OPTIKA® SCIENCE ITALY

M.A.D. APPARECCHIATURE SCIENTIFICHE ITALY

SCHOOL SCIENTIFIC LABORATORY

SCIENCE WITH PASSION

OPTIKA Science educational equipment

OPTIKA Italy is one of the leading companies in the manufacturing and distribution of educational and laboratory equipment, with a 45-year experience in the production of scientific equipment. People worldwide rely on OPTIKA products and solutions for significant discoveries and the most diversified applications, every day. Our core values are driven by the desire to improve customer's experience, by creating innovative technologies, ensuring the highest quality standards and expanding access to our products.

OPTIKA Italy offers a comprehensive range of products divided into three business lines:

OPTIKA Microscopes

With more than 100 models, fully accessorized, to virtually suit every customer need from educational to research applications

OPTIKA Balances

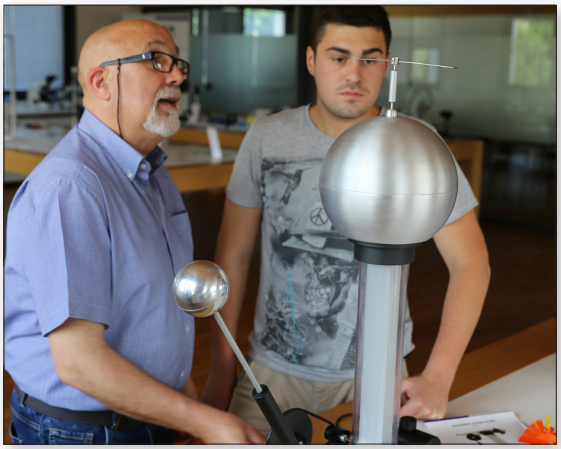
Over 25 series of counting scales for educational, laboratory and industrial purposes

OPTIKA Science

A huge range of instruments, kits and lab furnitures for the school's scientific laboratories, from primary to high schools.

All our products undergo a strict quality control process whereby 100% of the goods are individually tested to ensure premium quality standards according to our mission that is something we constantly care about: customer success!

WARNING: Specifications and appearances are subject to change without any notice or obligation on the part of the manufacturer.



NEWS

GALILEAN RELATIVITY 1842

See the contents on page 33

THE PRINCIPLE OF EQUIVALENCE 8124

See the contents on page 34

INTERACTIONS IN PHYSICS 1520

See the contents on page 35

NEWS

THE TRANSFER OF ENERGY 8140

See the contents on page 102

THE DYNAMICS AND CONSERVATION OF MECHANICAL ENERGY A10

See the contents on page 18

THE SIMPLE HARMONIC MOTION A11

See the contents on page 18

Index

SECTION 01 - KIT

Teaching guide in digital format

Minimum invoiced order: € 130,00 + VAT

PHYSICS LABORATORY SETS

Page 5

Our proposal of complete physics laboratories:

5625.1/5626.1 - MOBILE LABORATORIES (PHYSICS AND BIOLOGY)
5614 - SMALL PHYSICS LABORATORY (suitable for primary schools)
5621 - "ACTIVE SCHOOL" SET (suitable for primary schools)
5597 - PHYSICS SET FOR GROUP EXERCISES (suitable or secondary schools)
5592 - 6 PHYSICS SETS FOR TEAM WORKING (suitable for secondary schools)

PRIMARY AND MIDDLE SCHOOL - KIT BASIC

Page 10

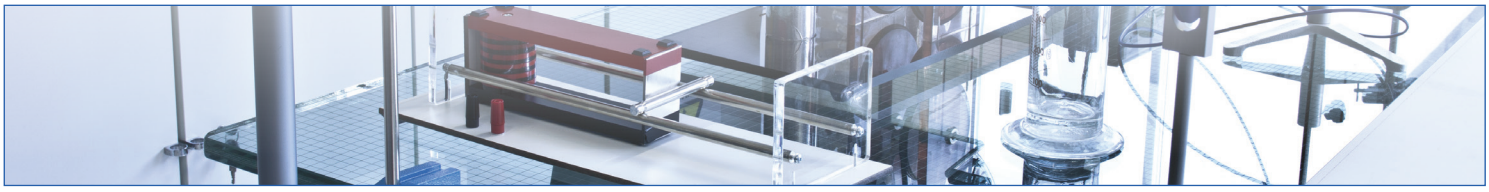
These kits "***First steps into science***" are suitable for the students of primary schools.
- the experiments aren't dangerous for the students;
- the materials used to create the components aren't toxic;
- no net tension is needed to use them.

The experiments are easy to be performed and they are suitable for students. The experiments have been perfomed in our laboratories by competent staff, this ensures the good development of them. The aim is to give students the possibility to approach science field observing elementary phenomena, catching their interdisciplinary aspects. The steps suggested for each experiment are easy to be checked and stimulate the curiosity of the students towards further questions and elaborations. The experiments are easy but not superficial, they help students to understand subjects which seem to be complicated from a theoretical point of view. The analysis of natural phenomena shouldn't be only explained by the teacher but it has to be performed directly by the students through several experiments. It is important to say that these kits are cheap but they present a high teaching efficiency. Each experiment is illustrated in the english manual together with a list of items to be used and the specific steps to follow to perform the experiment (teaching guides provided in pdf version).

HIGH SCHOOL - KIT ADVANCED

Page 17

The most effective way to introduce the world of science to young people is to teach them concepts representing the base for further investigation on the subject; a wider research could take place further on.
There are some fields of knowledge regarding our daily life we perceive as a whole; they house several phenomena.
For example, the air we breath is not only necessary for life, but it is also the seat of meteorological, sound and electrical phenomena, as well as many others, involving different scientific fields.
The same goes for water, energy, light and many other things. The first approach to the study of these subjects must feature a vision of the subject as a whole, through an experimental and interdisciplinary course. This new series of kits has been designed to offer teachers a valid educational instrument to deal with these phenomena in a unitary way, through a series of simple but effective experiments.



