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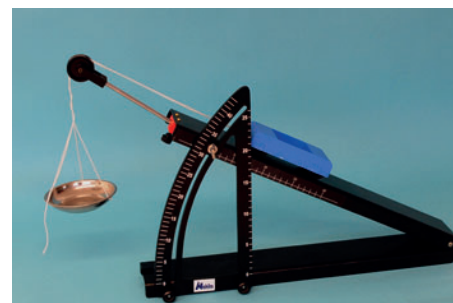
▶ QLB - Mechanics and fluids

▶ Inclined plane

This instrument has been design for the study of the concepts of movement on an inclined plane and its relation with friction. The whole structure is made of metal providing a good durability and robustness.

It is made of 2 metal plates hinged at one end; one of the plates is used as base and the other one as inclined plane. The plate acting as inclined plane presents a graduated scale 20-40 cm (divisions of 1 cm) in one side to measure the lineal distance along its length and can be inclined and fixed at any angle from 0 to 40°. A vertical scale 0-25 cm is also printed to measure the height of the inclined plane at any point. The end of the inclined plane is also provided with an adjustable pulley to hang weights, a pan, etc...

The instrument is completed with a plastic trolley with hook, a set of weights (including 1x100 g, 1x50 g y 1x20 g) and a pan with a lightweight cord.



Code	Description
QLB001	Inclined plane

▶ Force table

Used to verify the laws of composition and resolution of forces using vector diagrams of several concurrent forces. Made of a thick aluminium circular table, of about 40 cm diameter and covered by scratch resistant black epoxy coating. The external rim presents a circular scale graduated from 0° to 360° (divisions every 1° and marked every 10°).

The table is mounted on a heavy, stable cast metal tripod base that presents 3 height adjustable screws to correctly level the force table.

It is also provided with 4 pulleys with clamps that can be attached anywhere along the rim. A small detachable pin positioned at the centre of the table allows checking the balance of the forces through the centring of a ring tied to the cords carrying masses and suspended through the pulleys around it.

The instrument is supplied complete with a set of cords tied to the centring ring, a detachable pin and 4 sets of slotted masses with hanger. Each set of masses is composed of 1x100 g, 1x10 g, 1x20 g, 1x50 g and one hanger of 100 g.



Code	Description
QLB002	Force table

page
[01]



▶ QLB - Mechanics and fluids

▶ Free fall apparatus with digital timer

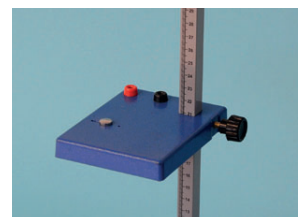


The instrument consists of an electromagnet mounted on a plastic case to allow releasing a metallic ball fitted on a square sectional rod. When the electromagnet is switched off the metallic sphere is released and timer starts; once the ball hits the impact sensor placed at the lower platform, the timer stops. The time taken by the sphere since it is released until it hits the impact sensor is shown on timer display to calculate the g by free fall.

The instrument includes a precise digital timer with the possibility of programming the time in micro seconds, milliseconds or seconds. The time is shown on a 7-segment LED display. The timer can be also used as stopwatch. It also includes all the necessary connection cables.



[01] Digital timer



[02] Case with electromagnet

Code	Description
QLB003	Free fall apparatus with digital timer

▶ Communicating vessels



It is composed of 4 glass tubes each one of them with different section diameter and shape, connected together at the bottom through a common horizontal glass tube, sealed to a manifold and mounted on a stand. It demonstrated that the liquid level in communicating vessels remains the same irrespective of the shapes and sizes of the vessels.

Code	Description
QLB004	Communicating vessels



The simple construction permits the use of water or even air for demonstration of the concepts involved. Comprises a pair of graduated glass syringes of capacities 50 and 10 cm³ respectively; both having ground pistons with limit stop to prevent their complete ejection from the barrels and providing a cross-sectional area ratio of 3:1 respectively.

