50 cm, blue
2	500624	Safety connecting lead 50 cm, black
2	500640	Safety connection lead 100 cm, yellow/green
	Additionally recommended:	
1	50204	Distribution box

D3.9.2 Conduction phenomena in liquids
D3.9.2.1 Current conduction in aqueous solutions

Investigate the flow of current in aqueous solutions.

consisting of:

1	591501	Electrochemistry set
1	531906	Demo Multimeter, passive
1	50146	Connecting lead 19 A, 100 cm, red/blue, pair
1	500421	Connecting lead 19 A, 50 cm, red
1	501861	Crocodile-clips, polished, set of 6
1	6753400	Water, pure, 1 l
1	6735720	Sodium chloride, 1 kg
1	521491	AC/DC power supply 0...12 V/3 A

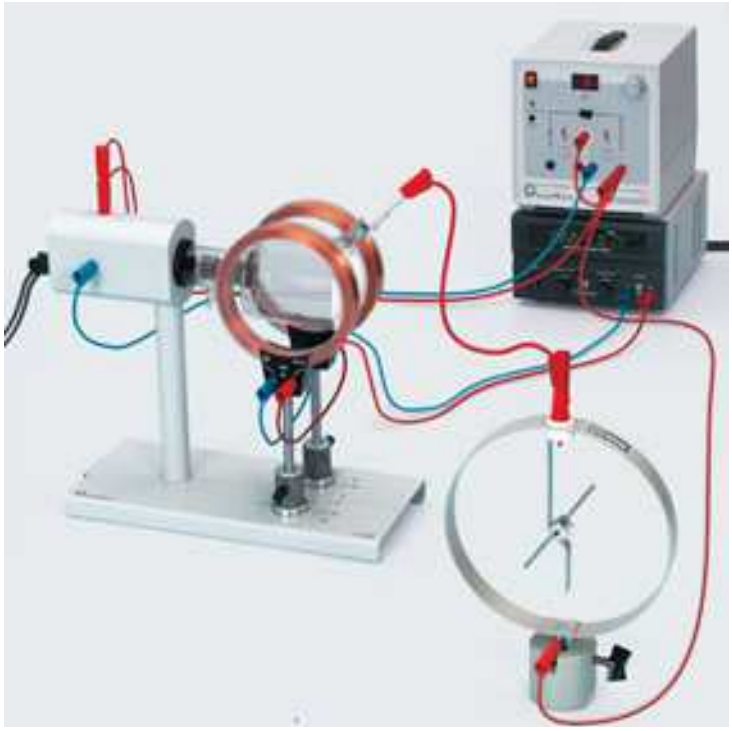
D3.9.2 Conduction phenomena in liquids
D3.9.2.8.a Fuel cell - Operation with solar cell and electrolysis cell

Demonstrating the transformation of energy in a fuel cell.

consisting of:

1	6674044	PEM reversible fuel cell
1	666487	Micromotor with blade wheel
1	57671	Plug-in board section STE
1	664432	Electrolysis cell on base
1	6753400	Water, pure, 1 l
1	6724410	Potassium lye, diluted, 500 ml
1	664431	Solar module 10 V/0.3 A
1	57126	Adapter leads 2/4 mm, 30 cm, blue, set of 5
1	571262	Adapter lead 2/4 mm, 30 cm, red
1	50146	Connecting lead 19 A, 100 cm, red/blue, pair
1	45073	Halogen lamp 1000 W
	Alternative:	
1	450641	Halogen lamp 12 V, 50/100W
1	45063	Halogen bulb 12 V/100 W, G6.35
1	726890	DC-High Current Power Supply 1...32 V/0...20 A
1	50146	Connecting lead 19 A, 100 cm, red/blue, pair
1	30041	Stand rod 25 cm, 12 mm Ø
1	30101	Leybold multiclamp
1	30002	Stand base, V-shaped, small

D3.9.4 Conduction phenomena in the vacuum
D3.9.4.1.a Thermionic emission - Perrin tube



Demonstrating the emission of charge carriers from the hot cathode of a Perrin tube.

Proving the negative polarity of the charge carriers.

consisting of:

1	555622	Perrin tube
1	555600	Tube stand
1	555604	Pair of Helmholtz coils
1	540091	Electroscope
1	54100	Friction rods, PVC and acrylic
1	666711	Butane gas burner
1	666712ET3	Butane cartridge, 190 g, set of 3
1	30011	Saddle base
1	52170	High-voltage power supply 10 kV
1	521546	DC Power Supply 0...16 V/0...5 A
2	500641	Safety connection lead 100 cm, red
2	500642	Safety connection lead 100 cm, blue
3	500644	Safety connection lead 100 cm, black
1	500621	Safety connecting lead 50 cm, red
1	500611	Safety connection lead 25 cm, red
1	500612	Safety connection lead 25 cm, blue

D3.9.4 Conduction phenomena in the vacuum
D3.9.4.2.a Photoemissive effect - Electroscope

Demonstrating the release of electrons from the surface of a zinc electrode irradiated with UV light.

consisting of:

1	546311	Zinc and grid electrodes
1	45115	High pressure mercury lamp
1	451195	Power Supply unit for Mercury Lamp
1	540091	Electroscope
1	54100	Friction rods, PVC and acrylic
1	54122	Leather cloth
1	68663	Polyethylene friction foils, set of 10
1	666711	Butane gas burner
1	666712ET3	Butane cartridge, 190 g, set of 3
2	30011	Saddle base
1	54052	Experiment insulator
1	50120	Connecting lead 32 A, 25 cm, red
1	50133	Connecting lead 32 A, 100 cm, black
1	501861	Crocodile-clips, polished, set of 6

D3.9.4 Conduction phenomena in the vacuum
D3.9.4.2.b Photoemissive effect - Electrometer amplifier

Demonstrating the release of electrons from the surface of a zinc electrode irradiated with UV light.

consisting of:

1	546311	Zinc and grid electrodes
1	53214	Electrometer amplifier
1	53216	Connecting rod
1	57702	Resistor 1 GOhm, STE2/19
1	531906	Demo Multimeter, passive
1	52227	Power supply 450 V
1	45115	High pressure mercury lamp
1	451195	Power Supply unit for Mercury Lamp
2	50145	Connecting lead 19 A, 50 cm, red/blue, pair
1	501451	Connecting lead 19 A, 50 cm, black, pair
1	50128	Connecting lead 32 A, 50 cm, black
1	30076	Laboratory stand II

D3.9.4 Conduction phenomena in the vacuum
D3.9.4.3 Linear propagation and deflection of electron beams

Demonstrating the linear propagation of electron beams.

Demonstrating the deflection of electron beams in a magnetic field.

consisting of:

1	555620	Maltese cross tube
1	555600	Tube stand
1	52170	High-voltage power supply 10 kV
1	51022	Large horseshoe magnet with yoke
1	500641	Safety connection lead 100 cm, red
1	500642	Safety connection lead 100 cm, blue
2	500644	Safety connection lead 100 cm, black
1	500621	Safety connecting lead 50 cm, red
1	500611	Safety connection lead 25 cm, red

D3.9.4 Conduction phenomena in the vacuum
D3.9.4.4.a Deflection of electron beams in a magnetic field - Perrin tube and permanent magnet

Investigating the deflection of electron beams in the magnetic field of a permanent magnet.

consisting of:

1	555622	Perrin tube
1	555600	Tube stand
1	51048	Magnets, 35 mm Ø, pair
1	52170	High-voltage power supply 10 kV
1	500641	Safety connection lead 100 cm, red
1	500642	Safety connection lead 100 cm, blue
2	500644	Safety connection lead 100 cm, black
2	500611	Safety connection lead 25 cm, red

D3.9.4 Conduction phenomena in the vacuum
D3.9.4.4.b Deflection of electron beams in a magnetic field - Perrin tube and pair of Helmholtz coils

Investigating the deflection of electron beams in the magnetic field of two Helmholtz coils.

consisting of:

1	555622	Perrin tube
1	555600	Tube stand
1	555604	Pair of Helmholtz coils
1	52170	High-voltage power supply 10 kV
1	521546	DC Power Supply 0...16 V/0...5 A
1	513511	Magnetic needle on base with pivot point
2	500641	Safety connection lead 100 cm, red
2	500642	Safety connection lead 100 cm, blue
2	500644	Safety connection lead 100 cm, black
3	500611	Safety connection lead 25 cm, red
1	500612	Safety connection lead 25 cm, blue

D3.9.4 Conduction phenomena in the vacuum
D3.9.4.5 Deflection of electron beams in an electric field

Investigating the deflection of electron beams in an electric field.

consisting of:

1	555622	Perrin tube
1	555600	Tube stand
1	52170	High-voltage power supply 10 kV
1	52227	Power supply 450 V
2	500641	Safety connection lead 100 cm, red
2	500642	Safety connection lead 100 cm, blue
2	500644	Safety connection lead 100 cm, black
1	500621	Safety connecting lead 50 cm, red

D3.9.4 Conduction phenomena in the vacuum
D3.9.4.6 Electron beams in parallel alternating electric and magnetic fields

Investigating the behaviour of an electron beam in parallel alternating electric and magnetic fields.

consisting of:

1	555622	Perrin tube
1	555600	Tube stand
1	555604	Pair of Helmholtz coils
1	52170	High-voltage power supply 10 kV
1	52140	Variable low voltage transformer 0 to 250 V
1	522621	Function generator S 12
2	500641	Safety connection lead 100 cm, red
2	500642	Safety connection lead 100 cm, blue
2	500644	Safety connection lead 100 cm, black
1	500621	Safety connecting lead 50 cm, red
1	500622	Safety connection lead 50 cm, blue
2	500611	Safety connection lead 25 cm, red
1	500612	Safety connection lead 25 cm, blue