Small physics laboratory 5614

Suitable for primary schools

96 performable experiments

Topics

MECHANICS

- Knowing forces
- Forces in action
- Weight is a force
- The spring scale and its calibration
- Other kinds of forces
- A strange addition
- Friction forces
- Center of gravity
- Let's use our force in a wise way
- The equilibrium of a rod
- Levers
- Pulleys
- Inclined plane

THERMOLOGY

- Let's tell apart heat and temperature
- Alcohol burner
- The combustion
- The thermometer and its calibration
- Thermal expansion of solids
- Thermal expansion of liquids
- Thermal expansion of gases
- Heat and temperature
- Heat propagation through conduction
- Good conductors and bad conductors
- Propagation of heat into liquids
- The convection of heat
- Irradiation
- Fusion and solidification
- Evaporation
- Boiling
- Steam condensation
- Fractional distillation

OPTICS

- Optical projector
- Why do we see objects?
- Do light rays exist?
- Lighting law
- The game of shadows
- Eclypses
- Reflection of light
- Spherical mirrors
- When the light passes from the air to a transparent body
- When the light passes from a transparent body to the air
- Total reflection
- Lenses
- Decomposition of white light
- Immages in flat mirrors
- Immages in lenses
- The eye and its defects
- Composed microscope
- Slides projector

ELECTROLOGY

- Knowing electricity
- Static electricity
- Protons and electrons
- Electric forces
- Electric induction
- Conductors and insulants
- The electroscope
- Let's learn how to use an electroscope
- Flashes and lightings
- Electricity on the move
- Batteries
- The electric circuit
- Light bulbs in series and in parallel
- Transformation of electric power into heat
- Electric conduction in liquids
- Electrolysis
- Magnets
- Magnetic poles
- Magnetic effect of the electric current
- The electromagnet
- Electric alarm

5614

"Active School" set 5621

Suitable for primary schools.

85 performable experiments

Topics

SIMPLE MACHINES

- Simple machines
- The spring scale
- Equilibrium of a pivoted rod
- First kind of lever
- Second kind of lever
- Third kind of lever
- Verification form
- Fixed pulley
- Mobile pulley
- Simple hoist
- Inclined plane

FLUID STATICS

- What fluids are
- The spring scale
- Graduated cylinder
- Specific weight
- Measuring the specific weight of a solid
- Measuring the specific weight of a liquid
- Pressure
- Atmospheric pressure
- Pascal's principle on liquids
- Pascal's principle in aeriforms
- Principle of communicating vessels
- Capillarity
- When a body is dipped into water
- Archimedes' principle
- Flotation

THERMOLOGY

- Heat and temperature
- Alcohol burner
- Combustion
- The thermometer and its calibration
- Linear thermal expansion
- Volumetric thermal expansion
- Thermal expansion of liquids
- Thermal expansion of gases
- Fusion and solidification
- Evaporation
- Boiling
- Condensation
- Fractioned distillation

OPTICS

- Dioptric projector
- Rectilinear propagation of light
- Eclypses
- Lighting law
- Diffusion of light
- Reflection of light
- Spherical mirrors
- Refraction of light
- Total reflection
- Decomposition of white light
- Lenses
- Immages in flat mirrors
- Immages in converging lenses
- Conjugate points
- The eye and its defects
- Correction of the eye's defects
- Composed microscope
- Slides projector

ELECTROLOGY

- Knowing electricity
- Static electricity
- Protons and electrons
- Electric forces
- Electric induction
- Conductors and isulators
- The electroscope
- How to use the electroscope
- Flashes and lightnings
- Electricity on the move
- Batteries
- Electric generator
- Electric circuit
- Light bulbs in series and in parallel
- Electric power
- Transformation of electric power into heat
- Electric conduction in liquids
- Electrolysis
- Magnets
- Magnetic poles
- Magnetic field
- Ampére's theory
- Magnetic effect of the electric current
- The electromagnet
- Attractive power of a coil

5621

Physics set for group exercises 5597

Suitable for secondary schools.

110 performable experiments

Topics

MECHANICS

- Error theory
- Measurement of small distances using calibrated instruments
- Law of the elastic lengthenings
- Forces
- Friction forces
- Equilibrium of the moments
- Center of gravity
- Levers
- Other simple machines
- The scale
- Ways of weighing
- Fluid statics
- Archimedes' principle
- Applications of Archimedes' principle
- Periodic motions

THERMOLOGY

- Error theory
- Bunsen burner and the thermometer
- Behaviour of solids when the temperature changes
- Behaviour of liquids when the temperature changes
- Behaviour of gases when the temperature changes
- Calorimetry/specific heat
- Fusion and solidification
- Vaporization
- Condensation and fractional distillation
- Endothermic and exothermic phenomena

OPTICS

- Error theory
- Optical projector
- Propagation and diffusion of light
- Reflection of the light
- Refraction of the light
- Refraction of the light through lenses
- Refraction of the light through a prism/ dispersion
- Measurement of the focal length of a mirror and of a lens with spherometer
- Images given by mirrors
- Images given by lenses
- Optical instruments

ELECTROLOGY

- Error theory
- Simple electrostatic phenomena
- Electric souces
- Electric circuit and measuring instruments
- Use of the multimeter
- Ohm's laws
- The rehostat and the potentiometer
- The electric circuit with several charges in series
- The electric circuit with several charges in parallel
- Electric nets
- Some methods for measuring the electric resistance
- Resistance depending on temperature
- Thermal effect of the electric current
- Electric conduction into liquids/the electrolysis
- Simple magnetostatic phenomena
- The magnetic effect of electric current
- Electromagnetic induction
- The transformer

5597

6 Physics sets for team working 5592

In order to have an effective laboratory practice, all working groups must not be composed of more than 4 - 5 units.