The syringes are mounted on a stable, non-skid metal base with a platform at their top to place the weights; the nozzles of both syringes are connected by a 3-position valve by means of which they can be opened to the atmosphere, isolated or interconnected as desired. The thick wall of syringes make them capable of withstanding pressures involved.

The graduated syringes also permit simple Boyle's Law experiments to be performed.

Set of weights included: 1x200 g, 1x100 g, 1x50 g, 2x20 g and 1x10 g

Code	Description
QLB005	Pressure syringes



▶ QLB - Mechanics and fluids

▶ Bell jar with hand vacuum pump

This instrument is composed of a transparent bell jar and a hand-operated vacuum pump, both made of resistant ABS plastic and suitable for performing vacuum physics experiments. The bell jar is provided with a robust chamber capable of withstanding full vacuum without danger of implosion or shattering and fitted with a vacuum release valve and a vacuum gauge.

A rubber gasket ring on the pump ensures airtight seal with the jar. A manual piston pump in the base provides quick and convenient evacuation of the air inside the jar.

Note: the exposure or contact of the apparatus to organic solvents or vapours or other aggressive chemicals must be totally avoided. The instrument is non-autoclavable.



Code	Description
QLB006	Bell jar with hand vacuum pump

▶ U-tube manometer

Glass manometer U-shaped tube with stopcock near the end of one of the arms and mounted on a stand. The scale presents a graduation 50-0-50 cm with divisions of 1 mm.

Code	Description
QLB007	U-tube manometer



[01] Detalle llave de paso



▶ Magdeburg hemispheres

A simple and economical device for demonstrating the effect of atmospheric pressure. The instrument consists of two plastic hemispheres of about 100 mm diameter, both with a handle at their top. One of them presents a plastic stopcock for pumping out air and releasing vacuum and a rubber O-ring seal inside. The lightweight plastic construction makes them easy to handle and use.



[01] Detail of stopcock



[02] Opened hemispheres



Code	Description
QLB008	Magdeburg hemispheres



► Wave form helix



[01] Snakey



Steel wire helices specially designed for demonstration of wave motion. The Snakey helix presents looped ends for safety.

Code	Description	Diameter	Length
QLD001	Snakey helix	19 mm	3 m (9 m extended)
QLD002	Slinky helix	75 mm	10 cm

► Vibrator generator with accessories, code QLD003



It is especially designed to produce mechanical oscillations when it is connected to a power supply. A especially designed coil system enables the unit to be operated at its maximum rating for a prolonged period of time without any damage due to overheating. The frequency of response covers the whole of the audio spectrum and beyond.

The voltage input is via a pair of 4 mm banana sockets and mechanical oscillation output is obtained through a shaft at the top. A locking device provides safety to the apparatus during storage or transportation by blocking the movement of the shaft.

The instrument is supplied complete with the following accessories:

1| Chladni plates: square and circular plates. They allow observation of the resonance patterns thanks to the spread of a thin layer of sand on their surface. The plates resonances are also audible.

2| Steel strips: set of various length of metal strips. Frequencies at 11, 15, 21, 36 and 50 Hz can be observed. Standing waves can be heard up to 900 Hz and observed up to 300 Hz.

Code	Description
QLD003	Vibrator generator with accessories

► Melde's apparatus



For showing the effects of vibrations in a stretched cord and investigate the relationship between frequency, tension and density. In addition, the presence of electrical contacts, opened and closed by a vibrating armature, allows the apparatus to be used as high-speed changeover switch in. Composed of a thin steel rod mounted on a in a clamp formed by a pair of 4 mm terminal sockets, so that its free length may be adjusted as desired.

An AC energizing coil surrounds the armature and a permanent magnet provides the necessary magnetic polarization. The free end of the armature equipped with a small bosshead and clamp serves for tying the cord and also as the moving contact when the apparatus is operating as a changeover switch.

Code	Description
QLD004	Melde's apparatus



▶ QLD - Waves and sound

▶ Pendulum, code QLD005

Designed to perform a large number of experiments related to pendulum motion in a quickly and accurately way.