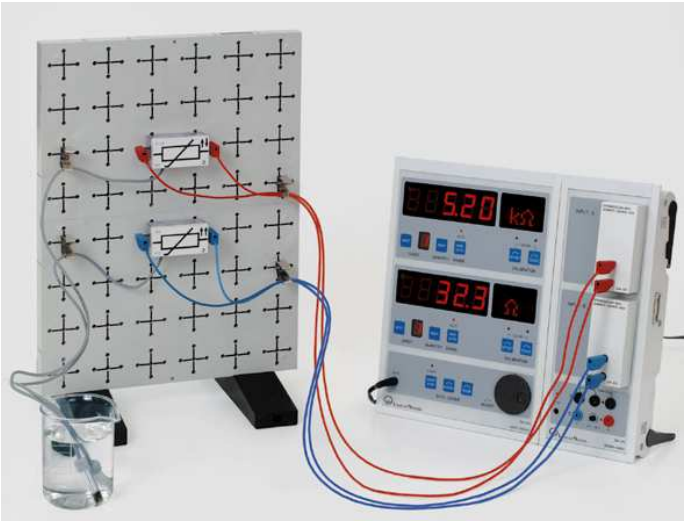
D3.9.4 Conduction phenomena in the vacuum
D3.9.4.7 Electron beams in crossed magnetic fields

Investigating the deflection of electron beams in crossed magnetic fields.

consisting of:

1	555622	Perrin tube
1	555600	Tube stand
1	555604	Pair of Helmholtz coils
1	52170	High-voltage power supply 10 kV
1	521352	Variable low-voltage transformer 1...12 V/6 A
1	522621	Function generator S 12
1	56214	Coil 500 turns
1	300761	Support blocks, set of 6
2	500641	Safety connection lead 100 cm, red
2	500642	Safety connection lead 100 cm, blue
2	500644	Safety connection lead 100 cm, black
2	500621	Safety connecting lead 50 cm, red
2	500622	Safety connection lead 50 cm, blue
2	500611	Safety connection lead 25 cm, red

D4.1.1 Special resistors
D4.1.1.1.a Temperature-dependent resistors - Set-up with plug-in board



To investigate the resistance variation of NTC and PTC resistors when heated.

consisting of:

1	58155	NTC probe 4.7 kOhm, STE 2/50
1	58159	PTC probe 30 Ohm, STE 2/50
1	57674	Plug-in board, DIN A4, STE
1	57677	Board holders STE, pair
2	524031	Current source box
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
2	50146	Connecting lead 19 A, 100 cm, red/blue, pair
1	30325	Immersion heater
1	59006	Plastic beaker, 1000 ml
4	59002	Small clip plug

D4.1.1 Special resistors
D4.1.1.1.b Temperature-dependent resistors - Set-up with connector blocks and bridging plugs

To investigate the resistance variation of NTC and PTC resistors when heated.

consisting of:

1	539021	NTC probe 4.7 kΩ, BST D
1	539022	PTC probe 30 Ω, BST D
1	539065	Cell, BST D
4	539004	Connector blocks 90° angle, BST D
4	539000	Bridging plug, BST
2	531902	Demo Multimeter, active
4	500644	Safety connection lead 100 cm, black
1	30325	Immersion heater
1	59006	Plastic beaker, 1000 ml
1	38221	Stirring thermometer -10...+110 °C
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

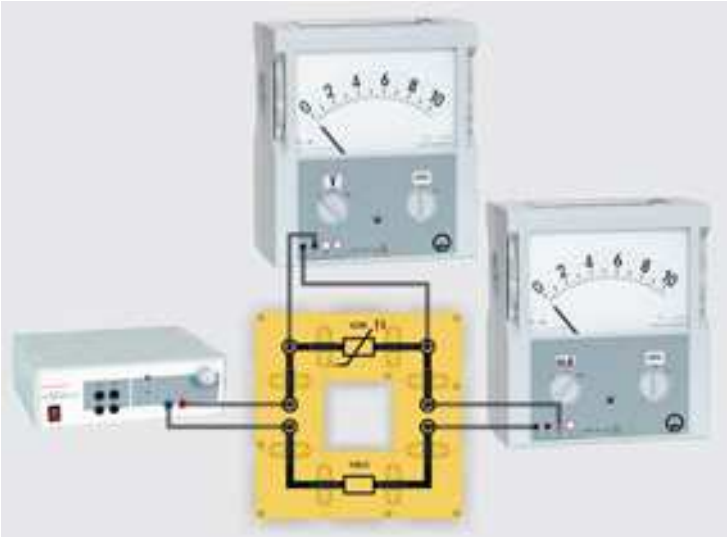
D4.1.1 Special resistors
D4.1.1.3.a Light-dependent resistor - Set-up with connector blocks and bridging plugs

To investigate the resistance variation of an LDR when illuminated.

consisting of:

1	539020	Photoresistor LDR 05, BST D
1	450651	Electric torch
2	68548	Battery 1.5 V (D)
2	539004	Connector blocks 90° angle, BST D
2	539000	Bridging plug, BST
1	531902	Demo Multimeter, active
2	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.1 Special resistors
D4.1.1.4.a Voltage-dependent resistor - VDR - Set-up with connector blocks and bridging plugs



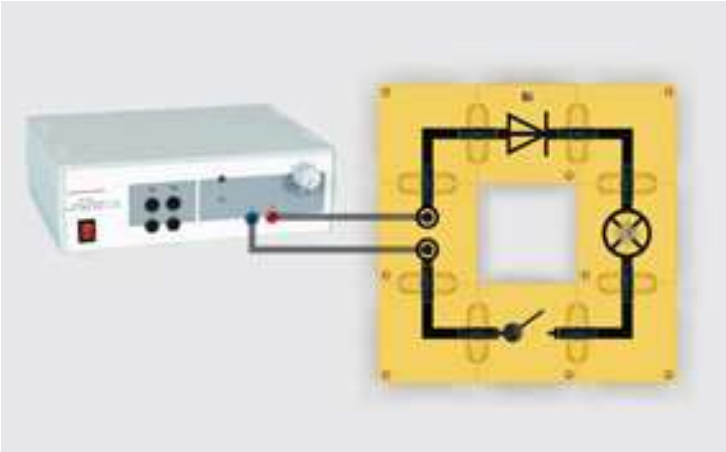
To investigate the dependence of a VDR on the applied voltage.

consisting of:

1	539023	VDR resistor, BST D
1	539009	Resistor 100 Ω, BST D
2	539003	Connector blocks straight with 2 sockets, BST D
2	539004	Connector blocks 90° angle, BST D
2	539005	Connector blocks 90° angle with socket, BST D
8	539000	Bridging plug, BST
2	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
6	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.2 Semiconductor diode

D4.1.2.1.a Si-diode in a DC circuit - Set-up with connector blocks and bridging plugs

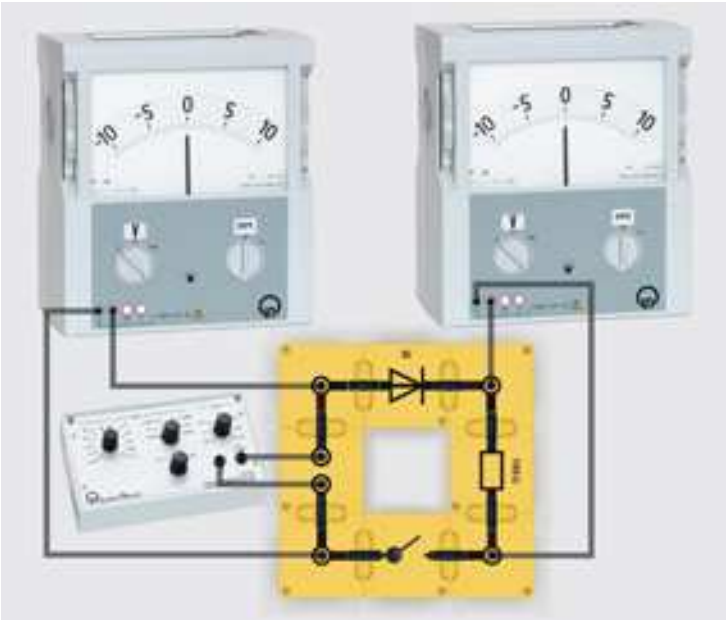


To investigate the characteristic of a silicon diode in a DC circuit.

consisting of:

1	539035	Diode 1N4007, BST D
1	539024	Lamp socket E10, BST D
1	50515	Bulb 6 V/0.05 A, E10, set of 10
1	539025	Toggle switch, BST D
1	539003	Connector blocks straight with 2 sockets, BST D
4	539004	Connector blocks 90° angle, BST D
8	539000	Bridging plug, BST
1	521491	AC/DC power supply 0...12 V/3 A
2	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.2 Semiconductor diode
D4.1.2.2.a Diode as rectifier - Set-up with connector blocks and bridging plugs

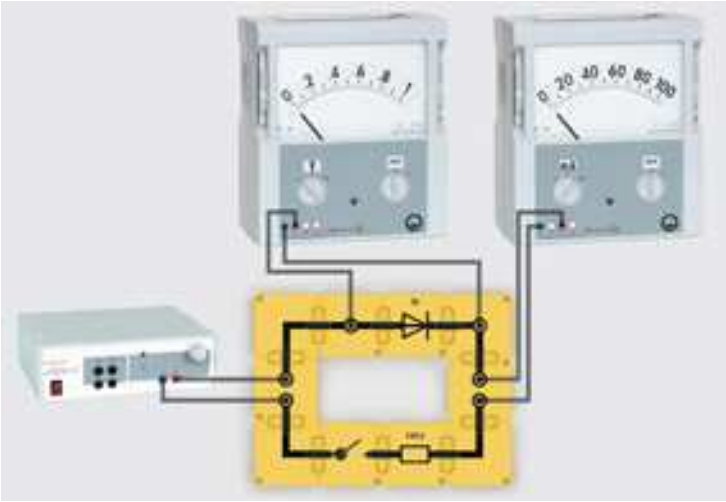


To demonstrate the working principle of a diode as rectifier in an AC circuit.