Since classes are composed of an average of 24-30 students, Optikascience offers the group of 6 physics sets (code 5597), whose equipments are contained in two metal wardrobes. The wardrobes are organized in order to put in evidence rods, metal rods, cables, etc., and are composed of stands and containers for tidy storage of an the equipment.

The group of 6 physics sets include all the equipment shown here beside, except for 6 timers which can be ordered apart (for the timers, please view section "MEASUREMENT INSTRUMENTS").

5592

MOBILE LABORATORY

"Stand-alone" system: equipped with sink, completely independent thanks to an independent hydraulic circuit and an adjustable electric power supply.
Sturdy and ergonomic structure, mounted on four swivel wheels, suitable for intense use: the equipment provided with the mobile lab is easy to use, functional and durable in time. The mobile laboratory is designed to contain in an orderly manner all the products needed to help the professor in laboratory practices.
We offer two different types of equipment:

- mobile laboratory of physics **"Genius"** code **5625.1**.
- mobile laboratory of biology "**Eureka**" code **5626.1**.

Each type has been studied specifically for primary schools and secondary schools, responding in the best way to every type of educational need.

OPTIKA mobile laboratory can be completely set up according to the teacher's needs.

We offer technical support aimed at purchasing and preparing the most suitable equipment for scientific practice in educational laboratories.

These photos may be different from the appearance of the delivered product, the correct dimensional and functional specifications will be provided once requested.

Genius - Mobile laboratory of physics 5625.1

Kits provided with "Genius" mobile lab: A1 + A4 +A5 +A7

83 Feasible experiments

Topics

A1 - Statics of solids
- Forces and their effects
- Elastic extensions: Hooke's law
- Spring scales
- Composition of forces with opposite direction
- Composition of forces with same direction
- Balance of moments
- Center of gravity
- The balance of the leaning bodies
- Levers
- Test
- Pulleys
- Inclined plane

A4 - Thermology
- Thermal sensations
- Thermoscope
- Thermometer
- Thermometric scales
- Thermal motion of the molecules
- Linear thermal expansion
- The coefficient of linear thermal expansion
- Bimetallic strip
- Volumetric thermal expansion
- Thermal expansion of liquids
- Thermal expansion of aeriform substances
- Thermal energy
- How to increase the temperature of a body
- Another way to increase the temperature
- Heat
- The relationship between heat and temperature
- Thermal balance
- Water equivalent of the calorimeter
- Measurement of the specific heat of a solid
- Propagation of heat by conduction
- Propagation of heat by convection
- Irradiation
- Change in states
- Melting
- Vaporization
- Condensation of a vapor

A5 - Geometric optics
- Light
- Rectilinear propagation of light
- Law of illumination
- Rays light
- Light diffusion
- Eclipse
- Light reflection
- Reflection in spherical mirrors
- Light refraction
- The laws of refraction
- Total reflection
- Lenses
- Refraction through lenses
- Images in the flat mirrors
- Images in spherical mirrors
- The conjugated points in spherical mirrors
- Lenses images
- The conjugated points in lenses
- The human eye
- Defects of the human eye and their correction
- Dispersion of light
- Color filters

A7 - Electrodynamics
- Electricity
- Electric charge
- Electric charges in matter
- Conductors and insulators
- Electric field
- The energy of the electric field - electric potential
- Battery
- Voltmeter
- Electric circuit
- The intensity of the electric current - the ammeter
- The first law of Ohm
- The second law of Ohm
- Resistivity
- How to measure the electrical resistance
- Series of resistors
- Rheostat
- Parallel of resistors
- Electric networks
- Potentiometer
- Internal resistance of a battery
- The thermal effect of the electric current
- Electrical conduction in liquids
- Electrolysis

5625.1

Eureka - Mobile laboratory of biology 5626.1

Kits provided with "Eureka" mobile lab: 5630+5631

48 Feasible experiments

Topics

5630 - Plants
- Classification of roots
- Roots: osmosis
- Roots: root hairs
- Roots are oriented
- Stem classification
- Stem: the morphology
- The underground stems
- Stem: the capillarity
- The leaf: chlorophyll
- The leaf: photosynthesis
- The leaf: perspiration
- The leaf: starch
- Flower: the morphology
- Flower: the reproductive organs
- Algae
- Ferns, mosses and lichens
- Mushrooms, molds and yeasts
- Seed morphology
- Seed classification
- Fruits classification
- Fruits pulp
- Carbon dioxide
- The reserve substances of plants
- Plants classification

5631 - Animals and human beings
- Protozoa
- Annelida
- Crustaceans
- Mollusca
- The shells of mollusca
- Insects
- Insect growth
- The anthill
- Anatomy of fish
- Habitats and living conditions
- Animal cells
- Glandular tissues
- Muscle tissues
- Starch digestion
- Fats digestion
- Protein digestion
- Enzymes
- Blood
- Osmotic pressure
- Breathing
- Skeleton
- Skin appendages: fish and reptiles
- Thermal insulation: birds and mammals
- pH and organic reactions

5626.1

NEW PACKAGING

New stackable and multi-function storage box with lid equipped with closing clip.

All components, after use, can be neatly stored in the special preformed polystyrene drawers.

Thanks to the high resistance to impact and atmospheric agents, the products contained in it will be protected over time.