The apparatus consists of a metric ruler with a 0 at the base, graduated in millimetres and with readings every centimetre, which is attached vertically to the rod of a support. From the upper end of the support, a rod from which hangs three spheres, each 25 mm in diameter and made of different materials (wood, steel and aluminium). The suspension length of each pendulum can be controlled. The apparatus is completed with a metal base

Code	Description
QLD005	Pendulum



▶ Pair of tuning forks with box, code QLD006

This set allows the study of the concept of resonance through sympathetic and forced vibration, and the phenomenon of beats. It comprises two matched nickel plated tuning forks of frequency A (426.6), each one of them mounted on top of hollow wooden box open at one end. Both forks present a sliding mass on one prong by means of which its frequency can be varied from the nominal 426.6 Hz. When both forks are sounded a clearly audible "beat" is produced, its rate depending upon the difference in frequency between the forks.

The instrument also includes a disk-shaped rubber mounted hammer.

Code	Description
QLD006	Pair of tuning forks with box



▶ Set of 8 tuning forks, steel

With the best quality, plain shanks and with frequency clearly marked. Each set is composed of 8 forks, one each of diatonic scale frequencies: C1-(256), D-(288), E-(320), F-(341.3), G-(384), A-(426.6), B-(480) y C2-(512).

The complete set is supplied in a box.

Code	Description
QLD007	Set of 8 tuning forks, steel





▶ **QLG - Light and optics**

▶ **Newton colour disks**

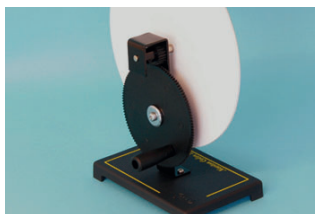


CODE QLG001



CODE QLG002

Especially designed for demonstrating that white light is composed of the additive mixing of all the spectral colours. They consist of a multi-coloured circular disk having sectors of various spectral colours in proper proportions. By rotating the disk at sufficient speed, all the colours will be observed to disappear by merging into a single white colour.



[01] Back of instrument

Code	Diameter	Type
QLG001	200 mm	Manual (Handle at the back)
QLG002	80 mm	Motorized (Low DC voltage motor)

▶ **Light box and optical set**



A complete kit providing comprehensive range of optical experiments involving reflection, refraction and colour mixing. The kit designed around a light box, all black, well ventilated, consisting of a light source 12V, 24W vertically straight filament lamp fitted in the holder through top of the box. The light box incorporates a collimating lens towards one end for producing convergent, divergent, or parallel light beams, with other end having triple aperture system for colour mixing experiments; adjustable hinged mirrors along both sides of the box facilitates colour mixing of all three beams. All apertures in the box are provided with vertical channels to hold slits plates and colour filters. A two core flexible connecting lead terminating in a pair of 4 mm banana plugs connect it to low voltage AC power source.

The complete optical set includes:

1 | Set of 5 acrylic prisms: one each of rectangular, semi-circular, equilateral triangular $60^\circ \times 60^\circ \times 60^\circ$, triangular $90^\circ \times 60^\circ \times 30^\circ$ and right angled triangular $90^\circ \times 45^\circ \times 45^\circ$. All prisms are free of optical imperfections and sharp edges.

2 | Set of 3 acrylic lenses: one double concave, one double convex (both having same radius of curvature) and one thick double convex.

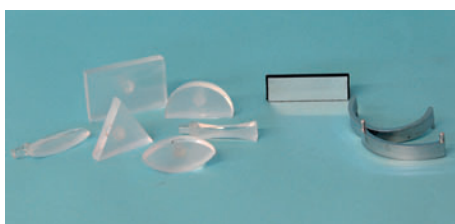
3 | Set of 3 mirrors: highly polished reflecting surfaces and free standing. One each of parabolic, semi-circular and plane shaped glass.

4 | Set of 2 slit plates, black: one with 1 and 3 narrow slits and the other with 4 narrow slits and 1 wide slit.