consisting of:

1	539035	Diode 1N4007, BST D
1	539009	Resistor 100 Ω, BST D
1	539025	Toggle switch, BST D
1	539003	Connector blocks straight with 2 sockets, BST D
4	539005	Connector blocks 90° angle with socket, BST D
8	539000	Bridging plug, BST
2	531906	Demo Multimeter, passive
1	522621	Function generator S 12
6	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board
	Additionally recommended:	
1	575302	Oscilloscope 30 MHz, digital, PT1265
2	57524	Screened cable, BNC/4 mm

D4.1.2 Semiconductor diode
D4.1.2.4.a Caracteristic of a Si-diode - Set-up with connector blocks and bridging plugs

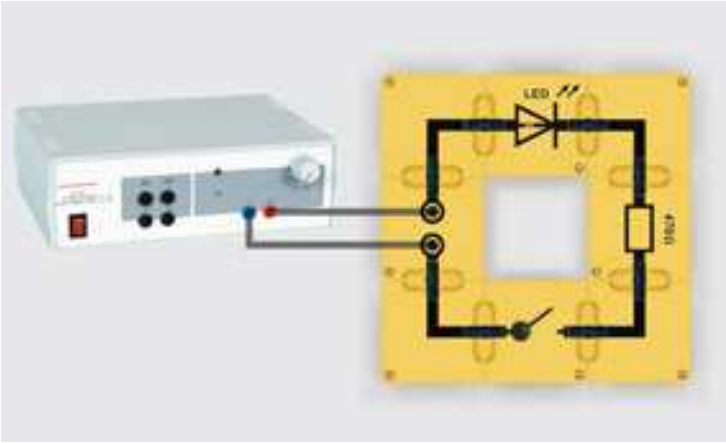


To investigate the relationship between the voltage *U* and the current *I* for a diode connected in the forward direction.

consisting of:

1	539035	Diode 1N4007, BST D
1	539009	Resistor 100 Ω, BST D
1	539025	Toggle switch, BST D
1	539002	Connector blocks straight with socket, BST D
2	539003	Connector blocks straight with 2 sockets, BST D
3	539004	Connector blocks 90° angle, BST D
1	539005	Connector blocks 90° angle with socket, BST D
10	539000	Bridging plug, BST
2	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
6	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.2 Semiconductor diode
D4.1.2.5.a Light emitting diode in a DC circuit - Set-up with connector blocks and bridging plugs

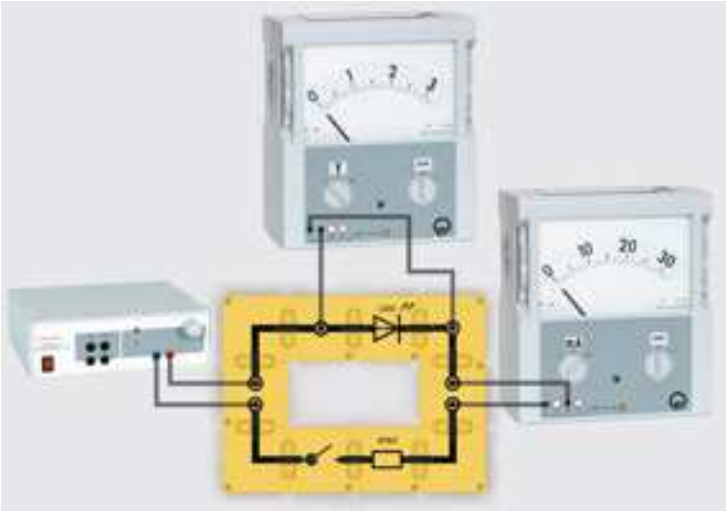


To investigate the characteristic of a light-emitting diode in a DC circuit.

consisting of:

1	539037	Light emitting diode red, BST D
1	539038	Light emitting diode green, BST D
1	539010	Resistor 470 Ω, BST D
1	539025	Toggle switch, BST D
1	539003	Connector blocks straight with 2 sockets, BST D
4	539004	Connector blocks 90° angle, BST D
8	539000	Bridging plug, BST
1	521491	AC/DC power supply 0...12 V/3 A
2	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.2 Semiconductor diode
D4.1.2.6.a Characteristic of a light emitting diode - Set-up with connector blocks and bridging plugs

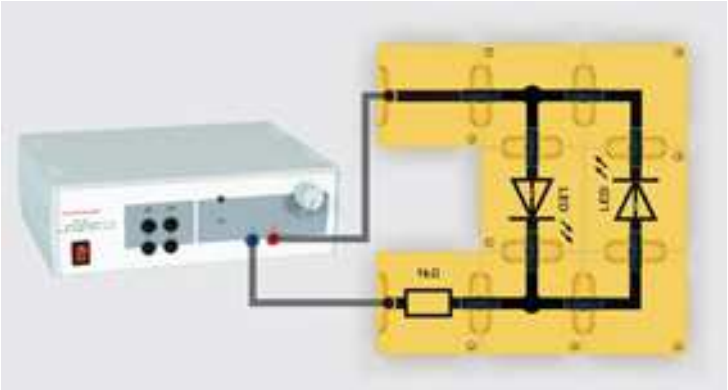


To investigate the relationship between the voltage *U* and the current *I* for a light-emitting diode connected in forward direction.

consisting of:

1	539037	Light emitting diode red, BST D
1	539038	Light emitting diode green, BST D
1	539010	Resistor 470 Ω, BST D
1	539025	Toggle switch, BST D
1	539002	Connector blocks straight with socket, BST D
2	539003	Connector blocks straight with 2 sockets, BST D
3	539004	Connector blocks 90° angle, BST D
1	539005	Connector blocks 90° angle with socket, BST D
10	539000	Bridging plug, BST
2	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
6	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.2 Semiconductor diode
D4.1.2.7.a Polarity tester with light emitting diodes - Set-up with connector blocks and bridging plugs



To demonstrate the layout and working principle of a polarity tester using light-emitting diodes.

consisting of:

1	539037	Light emitting diode red, BST D
1	539038	Light emitting diode green, BST D
1	539011	Resistor 1 kΩ, BST D
1	539001	Connector blocks, straight, BST D
2	539004	Connector blocks 90° angle, BST D
2	539006	Connector blocks, T branch, BST D
8	539000	Bridging plug, BST
1	521491	AC/DC power supply 0...12 V/3 A
2	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.3 Solar cells
D4.1.3.1.a No-load voltage of a solar cell - Set-up with connector blocks and bridging plugs

To measure the open-circuit voltage of an illuminated solar cell.

consisting of:

1	539042	Solar cell 0.5 V/0.3 A, BST D
2	539004	Connector blocks 90° angle, BST D
2	539000	Bridging plug, BST
1	531906	Demo Multimeter, passive
2	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.3 Solar cells
D4.1.3.2.a Short-circuit current of a solar cell - Set-up with connector blocks and bridging plugs

To measure the short-circuit current I_0 of a solar cell as a function of the solar cell area *A*.

consisting of:

1	539042	Solar cell 0.5 V/0.3 A, BST D
2	539004	Connector blocks 90° angle, BST D
2	539000	Bridging plug, BST
1	531906	Demo Multimeter, passive
2	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.3 Solar cells
D4.1.3.3.a Connecting solar cells in series - Set-up with connector blocks and bridging plugs

To investigate the short-circuit current I_0 in a series connection of solar cells.

To investigate the open-circuit voltage U_0 in a series connection of solar cells.

consisting of:

2	539042	Solar cell 0.5 V/0.3 A, BST D
1	539001	Connector blocks, straight, BST D
2	539004	Connector blocks 90° angle, BST D
3	539000	Bridging plug, BST
1	531906	Demo Multimeter, passive
2	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.3 Solar cells

D4.1.3.4.a Connecting solar cells in parallel - Set-up with connector blocks and bridging plugs

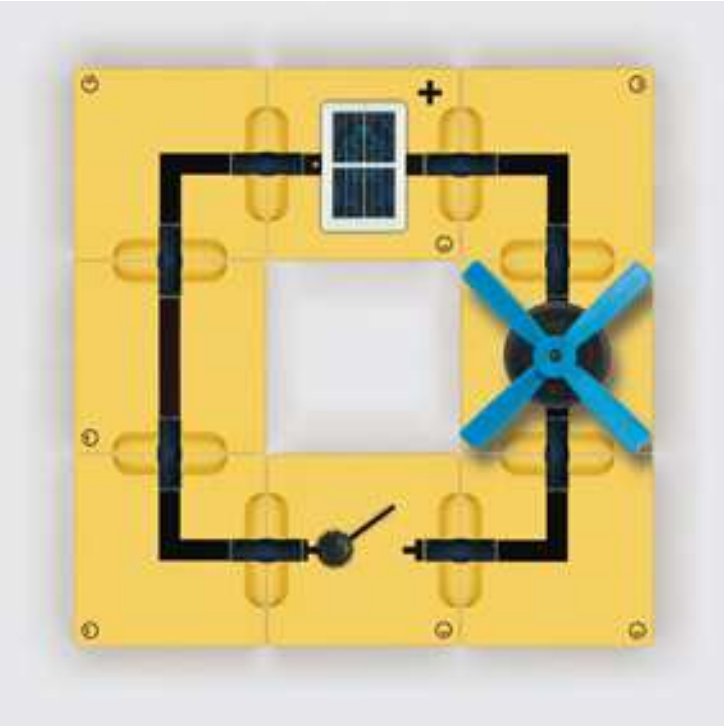
To investigate the short-circuit current I_0 in a parallel connection of solar cells.