Dimensions of the box: 46 x 36 mm h 23.5 mm.

States and properties of matter - Measurement B1

24 feasible experiments

Topics

- Space
- Matter
- Bodies
- The three states of matter
- A property of bodies: impenetrability
- Other properties of bodies
- The meaning of the comparison between different bodies
- Qualitative and quantitative comparisons
- Measurable properties and physical magnitudes
- Measurement of a physical magnitudes
- The metric decimal system
- Length
- The linear rule: a calibrated tool
- Geometry
- The fundamental bodies of geometry and the real world
- Straight lines and curved lines
- The metric wheel
- The curvimeter
- Closed lines
- Plane figures, borderline and surface
- Perimeter of a flat figure
- Area of a flat figure
- Simple polygons
- Regular simple polygons
- Isoperimetric polygons and polygons having same area
- How to compare two polygons
- Rectangles and squares
- How to measure the area of an irregular polygon
- Volume of solid bodies
- Volume of liquid bodies
- Graduated cylinder
- Volume of an irregular solid

Teaching guide in digital format

B1

Equilibrium and simple machines B3

14 feasible experiments

Topics

- Know the forces
- How to sum forces
- The parallelogram rule
- The resultant of parallel forces having same direction
- How to use our strength intelligently
- Equilibrium of a rod
- Simple machines
- First class of lever
- Second class of lever
- Third class of lever
- Some examples of levers
- Pulleys
- Fixed pulley
- Movable pulley
- Simple tackle
- Inclined plane

Teaching guide in digital format

B3

Motion B5

15 feasible experiments

Topics

- At rest or in motion?
- Motion along a line
- Motion on a plane
- Motion in space
- Trajectory
- Time
- Periodic motions
- Pendulum motion
- The period of a pendulum
- Does the period of a pendulum depend on the amplitude of its oscillation?
- Does the period of a pendulum depend on its length?
- Does the period of a pendulum depend on its mass?
- A tool for measuring time intervals
- The average speed
- Instantaneous speed
- The uniform rectilinear motion and its law depending on time
- Forces and motion
- Friction forces
- The motion almost frictionless
- The principle of inertia
- The action of a force on a body at rest
- Acceleration
- The uniformly accelerated motion and its law depending on time
- How to measure acceleration
- Does acceleration depend on the intensity of the force?
- The fundamental law of dynamics
- The unit of measurement of force in physics

Teaching guide in digital format

B5

Forces

B2

22 feasible experiments

Topics

- Meaning of words
- Force, a primitive concept
- Contact force and non contact force
- Plastic materials and elastic materials
- Contact force: elastic force
- Non contact force: weight
- The effects of forces
- Active forces and passive forces
- How to compare forces
- A property of elastic bodies: from qualitative to quantitative
- Spring scale
- The unit of measurement of forces
- How to use the spring scale
- Vector representation of forces
- The center of gravity
- When a body falls freely
- The weight does not remain constant
- Do heavy bodies or light bodies fall first?
- The origin of weight and the force of gravity
- Why does not the moon fall on the earth?

Teaching guide in digital format

Pressure, fluids and flotation

B4

20 feasible experiments

Topics

- How to walk on the snow
- When a force is distributed on a surface
- The footprints
- Footprint depth
- The concept of pressure
- Pressure: a new physical magnitude
- The non-precision of common language
- Knives, nails, thumbtacks and so on
- Pressure and liquids
- How to apply a force to a liquid
- How to apply a force to a gas
- Pressure in liquids
- When the pressure in a liquid is generated by its weight
- The specific weight
- A property of pressure generated by the weight of a liquid
- Two applications of Stevin's law
- Atmospheric pressure
- Archimede thrust
- The principle of Archimede
- Floating

Teaching guide in digital format

Temperature, heat and changes in status

B6

19 feasible experiments

Topics

- Thermal sensations
- How to compare thermal sensations
- A new physical magnitude: the temperature
- Thermal expansion of solids
- Thermal expansion of liquids
- Thermal expansion of aeriform substances
- How to compare temperatures - The thermoscope
- The thermometer
- The thermometric scales
- How to use the thermometer
- When two bodies at different temperatures touch each other
- Thermal balance
- Heat
- Propagation of heat in solids
- Propagation of heat in liquids
- Propagation of heat in gases
- Irradiation
- The relationship between heat and temperature
- Changes in status
- Fusion and solidification
- Evaporation
- Boiling
- Condensation

Teaching guide in digital format

Light and its phenomena

B7

23 feasible experiments

Topics

- The optical projector
- Why we see objects
- Rectilinear propagation of light
- Law of illumination
- Shadow and dim light
- Eclipse
- The rays of light do not exist, the diffusion of light
- Reflection of light
- Reflection due to spherical mirrors
- Refraction of light
- Refraction law
- Total reflection
- Lenses
- Refraction due to lenses
- The images in the flat mirrors
- Images in the lenses
- The conjugated points
- Human eye
- The defects of the human eye
- White light: light scattering
- Color filters

Teaching guide in digital format

B7

Sound

B8

27 feasible experiments

Topics

- Hearing
- When do we hear a sound?
- The oscillations
- The period of oscillations
- The frequency of oscillations
- The graphic representation of the oscillations
- Why we hear sounds
- Acoustic waves
- How acoustic waves are transformed into sounds
- The ear: a receiver of acoustic waves
- The ear-brain system
- The limits of audibility
- The sensitivity of the hearing system
- How to reinforce auditory sensitivity
- The distinctive characters of the sounds
- Stereophony
- The reflection of acoustic waves
- Interference of acoustic waves
- The beats
- The sonometer
- Resonance
- Stringed musical instruments
- Musical instruments working with air
- Take care of the hearing system