5 | Set of 8 colour filters: 3 primary colours (red, blue and green) and 5 secondary colours (cyan, violet, orange, yellow and magenta)

6 | Set of 8 colour plates: red, blue, green, violet, orange, cyan, yellow and pink. All acrylic prisms, lenses and mirrors are provided with finger grips, enabling their handling without touching their active optical surfaces. The bottoms of all refractive components are frosted to minimize internal reflections and revealing the path of light as it passes through.

The set is supplied complete with a spare bulb and in a moulded Styrofoam case for long life storage.



[01] Set of acrylic prisms, lenses and mirrors



[02] Detail of inside

Code	Description
QLG003	Light box and optical set



▶ QLG - Light and optics

▶ Optical bench

An optical bench made of cross sectional aluminium pipe with closed ends, fitted on two moulded supports with levelling screws. A scale graduated in millimetres is fitted on top of the optical bench. It is provided with easy sliding tilt proof riders with index mark for mounting various accessories; the height of the accessories can be adjustable with the help of knobs fitted in the riders. The optical bench is supplied complete with the following accessories:

- 1| **Light source:** halogen lamp 12V / 24W placed on a heat resistant Support. With 2 flexible cables with 4 mm banana plugs for connecting to the power supply.
 - 2| **Circular plane glass:** mounted on a metal frame.
 - 3| **Lens holder:** for holding lenses of 50 mm diameter
 - 4| **Circular black metal screen** with a 10 mm central aperture covered with 1.5 mm wire mesh gauze.
 - 5| **Diaphragm:** circular plate with an attached rotary circular disk with 6 holes of different aperture.
 - 6| **Ground glass screen** mounted on a metal frame
 - 7| **Grating holder:** rectangular plate with a centred circular aperture and fitted with two clips to hold the different size gratings.
 - 8| **Cross slits with arrowhead:** to Project the arrow head images
 - 9| **Jolly's photometer:** a thin aluminium foil is sandwiched in between two equal sized rectangular acrylic blocks fitted inside a plastic moulded block. Two eyepieces fitted on opposite sides of the block to differentiate between the light intensity of two light sources.
 - 10| **Support with needles:** four needles mounted on a plastic block in straight line.
 - 11| **Receiving screen:** a white rectangular acrylic sheet with two printed perpendicular lines, one of them with a graduation of 60 mm in vertical direction.
- This instrument allows the performance of optics related experiments such as image formation, reflection/refraction through optical elements, etc



[01] Detail of instrument



[02] Detail of instrument

Code	Description
QLG004	Optical bench complete with accessories

▶ Hartl disk, complete

This instrument has been designed for studying the different concepts of optics including reflection and refraction using the ray tracing technique. It is composed of a rotatable white metal disk, of around 30 cm diameter. The disk presents a graduation of 90° - 0° - 90° - 0° - 90° (divisions of 1°) that divides the disk in 4 equal quadrants with its centre clearly marked. Shapes of various optical elements are also clearly marked on the disk to facilitate their placement while performing experiments.

The apparatus is supplied with a laser type light source that allows the projection of 1, 3 or 5 parallel beams for performing different experiments. A complete set of optical elements is also included:

- 1| **Acrylic prisms (refraction):** semi-circular, biconvex, biconcave, right angled-prism, equilateral prism and trapezoidal prism.
- 2| **Mirrors (reflection):** plane and semi-circular

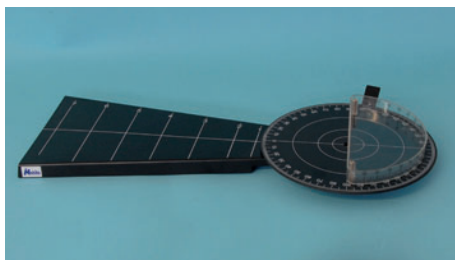
All optical elements are provided with powerful magnets at their bottom for placing them securely on the disk either in horizontal or vertical disk position. The bottoms of all refractive components are frosted to minimize internal reflections and revealing the path of light as it passes through. .