To investigate the open-circuit voltage U_0 in a parallel connection of solar cells.

consisting of:

2	539042	Solar cell 0.5 V/0.3 A, BST D
2	539004	Connector blocks 90° angle, BST D
2	539006	Connector blocks, T branch, BST D
6	539000	Bridging plug, BST
1	531906	Demo Multimeter, passive
2	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.3 Solar cells
D4.1.3.6.a Conversion of light energy in mechanical energy - Set-up with connector blocks and bridging plugs, Motor with blade wheel

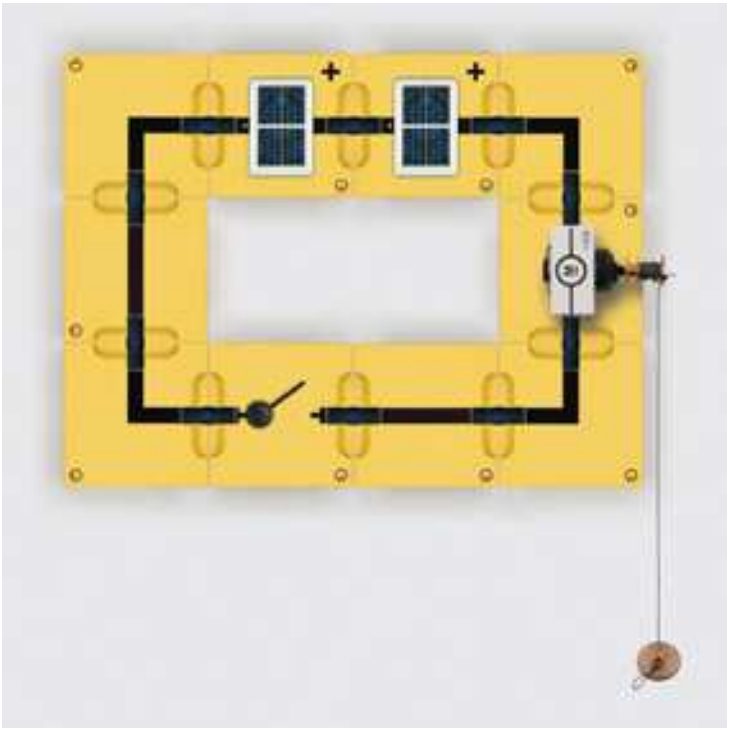


To demonstrate the conversion of light energy into mechanical energy.

consisting of:

1	539042	Solar cell 0.5 V/0.3 A, BST D
1	539025	Toggle switch, BST D
1	666487	Micromotor with blade wheel
1	539001	Connector blocks, straight, BST D
1	539003	Connector blocks straight with 2 sockets, BST D
4	539004	Connector blocks 90° angle, BST D
8	539000	Bridging plug, BST
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.3 Solar cells
D4.1.3.6.b Conversion of light energy in mechanical energy - Set-up with connector blocks and bridging plugs, Micromotor

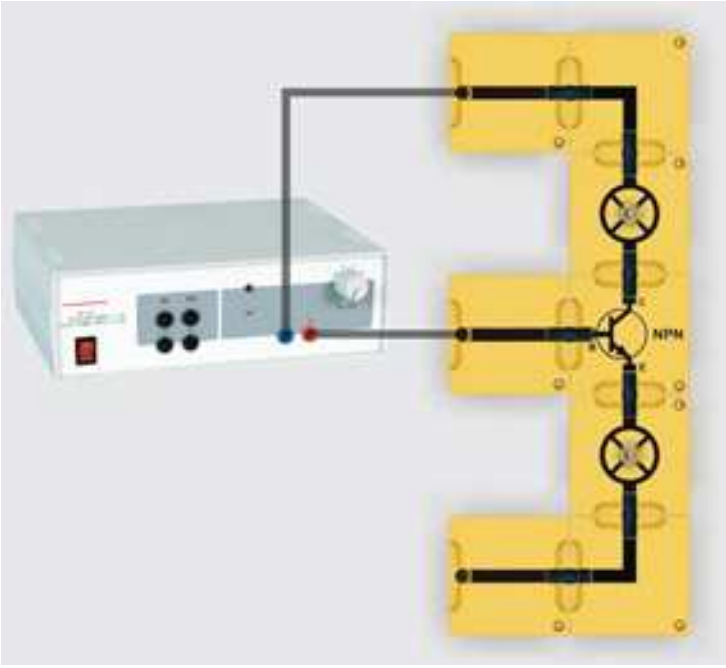


Demonstration der Umwandlung von Lichtenergie in mechanische Energie.

consisting of:

2	539042	Solar cell 0.5 V/0.3 A, BST D
1	539025	Toggle switch, BST D
1	57937	Micromotor STE 2/19
1	30948	Fishing line
1	34085	Set of 6 weights, 50 g each
2	539001	Connector blocks, straight, BST D
1	539003	Connector blocks straight with 2 sockets, BST D
4	539004	Connector blocks 90° angle, BST D
10	539000	Bridging plug, BST
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.4 Transistors
D4.1.4.1.a Transistor as diode paths - Set-up with connector blocks and bridging plugs

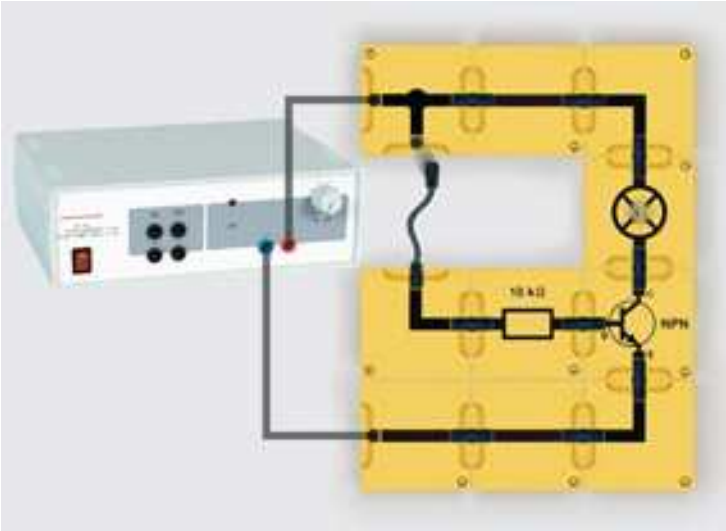


To investigate the characteristic of NPN and PNP transistors for different polarities of the base-emitter and base-collector junctions.

consisting of:

1	539043	Transistor NPN, BD 137, BST D
1	539044	Transistor PNP, BD 138, BST D
2	539024	Lamp socket E10, BST D
1	50515	Bulb 6 V/0.05 A, E10, set of 10
3	539001	Connector blocks, straight, BST D
2	539004	Connector blocks 90° angle, BST D
7	539000	Bridging plug, BST
1	521491	AC/DC power supply 0...12 V/3 A
2	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.4 Transistors
D4.1.4.2.a Principle of working of a transistor - Set-up with connector blocks and bridging plugs

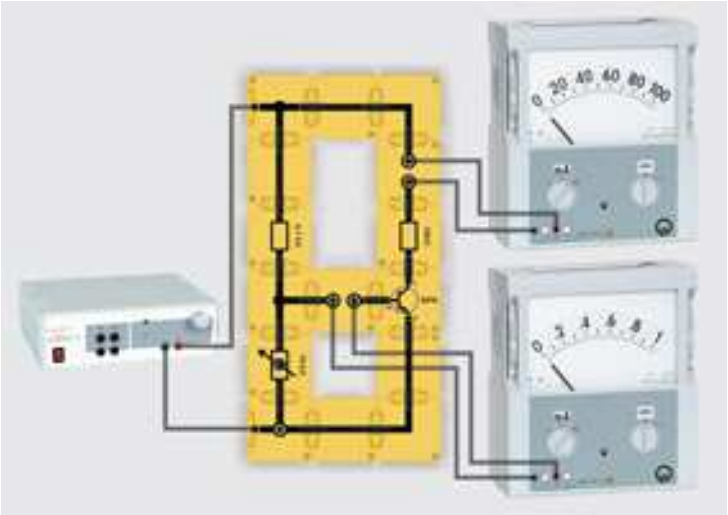


To demonstrate the working principle of a transistor.

consisting of:

1	539043	Transistor NPN, BD 137, BST D
1	539013	Resistor 10 kΩ, BST D
1	539024	Lamp socket E10, BST D
1	50515	Bulb 6 V/0.05 A, E10, set of 10
3	539001	Connector blocks, straight, BST D
3	539004	Connector blocks 90° angle, BST D
1	539006	Connector blocks, T branch, BST D
9	539000	Bridging plug, BST
1	521491	AC/DC power supply 0...12 V/3 A
2	500644	Safety connection lead 100 cm, black
1	500604	Safety connection cead 10 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.4 Transistors
D4.1.4.3.a Transfer characteristic of a transistor - Set-up with connector blocks and bridging plugs



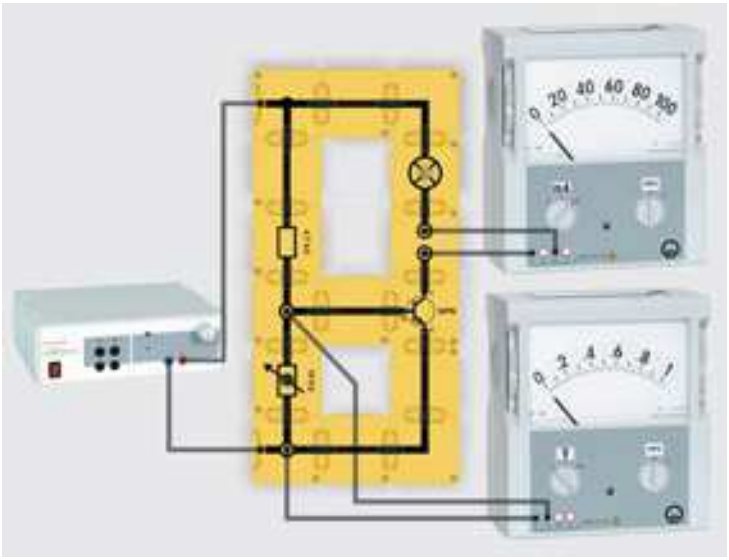
To investigate the relationship between the base current I_B and the collector current I_C .