Teaching guide in digital format

B8

Electricity and electric current

B9

21 feasible experiments

Topics

- Electricity
- Triboelectricity
- Protons and electrons
- Electric actions
- Electrostatic induction
- Double electric pendulum
- Contact electrization
- The leaf electroscope
- Electrical state of a body
- Determination of the electrical state of a body
- Even the air can be electrified
- The biological effects of air ionization
- Lightning
- Electricity in motion
- Batteries
- Volta battery
- Electric potential difference
- Voltmeter
- Electrical circuit
- Conductors and insulators
- Intensity of the electric current
- Ammeter
- Electrical resistance
- Electric energy
- Lamps in series and lamps in parallel
- The domestic electrical system

Teaching guide in digital format

B9

Magnets and electromagnets

B10

15 feasible experiments

Topics

- Magnets
- Magnetic poles
- Materials and magnets
- Magnetic needle
- Terrestrial magnetism
- The compass
- Magnetic interactions
- Magnetic levitation
- Magnetic field
- Magnetic induction
- How to create a magnet
- The magnetic effect of the electric current
- Electromagnet
- The attractive power of a coil
- Electric bell

Teaching guide in digital format

Work and energy - renewable energy

B11

20 feasible experiments

Topics

- What is a transformation
- Physics and chemical transformations
- Balanced forces and unbalanced forces
- The concept of work in everyday language
- The concept of work in physics
- Work: a new magnitudes
- When the force is not parallel to displacement
- The concept of energy in everyday language
- The concept of energy in physics
- Work and energy
- How energy is measured
- The two forms of mechanical energy
- Kinetic energy
- Gravitational potential energy
- Plastic materials, elastic materials
- The potential elastic energy
- Other forms of energy
- The properties of energy
- The transformations of mechanical energy
- Unusable energy
- The atomic theory of matter
- The potential electric energy
- Hydraulic circuit
- Electric circuit
- Power
- Renewable and non-renewable energy sources
- The biggest source of energy: the sun
- How to transform solar energy into electricity
- Wind energy
- Other forms of alternative energy

Teaching guide in digital format

Water and its properties

B12

30 feasible experiments

Topics

- Hydrosphere
- Water is a chemical compound
- Surface tension
- Water is not elastic
- Movement of water molecules
- The three states of water
- Volume of water
- Capillarity
- Weight of the water
- Water heating
- Thermal expansion of the water
- Water evaporation
- Boiling water
- Condensation of water vapor
- Water cycle
- Rain
- Rain gauge
- Specific weight and density of the water
- Archimede's principle
- Floating on water
- Water pressure
- Communicating vessels
- Pascal principle
- Solid water: ice
- The melting of ice
- The cycle of ice
- Various types of water
- Water for life
- Water pollution
- Acid rains
- Acidity indicators
- Water, a precious asset to save

Teaching guide in digital format

Air and its properties B13

32 feasible experiments

Topics

- Atmosphere
- Air exists
- Air composition
- Absolute and relative humidity
- Air is impenetrable
- Air is elastic
- Air pressure
- Pascal principle
- Compressed air and rarefied air
- Air temperature
- When the air warms up
- Winds
- How winds are used
- Air has a weight
- Atmospheric pressure
- Some applications of atmospheric pressure
- Barometers
- When the air is moving
- Air to fly
- Air brakes the fall
- Air for life
- Air pollution
- Greenhouse effect
- Consequences of the greenhouse effect

Teaching guide in digital format

B13

Plants B14

25 feasible experiments

Topics

- Introduction
- Seed morphology
- Seed germination
- Aqueous solutions
- Osmosis
- Mineral salts
- Roots
- Root hairs
- Movement of the roots
- Stem
- Internal structure of the stem
- Underground stems
- Absorption of the lymph
- Capillarity
- Why in the summer the leaves are green
- Why in autumn the leaves are yellow
- Chlorophyll photosynthesis
- The transpiration of plants
- Starch
- Morphology of the flower
- Fruit
- Development of carbon dioxide in plants
- How to build an herbarium

Teaching guide in digital format

B14

Animals B15

15 feasible experiments

Topics

- Biology
- Cells
- The food chain
- Eat to live
- Starch in foods
- Digestion of starch
- How to recognize fat types
- Digestion of fats
- How to recognize protein types
- Protein digestion
- Enzymes
- Taste buds
- Energy and life of animals
- Combustion
- Breathing of animals
- pH and organic reactions

Teaching guide in digital format

B15

Eye and sight B16

28 feasible experiments

Topics

- Light
- Light sources and lighting bodies
- If there was no air
- The light carries energy
- The nature of light
- Electromagnetic waves spectrum
- Sight
- Eye: a light receiver
- Lenses
- Eye as an optical system
- Defects of the eye and their correction
- Resolving power of the eye and visual acuity
- Eye-brain system
- Persistence of images on the retina
- White light
- Temporal synthesis of colors: Newton disk
- Spatial synthesis of colors
- Binocular vision
- The sense of depth
- Stereoscopic vision
- The visual field of the eye
- Optical illusions

Teaching guide in digital format

B16

Ear and hearing B17

16 feasible experiments

Topics

- Oscillatory motion
- Graphic representation of oscillatory motion
- When we hear a sound
- Why we hear sounds
- Acoustic waves
- How acoustic waves are transformed into sounds
- Ear: a receiver of acoustic waves
- The ear - brain system
- Audibility limits
- Distinctive characters of the sounds
- Sensitivity of the auditory system
- How to reinforce auditory sensitivity
- Stereophony
- Echo and reverberation
- How to take care of the hearing system