Code	Description
QLG005	Disco de Hartl completo



► Refraction disk



A metallic circular disk graduated (0-90°) in 4 quadrants and subdivided into 1°. A transparent acrylic semi-circular tank is fitted on the metallic disk to find out the refractive index of different liquids as for example water, oil, etc. All this assembly is fitted on a metallic base which is graduated from 1-7 to place the light box at any desired level.

Code	Description
QLG006	Refraction disk

► Laser ray box, red



Laser ray box of red colour (wavelength 650 nm) with the option of 1, 3 or 5 parallel beams. It is supplied complete with power adapter.

Code	Description
QLG007	Laser ray box, red

► Hand spectroscope



A simple device for the rapid qualitative examination of the composition of emission and absorption spectra. It presents the main components as collimator, prism and telescope mounted inside a straight tube; one of the ends of the tube presents an adjustable slit to regulate the light entering inside and the other end is provided with an eyepiece. The drawtube of the eyepiece can be slide along its length for sharp focusing the spectrum.

Supplied complete in a wooden box.

Code	Description
QLG008	Hand spectroscope

► Power supply for spectral tubes



It presents a sturdy and durable case made of metal and allows placing the tubes vertically. With On/Off switch and shielded sockets for safety during use.

The socket for fitting and connecting the tubes are also properly isolated and allow holding the spectral tube firmly. The lower socket is spring loaded to enable quick and easy changing of spectral tubes.

Black color of the case eliminates distracting ambient light.

Code	Description	Power supply
QLG009	ower supply for spectral tubes	220-240 V AC, 50 Hz

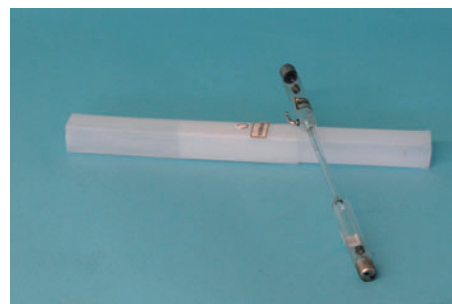


▶ QLG - Light and optics

▶ Spectral tubes

With straight shape and about 20 cm long, each tube is filled with a type of gas or vapour for studying their respective emission spectra. The central part of each tube (about 50 mm) presents a thin diameter for observing more easily the effect of the electrical discharge in the gas. The metal cap electrodes at both ends serve as connection to the high voltage power supply.

Code	Type of gas
QLG010	Argon
QLG011	Helium
QLG012	Neon
QLG013	Hydrogen
QLG014	Nitrogen
QLG015	Mercury



▶ QLJ - Thermology

▶ Gravesande's ring and ball

A simple and economical device for demonstrating the thermal expansion of solids. It is composed of a brass ring and ball each one of them mounted on separate insulated handles. When cold, the ball of 19 mm diameter easily passes through the ring but does not pass when heated. If the ring is heated on the same extent than the ball, then it passes through the ring.

Code	Description
QLJ001	Gravesande's ring and ball

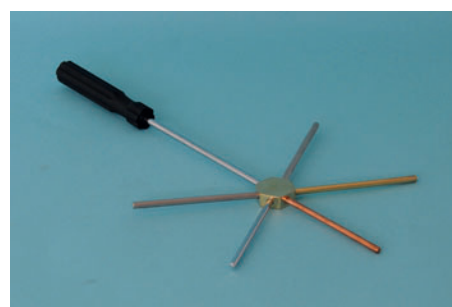


▶ Thermal conductivity apparatus star shaped

For demonstration of differences in the thermal conductivity of five different metals: brass, copper, aluminium, mild steel and stainless steel. The 5 metal rods spread radially outwards and are equally spaced on each side of hexagonal brass hub. Each rod has a small well at the end for holding paraffin wax. The instrument is completed with an isolating handle.

When the central hub is heated, the paraffin wax contained in the cavities of different metals melts at different times depending on the thermal conductivity of the corresponding metal.