To calculate the current amplification of the transistor.

consisting of:

1	539043	Transistor NPN, BD 137, BST D
1	539009	Resistor 100 Ω, BST D
1	539012	Resistor 4.7 kΩ, BST D
1	539015	Variable resistor 10 kΩ, BST D
4	539001	Connector blocks, straight, BST D
2	539003	Connector blocks straight with 2 sockets, BST D
2	539004	Connector blocks 90° angle, BST D
2	539006	Connector blocks, T branch, BST D
1	539007	Connector blocks, T branch with socket, BST D
16	539000	Bridging plug, BST
2	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
6	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.4 Transistors
D4.1.4.4.a Transistor as an electronic switch - Set-up with connector blocks and bridging plugs

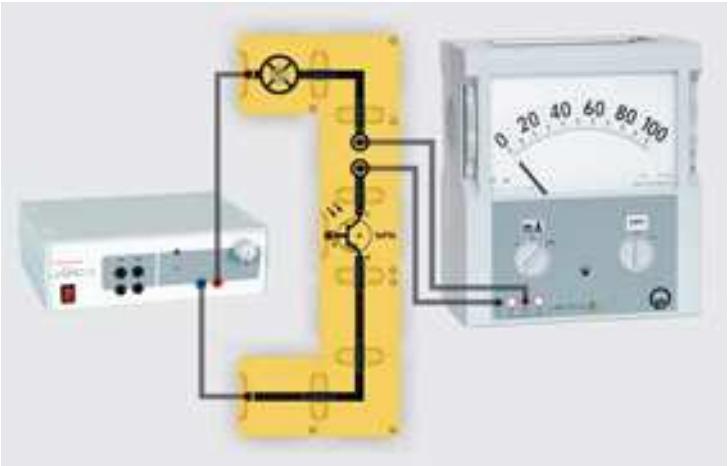


To demonstrate the working principle of a transistor as an electronic switch.

consisting of:

1	539043	Transistor NPN, BD 137, BST D
1	539012	Resistor 4.7 kΩ, BST D
1	539015	Variable resistor 10 kΩ, BST D
1	539024	Lamp socket E10, BST D
1	50515	Bulb 6 V/0.05 A, E10, set of 10
5	539001	Connector blocks, straight, BST D
1	539003	Connector blocks straight with 2 sockets, BST D
2	539004	Connector blocks 90° angle, BST D
1	539006	Connector blocks, T branch, BST D
2	539007	Connector blocks, T branch with socket, BST D
16	539000	Bridging plug, BST
2	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
6	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.4 Transistors
D4.1.4.5.a Phototransistor - Set-up with connector blocks and bridging plugs

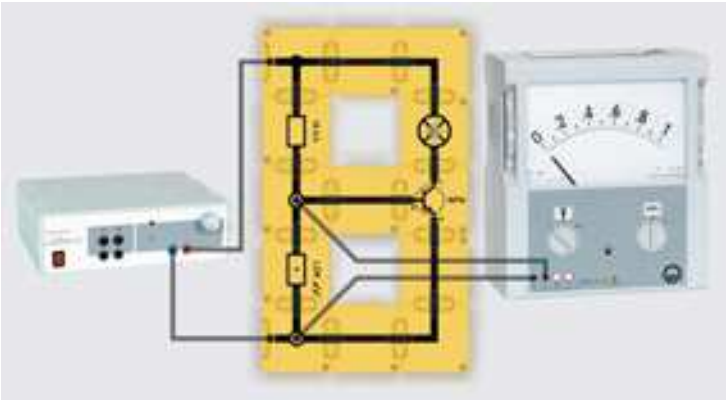


To demonstrate the working principle of a phototransistor.

consisting of:

1	539047	Phototransistor LWL, NPN, BST D
1	539024	Lamp socket E10, BST D
1	50515	Bulb 6 V/0.05 A, E10, set of 10
1	450651	Electric torch
2	68548	Battery 1.5 V (D)
2	539001	Connector blocks, straight, BST D
1	539003	Connector blocks straight with 2 sockets, BST D
2	539004	Connector blocks 90° angle, BST D
6	539000	Bridging plug, BST
1	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
4	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.5 Transistor applications
D4.1.5.1.a Twilight switch - Set-up with connector blocks and bridging plugs

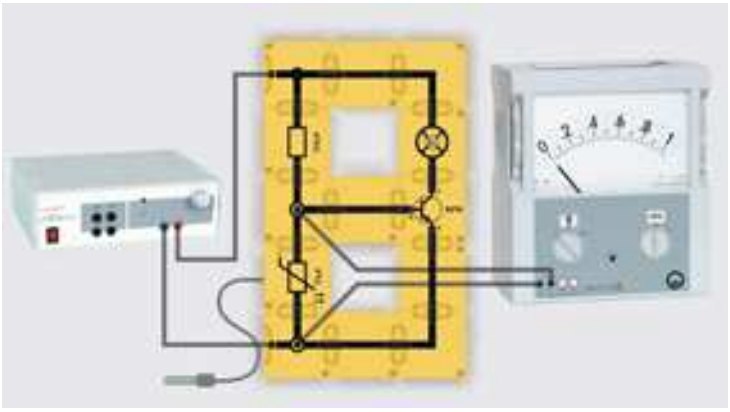


To demonstrate the working principle of a twilight switch.

consisting of:

1	539043	Transistor NPN, BD 137, BST D
1	539020	Photoresistor LDR 05, BST D
1	539013	Resistor 10 kΩ, BST D
1	539024	Lamp socket E10, BST D
1	50515	Bulb 6 V/0.05 A, E10, set of 10
4	539001	Connector blocks, straight, BST D
2	539004	Connector blocks 90° angle, BST D
1	539006	Connector blocks, T branch, BST D
2	539007	Connector blocks, T branch with socket, BST D
14	539000	Bridging plug, BST
1	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
4	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.5 Transistor applications
D4.1.5.2.a Temperature-controlled transistor - Set-up with connector blocks and bridging plugs

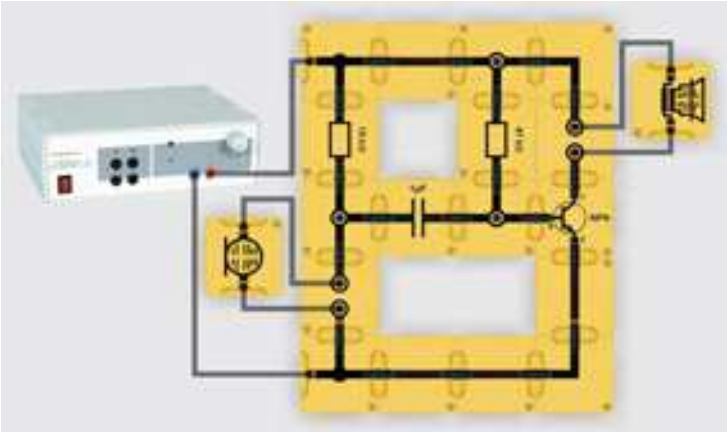


To demonstrate the working principle of a temperature-controlled transistor.

consisting of:

1	539043	Transistor NPN, BD 137, BST D
1	539022	PTC probe 30 Ω, BST D
1	539010	Resistor 470 Ω, BST D
1	539024	Lamp socket E10, BST D
1	50515	Bulb 6 V/0.05 A, E10, set of 10
4	539001	Connector blocks, straight, BST D
2	539004	Connector blocks 90° angle, BST D
1	539006	Connector blocks, T branch, BST D
2	539007	Connector blocks, T branch with socket, BST D
14	539000	Bridging plug, BST
1	531906	Demo Multimeter, passive
1	521491	AC/DC power supply 0...12 V/3 A
4	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.5 Transistor applications
D4.1.5.3.a Single-stage microphone amplifier - Set-up with connector blocks and bridging plugs

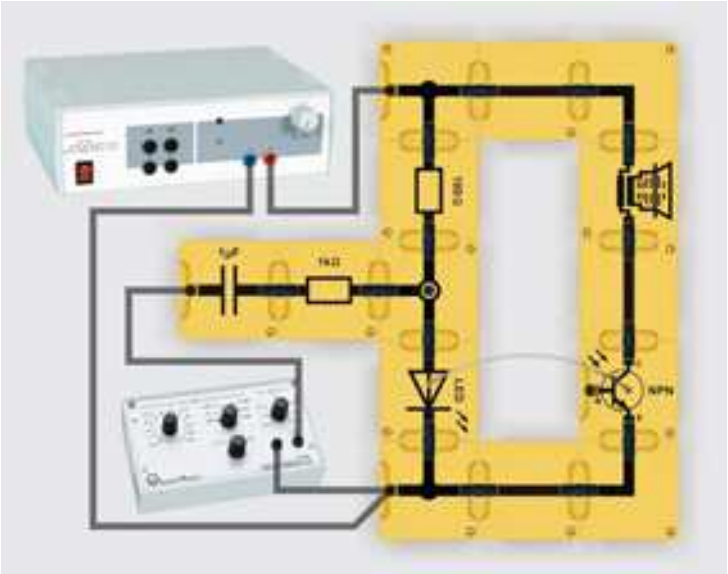


To demonstrate the working principle of a single-stage microphone amplifier.