Teaching guide in digital format

B17

Touch, smell and taste B18

Touch (*11 feasible experiments*) - Topics

- Skin
- Skin sensitivity
- Stimulus of contact
- Pressure stimulus
- Pain stimulus
- Temperature and heat
- Body temperature
- Thermal stimulus
- See with touch
- Fingerprints
- Skin hygiene

Smell (*8 feasible experiments*) - Topics

- How the matter is made
- Aggregation states of the matter
- Change in states
- Nose: the smell organ
- How the smells are felt
- How to identify the smells
- Addiction to smells
- Nose hygiene

Taste (*6 feasible experiments*) - Topics

- Tongue: organ of taste
- How we feel the flavors
- The four basic flavors
- Taste and smell
- Taste and sight
- Good tastes and bad tastes

Teaching guide in digital format

B18

Environment of life B19

23 feasible experiments

Topics

- Soil as a habitat
- Mineral fraction of the soil
- Organic fraction of the soil
- Soil contains air
- Soil contains water
- Practice on the use of acidity indicators
- Soil acidity
- Carbonates in the soil
- The permeability of the soil
- Soil fertility
- Biodegradability and soil
- Water for life
- Water cycle
- Vaporization and condensation of water
- The rain
- Sea water
- Drinking water and its distribution
- Water pollution
- How to look for ammonia
- How to look for nitrite
- How to look for sulphates
- The research of surfactants
- What the atmosphere is?
- Air composition
- Absolute and relative humidity
- Atmospheric pollutants
- Acid rains
- The greenhouse effect

Teaching guide in digital format

B19

The apparent motion of the sun B21

14 feasible experiments

Topics

- Light sources and illuminated bodies
- The light source
- Shadows
- Light propagates in a straight line
- Length of the shadow
- A bit of geometry
- When the source changes height and position
- How we see the sun moving from the Earth
- How the height of the sun varies on the same day
- Time zones
- Summer time
- How the height of the sun varies on different days
- Solstices and the equinoxes
- The movement of the sun is apparent
- Earth's motion of revolution around the Sun
- A consequence of Earth rotation: day and night
- A consequence of polar axis inclination
- Astronomical seasons
- Earth heating
- Earth natural satellite: the Moon
- Lunar phases
- Lunar eclipse
- Sun eclipse

Teaching guide in digital format

B21

Introduction to chemistry B20

23 feasible experiments

Topics

- Alcohol burner
- Matter
- Atoms
- Molecules
- Cohesion force
- Molecules motion
- Physics and chemistry phenomena
- Elements and compounds
- The three states of matter
- Change in states
- Fusion and solidification
- Vaporization and condensation
- The mixtures: solid in solid
- The mixtures: solid in liquid
- The mixtures: liquid in liquid
- Solutions
- Crystals
- Chemical reactions
- Oxidation
- Combustion

Teaching guide in digital format

B20

Statics of rigid bodies A1

17 feasible experiments

Topics

- Forces and their effects
- Elastic extensions: Hooke's law
- Spring scales
- Composition of forces with opposite direction
- Composition of forces with same direction
- Balance of moments
- Center of gravity
- The balance of the leaning bodies
- Levers
- Test
- Pulleys
- Inclined plane

Teaching guide in digital format

A1

Static of fluids A2

16 feasible experiments

Topics

- Specific weight
- Density
- Pressure
- Pascal's principle
- Stevin's principle
- Principle of communicating vessels
- Atmospheric pressure
- The pressure gauge: how to measure the pressure
- The principle of Archimedes and its applications
- Floating

Teaching guide in digital format

A2

Dynamics A3

26 feasible experiments

Topics

- Motion
- Motion is relative
- Reference systems
- Trajectory
- Displacement
- Time table
- Tools for the experimental study of motion
- Manual time counting
- Automatic time counting
- Average speed
- How to measure the average speed
- Instantaneous velocity
- How to measure instantaneous velocity
- Average acceleration
- How to measure average acceleration
- Instantaneous acceleration
- Various types of motion
- Uniform rectilinear motion
- Uniformly accelerated rectilinear motion
- Uniformly accelerated motion: how to study it
- Causes of the motion
- When no forces are applied to a body
- When a constant force is applied to a body
- Taking stock of the work
- Mass
- The fundamental law of dynamics
- Energy conservation
- Free fall of a grave
- Periodic motions
- Simple pendulum
- Energy of an oscillating pendulum
- Gravity acceleration
- Springs properties
- Elastic pendulum

Teaching guide in digital format

A3

Dynamics and mechanical energy conservation A10

29 feasible experiments

Topics

- Motion
- Motion is relative
- Reference systems
- Trajectory
- Displacement
- Time table
- Tools for the experimental study of motion
- Manual time counting
- Automatic time counting
- Average speed
- How to measure average speed
- Instantaneous velocity
- How to measure instantaneous velocity in one point
- How to measure instantaneous velocity in two points
- Average acceleration
- How to measure average acceleration
- Instantaneous acceleration
- Various types of motion
- Uniform rectilinear motion
- Uniformly accelerated rectilinear motion
- How to achieve uniformly accelerated motion
- Causes of motion
- The concept of force in dynamics
- When no forces are applied to a body
- When an impulse is given to a body
- Friction
- When a constant force is applied to a body
- Taking stock of the work
- Mass
- Fundamental law of dynamics
- Interactions
- Forces at work
- Work when the force is not constant
- Elastic force
- Work of the elastic force
- Conservative forces
- Concept of energy in physics
- Kinetic energy of translation
- Gravitational potential energy
- Force of gravity is conservative
- Elastic potential energy
- Conservative forces and potential energy
- Principle of conservation of mechanical energy
- Periodic motions
- Gravitational pendulum
- Energy of a swinging pendulum
- Elastic pendulum