Code	Description
QLJ002	Thermal conductivity apparatus star shaped



▶ Joule's calorimeter

It is composed of an inner vessel of about 300 mL of capacity contained inside and outer vessel of about 900 mL both of them made of aluminium and separated by an isolating material that minimizes heat loss. The set is closed with an acrylic transparent lid provided with a resistance at the bottom to be conveniently introduced in the vessel and two 4 mm banana sockets for electrical connection. The lid is also provided with stirrer and a hole to put a thermometer (thermometer is not included).





► Calorimeter block



CODE QLG004



CODE QLG005



CODE. QLG006

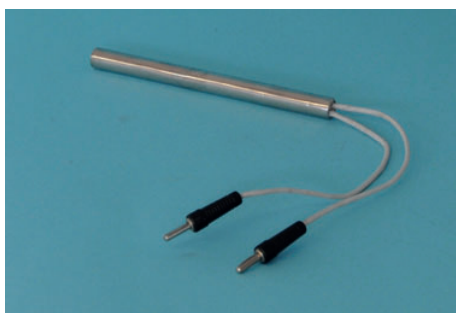


CODE QLG007

A simple calorimeter for quick experiments of determination of the specific heat capacity of different metals. Each block is cylindrical shaped, has a mass of $1 \text{ Kg} \pm 2\%$ and presents 2 holes, a large central hole (about 12.5 mm diameter) to accept special immersion heater and a smaller hole (about 7.5 mm diameter) to accept a thermometer or temperature sensor.

Code	Material
QLJ004	Aluminium
QLJ005	Steel
QLJ006	Copper
QLJ007	Brass

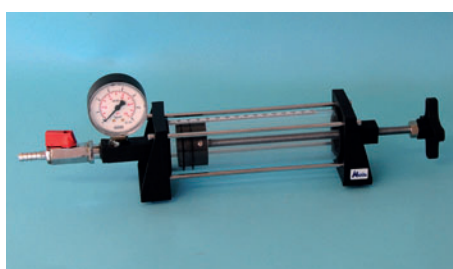
► Heating resistance for calorimeter blocks



It is a especial heater designed for use with metal block calorimeters. The heating element is enclosed in a stainless steel tube with two flying leads coming out of the sealed tube body for electrical connections. It operates on 12 V, 50 W.

Code	Description
QLJ008	Heating resistance for calorimeter blocks

► Boyle's law apparatus



This instrument allows the study of the Pressure/volume relationship of air at a constant temperature. It consists of a graduated cylinder of (0-300) cm³, made of transparent material and mounted on a support. One of the ends of the cylinder is closed by a piston and the other end presents a valve to adjust the mass of air contained inside the cylinder. The reading of the pressure inside the cylinder is made by a pressure gauge placed near the valve and graduated from (0-3.4) x 10⁵ Pa.

Code	Description
QLJ009	Boyle's law apparatus

► Gas kinetics theory model



For demonstration of the kinetic theory of gases explaining the molecular motion of the gases, thinning of air with increasing altitude, increase in pressure/volume with temperature, etc. It is composed of a clear cylindrical tube closed at the top through a loose-fitting lid and with a rubber diaphragm at the base; through the connection of the instrument to a low voltage power supply an oscillatory movement is of the diaphragm is produced. The instrument also includes a set of small metal spheres and a cardboard disk for loading at the top.

Code	Description
QLJ010	Gas kinetics theory model



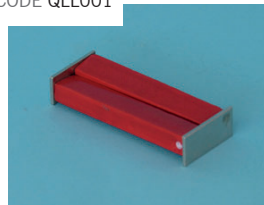
▶ QLL - Magnetism and electrostatics

▶ Magnets

Different models of magnets for performing experiments of magnetism and visualization of magnetic fields.

Code	Shape	Dimensions	Material	Quantity/pack
QLL001	Rectangular	75x15x10 mm	Alnico	2 uds/pack
QLL002	Cylindrical	100x12 mm	Alnico	2 uds
QLL003	Ring	36x18x8 mm	Ceramics	1 ud
QLL004	Horeshoe	75x12x5 mm	Chromed steel	1ud

CODE QLL001



CODE QLL002



CODE QLL003



▶ Iron filling, fine

For the study of magnetic fields. Supplied in box of 500 g.