consisting of:

1	539043	Transistor NPN, BD 137, BST D
1	539014	Resistor 47 kΩ, BST D
1	539013	Resistor 10 kΩ, BST D
1	539031	Capacitor 1µF, BST D
1	539050	Microphone, BST D
1	539049	Loudspeaker, BST D
4	539001	Connector blocks, straight, BST D
2	539003	Connector blocks straight with 2 sockets, BST D
2	539004	Connector blocks 90° angle, BST D
2	539006	Connector blocks, T branch, BST D
3	539007	Connector blocks, T branch with socket, BST D
19	539000	Bridging plug, BST
1	521491	AC/DC power supply 0...12 V/3 A
2	500644	Safety connection lead 100 cm, black
4	500664	Safety connection lead 200 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.5 Transistor applications
D4.1.5.4.a Transmitting signal with the light waveguide - Set-up without signal amplification

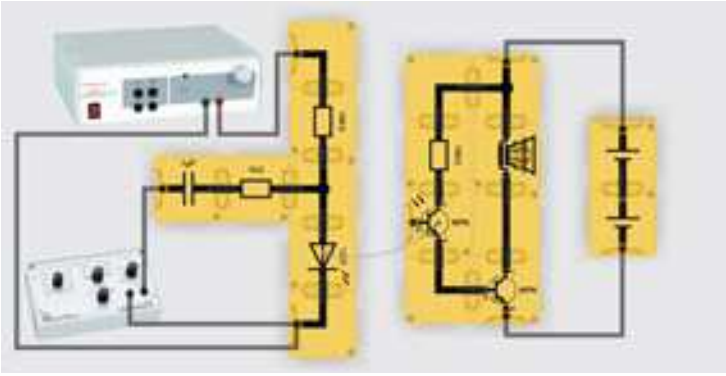


To demonstrate the signal transmission between an LED and phototransistor through a light waveguide.

consisting of:

1	539047	Phototransistor LWL, NPN, BST D
1	539040	Light emitting diode LWL, BST D
1	57944	Light waveguide, set of 2
1	539009	Resistor 100 Ω, BST D
1	539011	Resistor 1 kΩ, BST D
1	539031	Capacitor 1µF, BST D
1	539049	Loudspeaker, BST D
3	539001	Connector blocks, straight, BST D
2	539004	Connector blocks 90° angle, BST D
2	539006	Connector blocks, T branch, BST D
1	539007	Connector blocks, T branch with socket, BST D
14	539000	Bridging plug, BST
1	521491	AC/DC power supply 0...12 V/3 A
1	522621	Function generator S 12
4	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D4.1.5 Transistor applications
D4.1.5.4.b Transmitting signal with the light waveguide - Set-up with single-stage transistor amplifier



To demonstrate the signal transmission between an LED and phototransistor through a light waveguide.

consisting of:

1	539047	Phototransistor LWL, NPN, BST D
1	539043	Transistor NPN, BD 137, BST D
1	539040	Light emitting diode LWL, BST D
1	57944	Light waveguide, set of 2
2	539009	Resistor 100 Ω, BST D
1	539011	Resistor 1 kΩ, BST D
1	539031	Capacitor 1µF, BST D
1	539049	Loudspeaker, BST D
2	539053	Battery element, BST D
1	539001	Connector blocks, straight, BST D
4	539004	Connector blocks 90° angle, BST D
2	539006	Connector blocks, T branch, BST D
14	539000	Bridging plug, BST
1	521491	AC/DC power supply 0...12 V/3 A
1	522621	Function generator S 12
6	500644	Safety connection lead 100 cm, black
1	301300	Demonstration-experiment-frame
1	301301	Adhesive magnetic board

D5.1.2 Propagation of light
D5.1.2.1.b Linear propagation of light - Optical bench S1 profile

Demonstrate that light travels in straight lines.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
2	460313	Clamp rider with fixed column
1	460311	Clamp rider with clamp 45/65
1	45060	Lamp housing with cable
1	450511	Bulb 6 V/30 W, E14, set of 2
1	46165	Iris diaphragm on rod
1	45931	Candle holder
1	539065	Cell, BST D
1	6720110	Fluoresceine, 25 g
1	666967	Spatula, spoon-ended, stainless steel, 150 mm
1	521210	Transformer 6/12 V

D5.1.2 Propagation of light
D5.1.2.3 Formation of images in a pinhole camera

To investigate the image formation on a pinhole camera.

To investigate the dependence of the image sharpness on the diameter of the hole.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
2	460313	Clamp rider with fixed column
1	460311	Clamp rider with clamp 45/65
1	45933	Diaphragm and slide holder on rod
1	45931	Candle holder
1	46163	Set of 4 different diaphragms
1	45932	Candle, set of 20
1	44153	Screen, translucent

D5.1.2 Propagation of light
D5.1.2.4 Distance law for light

Investigate how light intensity depends on the distance of the illuminated surface from the source of the light.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
2	460311	Clamp rider with clamp 45/65
1	45060	Lamp housing with cable
1	450511	Bulb 6 V/30 W, E14, set of 2
1	524013	Sensor-CASSY 2
1	524020USB	CASSY-Display USB
1	5240511	Lux adapter S
1	666243	Lux sensor
1	59002	Small clip plug
1	46021	Holder for plug-in elements
1	521210	Transformer 6/12 V

D5.1.3 Light transmitting capacity
D5.1.3.1.a Light transmitting capacity of different solid bodies - Optical bench S1 profile

To investigate the light transmitting capacity of different solid bodies.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
2	460311	Clamp rider with clamp 45/65
1	45060	Lamp housing with cable
1	450511	Bulb 6 V/30 W, E14, set of 2
1	44153	Screen, translucent
1	54425	Set of dielectrics
1	54424	Parallel plate capacitor with spacers
1	688106	Acetate foils 300 x 300 x 0.1 mm, set of 10
1	664198	Glass plate 120 x 120 x 4 mm
1	521210	Transformer 6/12 V

D5.1.4 Light and shadow
D5.1.4.1.a Formation of a shadow - Optical bench S1 profile

Demonstrate how a shadow arises behind an opaque object.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
2	460313	Clamp rider with fixed column
1	460311	Clamp rider with clamp 45/65
1	459032	Halogen lamp 12 V/20 W
1	45930	Plate holder on rod
1	44153	Screen, translucent
1	521210	Transformer 6/12 V
1	501451	Connecting lead 19 A, 50 cm, black, pair

D5.1.4 Light and shadow
D5.1.4.2.a Formation of umbra and half-shadow - Optical bench S1 profile

Demonstrate how umbra and half-shadows are arise behind an opaque object.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
2	460313	Clamp rider with fixed column
1	460311	Clamp rider with clamp 45/65
2	459032	Halogen lamp 12 V/20 W
2	45930	Plate holder on rod
1	44153	Screen, translucent
1	521210	Transformer 6/12 V
2	501451	Connecting lead 19 A, 50 cm, black, pair

D5.4.2 Images in a concave mirror
D5.4.2.1 Real images in a concave mirror

Investigate the images formed by a concave mirror for various object distances.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
2	460313	Clamp rider with fixed column
2	460311	Clamp rider with clamp 45/65
1	45060	Lamp housing with cable
1	450511	Bulb 6 V/30 W, E14, set of 2
1	46020	Condenser with diaphragm holder
1	45933	Diaphragm and slide holder on rod
1	46166	Objects for investigating images, pair
1	45971	Convex-concave mirror on rod
1	44153	Screen, translucent
1	521210	Transformer 6/12 V

D5.4.3 Images at convex lenses
D5.4.3.1 Real images at a convex lens

Investigate the images formed by a convex lens for various object distances.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
2	460313	Clamp rider with fixed column
2	460311	Clamp rider with clamp 45/65
1	45060	Lamp housing with cable
1	450511	Bulb 6 V/30 W, E14, set of 2
1	46020	Condenser with diaphragm holder
1	45933	Diaphragm and slide holder on rod
1	46166	Objects for investigating images, pair
1	45962	Lens on rod f = +100 mm
1	44153	Screen, translucent
1	521210	Transformer 6/12 V

D5.4.3 Images at convex lenses
D5.4.3.2 Virtual images at a convex lens

Investigate the images formed by a convex lens with object distances $g \leq f$.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
2	460313	Clamp rider with fixed column
2	460311	Clamp rider with clamp 45/65
1	45060	Lamp housing with cable
1	450511	Bulb 6 V/30 W, E14, set of 2
1	46020	Condenser with diaphragm holder
1	45933	Diaphragm and slide holder on rod
1	46166	Objects for investigating images, pair
1	45962	Lens on rod f = +100 mm
1	44153	Screen, translucent
1	521210	Transformer 6/12 V
1	MIK74708	BMS SyncCam 8Mp
	additionally required: 1 Monitor	

D5.4.3 Images at convex lenses
D5.4.3.4 Law of imagery

Investigate the images formed by a convex lens for various object distances.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
2	460313	Clamp rider with fixed column
2	460311	Clamp rider with clamp 45/65
1	45060	Lamp housing with cable
1	450511	Bulb 6 V/30 W, E14, set of 2
1	46020	Condenser with diaphragm holder
1	45933	Diaphragm and slide holder on rod
1	46166	Objects for investigating images, pair
1	45962	Lens on rod f = +100 mm
1	44153	Screen, translucent
1	31154	Precision vernier callipers
1	521210	Transformer 6/12 V

D5.4.3 Images at convex lenses
D5.4.3.5 Lens equation

Confirmation of the lens equation.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
2	460313	Clamp rider with fixed column
2	460311	Clamp rider with clamp 45/65
1	45060	Lamp housing with cable
1	450511	Bulb 6 V/30 W, E14, set of 2
1	46020	Condenser with diaphragm holder
1	45933	Diaphragm and slide holder on rod
1	46166	Objects for investigating images, pair
1	45962	Lens on rod f = +100 mm
1	44153	Screen, translucent
1	521210	Transformer 6/12 V

D5.4.3 Images at convex lenses
D5.4.3.6 Focal length of a convex lens

Determination of the focal length of a convex lens.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
2	460313	Clamp rider with fixed column
2	460311	Clamp rider with clamp 45/65
1	45060	Lamp housing with cable
1	450511	Bulb 6 V/30 W, E14, set of 2
1	46020	Condenser with diaphragm holder
1	45933	Diaphragm and slide holder on rod
1	46166	Objects for investigating images, pair
1	45962	Lens on rod f = +100 mm
1	44153	Screen, translucent
1	521210	Transformer 6/12 V

D5.5.1 The magnifier
D5.5.1.1 Magnification with a magnifier

Determination of the magnification V_L of a magnifier.