ATTENTION: The teaching unit A10 contains all the material of the teaching unit A3 and other material for the study of mechanical energy conservation

Teaching guide in digital format

A10

Simple harmonic motion A11

14 feasible experiments

Topics

- Simple harmonic oscillations
- The simple pendulum
- The period of a simple pendulum
- The force that moves a simple pendulum
- Elasticity
- The elastic constant of a spring
- The mass - spring oscillator
- The period of a mass-spring oscillator
- The force that moves a mass-spring oscillator
- An important conclusion
- The hourly law of simple harmonic motion
- Speed and acceleration in simple harmonic motion
- The dynamics of simple harmonic motion
- A check on the elastic pendulum

Teaching guide in digital format

A11

Vacuum and atmospheric pressure 5701

12 feasible experiments

Topics

- Suction pump
- Vacuum plate
- Pressure
- Atmospheric pressure
- Isotropy of atmospheric pressure
- Pressure tear device
- Magdeburg hemispheres
- Straws and suction cup valve
- The balloon experiment
- Flask experiment
- Boiling water
- Acoustic waves propagation
- Newton tube
- Baroscope

Teaching guide in digital format

5701

Thermology

A4

24 feasible experiments

Topics

- Thermal sensations
- Thermoscope
- Thermometer
- Thermometric scales
- Thermal motion of the molecules
- Linear thermal expansion
- The coefficient of linear thermal expansion
- Bimetallic strip
- Volumetric thermal expansion
- Thermal expansion of liquids
- Thermal expansion of aeriform substances
- Thermal energy
- How to increase the temperature of a body
- Another way to increase the temperature
- Heat
- The relationship between heat and temperature
- Thermal balance
- Water equivalent of the calorimeter
- Measurement of the specific heat of a solid
- Propagation of heat by conduction
- Propagation of heat by convection
- Irradiation
- Change in states
- Melting
- Vaporization
- Condensation of a vapor

Teaching guide in digital format

A4

Geometric optics

A5

26 feasible experiments

Topics

- Light
- Rectilinear propagation of light
- Law of illumination
- Rays light
- Light diffusion
- Eclipse
- Light reflection
- Reflection in spherical mirrors
- Light refraction
- The laws of refraction
- Total reflection
- Lenses
- Refraction through lenses
- Images in the flat mirrors
- Images in spherical mirrors
- The conjugated points in spherical mirrors
- Lenses images
- The conjugated points in lenses
- The human eye
- Defects of the human eye and their correction
- Dispersion of light
- Color filters

Teaching guide in digital format

A5

Light, color and vision

5504

35 feasible experiments

Topics

- Know the light
- Light sources and illuminated bodies
- Light brings energy
- Do the rays of light really exist?
- Two properties of light
- Illuminance
- Light reflection
- Light refraction
- Total reflection
- I prismi a riflessione totale e le fibre ottiche
- Nature of light in physics terms
- Colors
- White light
- Light filters
- Colors of the objects
- Additive synthesis of colors
- Subtractive synthesis of colors
- Sky and Sun color
- Lenses
- Images in the lenses
- Eye and vision
- Defects of the eye
- Binocular vision and the dominant eye
- The sense of depth
- Optical illusions

Teaching guide in digital format

5504

KIT "ADVANCED"

Physics of sound — A6

22 feasible experiments

Topics

- Introduction
- When we hear a sound
- Oscillatory motion
- Period and frequency of oscillating motion
- Time dependence of oscillatory motion law
- Oscillatory motion energy
- Features of sounds
- Why we hear sounds
- Acoustic waves
- Equation of a sine wave
- How acoustic waves are transformed into sounds
- The limits of audibility
- The sensitivity of the auditory system
- Reflection of acoustic waves
- Interference of acoustic waves
- Beats
- Stationary waves
- Resonance
- Stringed musical instruments
- Musical instruments working with air
- Sounds timbre

Teaching guide in digital format

A6

Electrodynamics — A7

24 feasible experiments

Topics

- Electricity
- Electric charge
- Electric charges in matter
- Conductors and insulators
- Electric field
- The energy of the electric field - electric potential
- Battery
- Voltmeter
- Electric circuit
- The intensity of the electric current - the ammeter
- The first law of Ohm
- The second law of Ohm
- Resistivity
- How to measure the electrical resistance
- Series of resistors
- Rheostat
- Parallel of resistors
- Electric networks
- Potentiometer
- Internal resistance of a battery
- The thermal effect of the electric current
- Electrical conduction in liquids
- Electrolysis

Teaching guide in digital format

A7

Electromagnetism — A8

18 feasible experiments

Topics

- Magnets
- Magnetic materials
- Magnetic poles
- Magnetic levitation
- Magnetic induction
- Magnetic field
- Magnetic field flow lines
- The magnetic field vector
- Lorentz force
- Earth's magnetic field
- The magnetic effect of electric current
- When the conductor is rectilinear
- When the conductor is a coil
- Electromagnet
- Electric bell
- The electric motor in direct current
- Ampère theory on magnetism

Teaching guide in digital format

A8

Electromagnetic induction and alternating current — A9

18 feasible experiments

Topics

- Faraday's experiences with the permanent magnet
- Faraday's experiences with the electromagnet
- Magnetic flux
- Neumann law
- Lenz law
- The law of electromagnetic induction
- Magnetic flux and sinusoidal law
- Alternating current
- The properties of alternating currents: the effective value
- Measurement instruments for alternating current
- Transformer
- The efficiency of a transformer
- The self-induction
- Self-induction and alternating current
- Impedance
- Inductive reactance