Code	Description
QLL005	Iron filling, fine

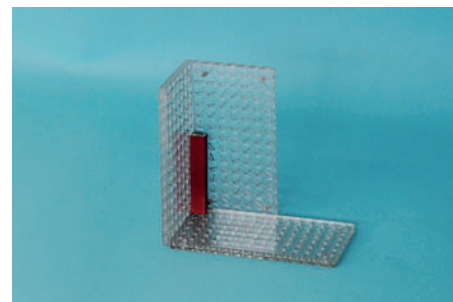


▶ Magnetic field demonstrator, 3D

Set of 4 transparent plate with size 155x76x6 mm that present a matrix of small circular chambers (14x7 mm) each one containing an iron rod and that act as small compasses. The plates can be placed in different positions as for example a large bidimensional surface or as the faces of a cube; this way it is possible to show the configuration of a magnetic field in 2 or 3 dimensions with the properties of attraction and repulsion of magnets. The transparent nature of the plates makes them suitable to be used with a projector.

The set also includes a rectangular magnet.

Code	Description
QLL006	Magnetic field demonstrator, 3D



▶ Stand with magnetic needle

Stable circular base of bakelite with non-magnetic pillar and carbon steel pivoting point for the needle. Total height of about 110 mm.

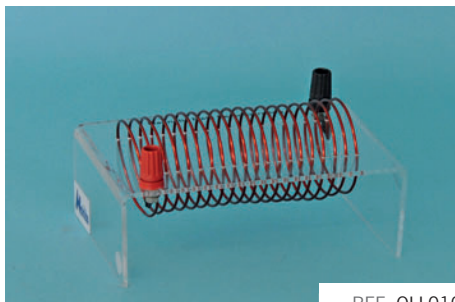
Code	Description
QLL011	Stand with magnetic needle





▶ QLL - Magnetism and electrostatics

▶ Magnetic field demonstrators



REF. QLL010

For the study and demonstration of magnetic fields associated to different shapes of an electrical current conducting wire. Mounted on a transparent acrylic base they can be placed on a retro projector for classroom demonstrations. Each instrument presents a pair of sockets for 4 mm banana plugs to be connected to a power supply. The effects of the magnetic field can be observed by using iron fillings.

3 models are available depending on the shape of the conducting wire:

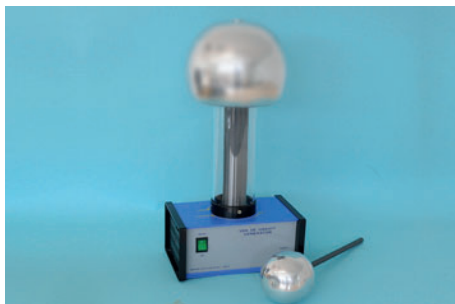
1 | Straight: U-shaped copper wire vertically mounted on the base. Maximum current of 8 A.

2 | Circular coil: 1-coil copper wire. Maximum current of 8 A.

3 | Solenoid: copper solenoid of about 52x125 mm (diam. x length).

Code	Shape
QLL008	Straight
QLL009	Coil
QLL010	Solenoid

▶ Van de Graaff generator



Code	Description
QLL014	Van de Graaff generator



A traditional device capable of generating high electrostatic potentials that can produce sparks of length up to 7 cm approx. in favourable environmental conditions. It is equipped with 2 acrylic plates each one of approx. 25 cm of diameter with aluminium sectors permanently pasted radially along the rim. Both plates are parallel to each other and rotate in opposite directions through a system of pulleys and belts; the pulley of one of the plates has a handle to make the system rotate manually.

The device has also 2 crossed rods with collecting "combs" at their end and 2 discharge spheres mounted at the end of a pair of arms which opposite end presents an isolating handle to adjust the distance between both spheres.

The charge can be accumulated in a couple of high capacity Leyden jars that can be connected or disconnected as desired for increasing the accumulated charge. When the machine starts rotating, the spheres start accumulating charge until the charge transfer between both spheres takes place in the form of an electric spark. The spark is produced intermittently by the continuous rotation of plates.