Investigate the relationship between the magnification V_L and the focal length of the lens used as a magnifier

consisting of:

1	460310	Optical bench, S1 profile, 1 m
1	460313	Clamp rider with fixed column
1	460311	Clamp rider with clamp 45/65
1	45961	Lens on rod, f = +75 mm
1	45962	Lens on rod f = +100 mm
1	45963	Lens on rod f = +200 mm
1	44153	Screen, translucent
1	46097	Metal rule, 0.5 m
1	MIK74708	BMS SyncCam 8Mp
	additionally required: 1 Monitor	

D5.5.2 The microscope
D5.5.2.1 Construction and image formation at the microscope

Investigate the construction and image formation on a microscope.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
3	460313	Clamp rider with fixed column
2	460311	Clamp rider with clamp 45/65
1	450641	Halogen lamp 12 V, 50/100W
1	45063	Halogen bulb 12 V/100 W, G6.35
1	45933	Diaphragm and slide holder on rod
1	45962	Lens on rod f = +100 mm
1	45960	Lens on rod f = +50 mm
1	44153	Screen, translucent
1	726890	DC-High Current Power Supply 1...32 V/0...20 A
1	501451	Connecting lead 19 A, 50 cm, black, pair
1	MIK74708	BMS SyncCam 8Mp

additionally required: 1 Monitor

D5.5.3 The telescope
D5.5.3.1 Construction and image formation at the telescope

Investigate the construction and image formation on the astronomical telescope.

Demonstrate the image reversal with a dispersing lens (Dutch telescope/Galilean telescope).

consisting of:

1	460310	Optical bench, S1 profile, 1 m
2	460313	Clamp rider with fixed column
1	460311	Clamp rider with clamp 45/65
1	45964	Lens on rod f = +300 mm
1	45962	Lens on rod f = +100 mm
1	45968	Lens on rod f = -100 mm
1	44153	Screen, translucent
1	666711	Butane gas burner
1	666712ET3	Butane cartridge, 190 g, set of 3
1	MIK74708	BMS SyncCam 8Mp
	additionally required: 1 Monitor	

D5.5.4 The slide projector
D5.5.4.1 Construction and image formation at the slide projector

Investigate the construction and image formation on a slide projector.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
3	460313	lamp rider with fixed column
1	460311	Clamp rider with clamp 45/65
1	45060	Lamp housing with cable
1	450511	Bulb 6 V/30 W, E14, set of 2
1	45933	Diaphragm and slide holder on rod
1	46166	Objects for investigating images, pair
1	45960	Lens on rod f = +50 mm
1	45962	Lens on rod f = +100 mm
1	521210	Transformer 6/12 V

D5.5.5 The camera
D5.5.5.1 Construction and image formation at the camera

Investigate the construction of a camera and the formation of an image on the film plane.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
3	460313	Clamp rider with fixed column
1	45931	Candle holder
1	45932	Candle, set of 20
1	45962	Lens on rod f = +100 mm
1	45933	Diaphragm and slide holder on rod

D5.5.5 The camera
D5.5.5.2 Focal lengths of objectives

Investigate the change in image size and image detail when using objectives with different focal lengths.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
5	460313	Clamp rider with fixed column
1	45931	Candle holder
1	45932	Candle, set of 20
1	45962	Lens on rod f = +100 mm
1	45960	Lens on rod f = +50 mm
1	45963	Lens on rod f = +200 mm
1	45933	Diaphragm and slide holder on rod

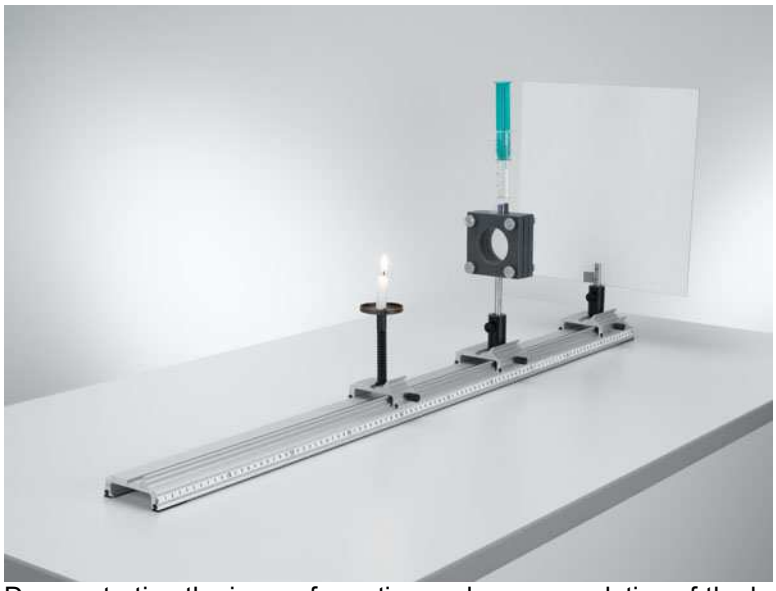
D5.5.5 The camera
D5.5.5.3 Zoom lens

Demonstrating the principle of operation of a zoom lens.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
4	460313	Clamp rider with fixed column
1	45931	Candle holder
1	45932	Candle, set of 20
1	45962	Lens on rod f = +100 mm
1	45963	Lens on rod f = +200 mm
1	45933	Diaphragm and slide holder on rod

D5.5.6 The eye
D5.5.6.1.a Image formation and accommodation of the eye - Structure of the eye with lens model and translucent screen



Demonstrating the image formation and accommodation of the human eye.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
1	460313	Clamp rider with fixed column
2	460311	Clamp rider with clamp 45/65
1	45931	Candle holder
1	45932	Candle, set of 20
1	662402	Lens Model
1	44153	Screen, translucent
1	6753400	Water, pure, 1 l

D5.5.6 The eye
D5.5.6.2.a Far-sightedness - Structure of the eye with lens model and translucent screen

Demonstrating the far-sightedness of an eye and its correction by means of a converging lens

consisting of:

1	460310	Optical bench, S1 profile, 1 m
2	460313	Clamp rider with fixed column
2	460311	Clamp rider with clamp 45/65
1	45931	Candle holder
1	45932	Candle, set of 20
1	662402	Lens Model
1	45962	Lens on rod f = +100 mm
1	44153	Screen, translucent
1	6753400	Water, pure, 1 l

D5.5.6 The eye
D5.5.6.3.a Short-sightedness - Structure of the eye with lens model and translucent screen

Demonstrating the short-sightedness of an eye and its correction by means of a diverging lens.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
2	460313	Clamp rider with fixed column
2	460311	Clamp rider with clamp 45/65
1	45931	Candle holder
1	45932	Candle, set of 20
1	662402	Lens Model
1	45968	Lens on rod f = -100 mm
1	44153	Screen, translucent
1	6753400	Water, pure, 1 l

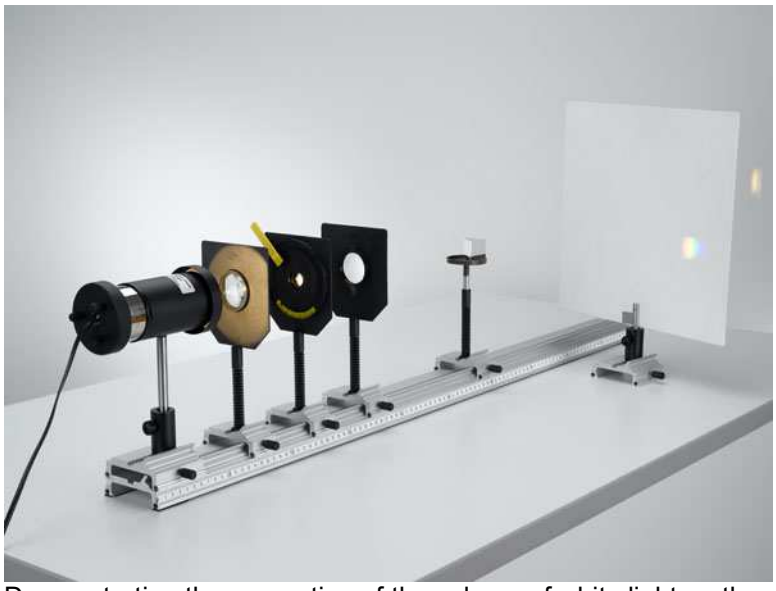
D5.5.6 The eye
D5.5.6.4.a Presbyopia - Structure of the eye with lens model and translucent screen

Demonstrating the presbyopia of an eye and its correction by means of a diverging lens.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
2	460313	Clamp rider with fixed column
2	460311	Clamp rider with clamp 45/65
1	45931	Candle holder
1	45932	Candle, set of 20
1	662402	Lens Model
1	45962	Lens on rod f = +100 mm
1	44153	Screen, translucent
1	6753400	Water, pure, 1 l

D5.6.1 Dispersion of light into colours
D5.6.1.2.a Separation of the colours of light on the passage through a prism - Optical bench S1 profile



Demonstrating the separation of the colours of white light on the passage through a flint glass prism.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
4	460313	Clamp rider with fixed column
2	460311	Clamp rider with clamp 45/65
1	45060	Lamp housing with cable
1	450511	Bulb 6 V/30 W, E14, set of 2
1	45960	Lens on rod f = +50 mm
1	45962	Lens on rod f = +100 mm
1	47171	Adjustable slit on stand rod
1	46532	Prism, flint glass
1	45931	Candle holder
1	68660	Extension pin
1	44153	Screen, translucent
1	521210	Transformer 6/12 V

D5.6.1 Dispersion of light into colours
D5.6.1.3 Detection of infrared radiation

Detecting infrared radiation by means of a zinc sulphide screen.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
3	460313	Clamp rider with fixed column
1	460311	Clamp rider with clamp 45/65
1	45060	Lamp housing with cable
1	450511	Bulb 6 V/30 W, E14, set of 2
1	45933	Diaphragm and slide holder on rod
1	46874	Filter infrared
1	45960	Lens on rod f = +50 mm
1	45930	Plate holder on rod
1	46872	Zinc sulphide screen
1	521210	Transformer 6/12 V

D5.6.1 Dispersion of light into colours
D5.6.1.4.a Infrared radiation in the continuous spectrum - Setup with a zinc sulphide screen

Detecting infrared radiation in the continuous spectrum of an incandescent lamp.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
5	460313	Clamp rider with fixed column
2	460311	Clamp rider with clamp 45/65
1	45060	Lamp housing with cable
1	450511	Bulb 6 V/30 W, E14, set of 2
1	45930	Plate holder on rod
1	45960	Lens on rod f = +50 mm
1	45962	Lens on rod f = +100 mm
1	47171	Adjustable slit on stand rod
1	46532	Prism, flint glass
1	45931	Candle holder
1	68660	Extension pin
1	44153	Screen, translucent
1	46872	Zinc sulphide screen
1	521210	Transformer 6/12 V

D5.6.1 Dispersion of light into colours
D5.6.1.5 Detection of ultraviolet radiation

Detection of ultraviolet radiation by means of an ultraviolet phosphorescent screen.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
3	460313	Clamp rider with fixed column
1	460311	Clamp rider with clamp 45/65
1	45060	Lamp housing with cable
1	450511	Bulb 6 V/30 W, E14, set of 2
1	45933	Diaphragm and slide holder on rod
1	46979	Ultraviolet filter
1	45960	Lens on rod f = +50 mm
1	45930	Plate holder on rod
1	46982	Card with emission colours
1	521210	Transformer 6/12 V

D5.6.1 Dispersion of light into colours
D5.6.1.6.a Ultraviolet radiation in the continuous spectrum - Setup with an ultraviolet phosphorescent screen

Detection of ultraviolet radiation in the continuous spectrum of an incandescent lamp.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
5	460313	Clamp rider with fixed column
2	460311	Clamp rider with clamp 45/65
1	45060	Lamp housing with cable
1	450511	Bulb 6 V/30 W, E14, set of 2
1	45930	Plate holder on rod
1	45960	Lens on rod f = +50 mm
1	45962	Lens on rod f = +100 mm
1	47171	Adjustable slit on stand rod
1	46532	Prism, flint glass
1	45931	Candle holder
1	68660	Extension pin
1	44153	Screen, translucent
1	46982	Card with emission colours
1	521210	Transformer 6/12 V

D5.6.2 Additive and subtractive colour mixing
D5.6.2.2.a Additive colour mixture - Three-fold lamp and three-fold colour filter

Determining the mixed colours that arise when light of the colours red, green and blue is added.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
3	460313	Clamp rider with fixed column
1	460311	Clamp rider with clamp 45/65
1	459046	Lamp, three-fold 12 V/3 x 6 W
1	46797	Triple colour filter
1	45933	Diaphragm and slide holder on rod
1	45962	Lens on rod f = +100 mm
1	44153	Screen, translucent
1	521210	Transformer 6/12 V
1	501461	Connecting lead 19 A, 100 cm, black, pair

D5.6.2 Additive and subtractive colour mixing
D5.6.2.3.a Additive colour mixture - complementary colours - Three-fold lamp

Determining the complementary colors by additive color mixture.

consisting of:

1	460310	Optical bench, S1 profile, 1 m
3	460313	Clamp rider with fixed column
1	460311	Clamp rider with clamp 45/65
1	459046	Lamp, three-fold 12 V/3 x 6 W
1	46795	Colour filter set, primary
1	46796	Colour filter set, secondary
1	45933	Diaphragm and slide holder on rod
1	45962	Lens on rod f = +100 mm
1	44153	Screen, translucent
1	521210	Transformer 6/12 V
1	501461	Connecting lead 19 A, 100 cm, black, pair

D5.6.3 Spectra
D5.6.3.1.a Spectra of luminous gases - Gas discharge tubes

Demonstrating the spectra of helium, neon, and hydrogen.

consisting of:

1	46767		Spectral tube He
1	46769		Spectral tube Ne
1	46766		Spectral tube H_2
1	46781		Holder for spectral tubes
1	536251		Measuring resistor 100 kOhm
1	52170		High-voltage power supply 10 kV
1	500611		Safety connection lead 25 cm, red
1	500641		Safety connection lead 100 cm, red
1	500642		Safety connection lead 100 cm, blue
1	500610		Safety connecting lead 25 cm, yellow/green
1	30002		Stand base, V-shaped, small
1	30040		Stand rod 10 cm, 12 mm Ø
1	30101		Leybold multiclamp
5	46532		Prism, flint glass
		Alternative:	
5	47123		Ruled grating 6000/cm (Rowland)

D6.1.1 Detecting radioactive radiation
D6.1.1.2 Detecting α radiation

Demonstrating the trajectories of a particles in a Wilson cloud chamber

consisting of:

1	55957	Wilson cloud chamber
1	559596	Ra-226 radium source for Wilson chamber
1	45060	Lamp housing with cable
1	46020	Condenser with diaphragm holder
1	450511	Bulb 6 V/30 W, E14, set of 2
1	521352	Variable low-voltage transformer 1...12 V/6 A
1	52227	Power supply 450 V
1	50146	Connecting lead 19 A, 100 cm, red/blue, pair
1	30107	Simple bench clamp
1	30106	Bench clamp
1	6719720	Ethanol, denaturated, 1 l
1	6753410	Water, pure, 5 l
1	661222	Narrow-neck polyethylene bottle, 250 ml
1	665754	Measuring cylinder 100 ml, with plastic base
1	665953	Dropping pipette, 7 x 150 mm, 10 pcs.
1	665954	Rubber bulbs, 10 pcs
	Additionally recommended:	
1	MIK74708	BMS SyncCam 8Mp
	additionally required: 1 Monitor	

D6.1.2 Properties of radioactive radiation
D6.1.2.3.a Absorption of α- , β- and γ-radiation - Measurement with the counter P

Investigate the relationship between the counting rate *R* and the distance *d* between the radioactive preparation and the counter tube.

consisting of:

1	588857S	Advanced Science Kit - Set RAD 2, Basic
1	559460	Button-shaped source
1	559012	Pancake GM counter tube
1	575451	Counter P

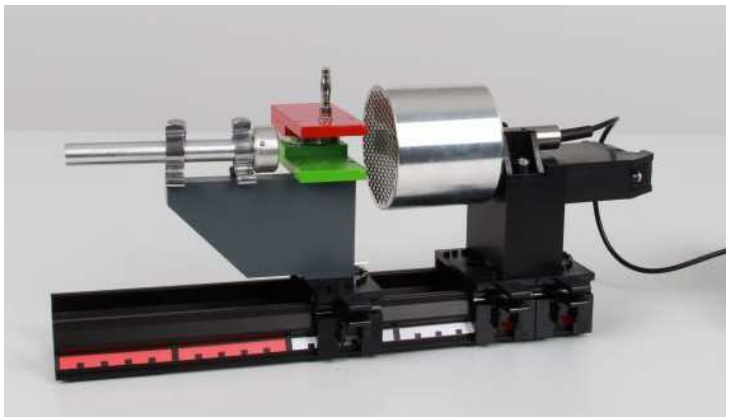
D6.1.2 Properties of radioactive radiation
D6.1.2.4.a Dependence of the counting rate from the distance - Measurement with the counter P

Investigate the relationship between the counting rate *R* and the distance *d* between the radioactive preparation and the counter tube.

consisting of:

1	588857S	Advanced Science Kit - Set RAD 2, Basic
1	559460	Button-shaped source
1	559012	Pancake GM counter tube
1	575451	Counter P

D6.1.2 Properties of radioactive radiation
D6.1.2.6.a Deflection of β - radiation in a magnetic field - Measurement with the counter P



Investigate the deflection of β-radiation in the magnetic field.

consisting of:

1	588857S	Advanced Science Kit - Set RAD 2, Basic
1	559460	Button-shaped source
1	559012	Pancake GM counter tube
1	575451	Counter P