The complete machine is mounted on a well-isolated base that has also a couple of sockets for earth connection of the Leyden jars.

Code	Description
QLL015	Wimshurst electrostatic generator



[01] Leyden jars



▶ QLL - Magnetism and electrostatics

▶ Compass inclinometer

To demonstrate the earth's magnetic field and to illustrate the thumb rule. It consists of an aluminium ring with a double pointed needle pivoting in the centre; the ring is graduated from 0-360° in both clockwise and anticlockwise directions. The whole assembly is fitted on an aluminium pillar and mounted on a plastic base of approx. 142x80x40 mm .

Code	Description
QLL012	Compass inclinometer



▶ QLN - Electricity and electronics

▶ Power supply 1-12 V AC/DC

By simply selecting the proper voltage, this power supply is the solution for those experiments that requires a voltage supply up to 12 V. The AC/DC power supply can provide a voltage from 1 to 12 V in steps of 1 V, adjustable by means of a rotating knob at the frontal panel. The equipment is provided with overloading and short circuit protection. The AC current is supplied through a couple of blue sockets while the DC current is supplied through a pair of colour coded sockets (black/red). The earth connection point is placed between AC and DC sockets.

Code	QLN001
Power supply	220-240 V AC, 50 Hz
Output voltage	AC/DC 1-12 V
Intensity	6 A máx.
Primary protection	Fuse 2 A
Secondary protection	Thermal switch



▶ Regulated power supply 1-15 V DC

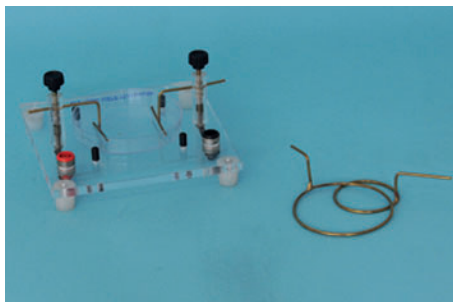
High performance power supply with DC current output suitable for a wide range of applications in the laboratory such as development, assembly and installation of circuits. The power supply output is an adjustable voltage in a continuous range of 0-15 V DC at a maximum intensity of 2 A and through a colour coded sockets (black/red). The output voltage and intensity adjustment knobs are placed on the front panel as well as LED displays for parameter visualization.

Code	QLN002
Power supply	110-220 V \pm 10% AC, 50/60 Hz
Output voltage	0-15 V DC, continuous variable range
Intensity	0-2 A max., continuous variable range
Displays	2 LED displays for voltage and intensity
Environmental cond. of use	0-40°C, 95% HR



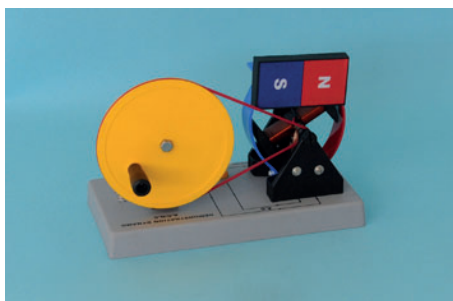


► Electric field apparatus



Code	Description
QLN003	Electric field apparatus

► Demonstration dynamo AC/DC



It shows the conversion of mechanical energy into electrical energy and the principle of operation of simple dynamos. The whole instrument is mounted on a base and is capable of generating AC and DC current simultaneously as it is shown by the illumination of a couple of light bulbs placed at the base. The equipment consists of an isolated copper wire coil mounted on a support that is placed between two curved metal strips; the support presents a commutator for DC output on one side and a commutator for AC output on the other side. A permanent magnet placed at the top of the metal strips generates the magnetic field. The instrument is completed with a hand operated pulley connect to the coil support through a rubber belt.

Code	Description
QLN004	Demonstration dynamo AC/DC

► Connection cables



Power cords with 4 mm banana type connectors, available in red and black colour and length of 1 m.

Code	Colour
QLN005	Black
QLN006	Red