Teaching guide in digital format

A9

How to measure the passage of time — 5506

30 feasible experiments

Topics

- Introduction
- Time in science
- Motion
- Velocity
- Periodic motion
- The period of a pendulum
- Elasticity phenomenon
- Elastic pendulum
- Pendulum clock
- Natural periodic motions
- Earth shape
- Poles, meridians and circle of latitude
- Latitude and longitude
- The apparent motion of the Sun
- The motion of revolution of the Earth
- The sidereal day and the solar day
- The time in the various points of the Earth
- The date change line
- Gnomon
- The sundial
- Summer time
- Calendar
- Moon: Earth satellite
- Month
- Lunar phases
- Moon eclipse
- Sun eclipse
- The age of the trees

Teaching guide in digital format

5506

The sun, the earth and the moon — 5655

25 feasible experiments

Topics

- Solar system
- Breakdown of sunlight
- Earth shape
- Poles, meridians and circle of latitude
- Earth magnetism
- Orientation
- Earth motions
- The apparent motion of the Sun
- Day and night
- The height of the sun during the day
- Measurement of time
- Time zones
- The sundial
- If the earth's axis were not inclined
- Consequences of the inclination of the earth's axis
- The solar irradiation on the earth's surface
- Seasons
- Earth satellite: the Moon
- Lunar phases
- Eclipses

Teaching guide in digital format

5655

Meteorology 5654

25 feasible experiments

Topics

- What meteorology is?
- Solar radiation
- Irradiation
- The greenhouse effect
- The apparent motion of the Sun
- Seasons
- Atmosphere
- Gases contained in the air
- Air temperature
- Room thermometer
- Maximum and minimum thermometer
- Air has a weight
- Atmospheric pressure
- Barometers
- When the air warms up
- Winds
- Anemoscope and anemometer
- Water cycle
- Rain: the rain gauge
- Water vapor in the air
- Relative humidity: the psychrometer
- Atmospheric precipitations
- Weather forecasting

Teaching guide in digital format

5654

Ecology 5632

30 feasible experiments

Topics

- Soil: organic mineral fraction
- Soil porosity
- Soil acidity
- Carbonates in soil
- Agricultural land
- Habitat: life in soil
- Water cycle
- Habitat: life in water
- Drinking water and its distribution
- Water pollution
- Search for the main pollutants
- Biological indicators
- Atmosphere
- Atmospheric pollutants
- Acid rains
- The greenhouse effect
- Atmospheric dust
- Smog and thermal inversion

Teaching guide in digital format

5632

Plants 5630

33 feasible experiments

Topics

- Classification of roots
- Roots: osmosis
- Roots: root hairs
- Roots are oriented
- Stem classification
- Stem: the morphology
- The underground stems
- Stem: the capillarity
- The leaf: chlorophyll
- The leaf: photosynthesis
- The leaf: perspiration
- The leaf: starch
- Flower: the morphology
- Flower: the reproductive organs
- Algae
- Ferns, mosses and lichens
- Mushrooms, molds and yeasts
- Seed morphology
- Seed classification
- Fruits classification
- Fruits pulp
- Carbon dioxide
- The reserve substances of plants
- Plants classification

Teaching guide in digital format

5630

Animals and humans 5631

35 feasible experiments

Topics

- Protozoa
- Annelida
- Crustaceans
- Mollusca
- The shells of mollusca
- Insects
- Insect growth
- The anthill
- Anatomy of fish
- Habitats and living conditions
- Animal cells
- Glandular tissues
- Muscle tissues
- Starch digestion
- Fats digestion
- Protein digestion
- Enzymes
- Blood
- Osmotic pressure
- Breathing
- Skeleton
- Skin appendages: fish and reptiles
- Thermal insulation: birds and mammals
- pH and organic reactions

Teaching guide in digital format

5631

Chemical phenomena 5627

26 feasible experiments

Topics

- Alcohol burner
- Matter
- How to measure the diameter of a molecule
- Chemical phenomena
- Elements and compounds
- The three states of matter
- Melting and freezing
- Vaporization e condensation
- Mixtures: solid in solid
- Mixtures: solid in liquid
- Mixtures: liquid in liquid
- Solutions
- Crystals
- Water cycle
- Metals and not metals
- Chemical reactions
- Oxidation
- Combustion
- Indicators
- Acidity analysis

Teaching guide in digital format

5627

KIT "ADVANCED"

Physical and chemical phenomena 5510

11 feasible experiments

Topics

- Comparison between two types of phenomena
- Sublimation
- Filtration of a suspended solid
- Separation of two liquids in a mixture and separation of a solvent from the solute by distillation
- Crystallization of the copper sulphate
- Preparation of a mixture and preparation of a compound and their determination
- Examples of chemical reaction
- Some flame tests

Teaching guide in digital format

5510

General chemistry basis 5511

10 feasible experiments

Topics

- Lavoisier law
- Proust law
- Flame tests
- Acid or basic character of compounds
- Precipitation reactions
- How to create an aeriform compound
- Redox reactions

Teaching guide in digital format

5511

Electrochemistry 5513

9 feasible experiments

Topics

- Electrolyte conductivity
- Comparison on the electropositivity of some elements
- Construction of the Daniell battery
- Electrolysis of a solution of potassium iodide
- Water electrolysis
- Electrolytic coating of a metallic object

Teaching guide in digital format

5513

Organic chemistry 5515

8 feasible experiments

Topics

- Presence of carbon and hydrogen in organic substances
- Nitrogen research in organic compounds
- Preparation of acetic aldehyde
- Preparation of ethyl acetate
- Presenza di amminoacidi in sostanze proteiche
- Fehling test
- Recognition of a polysaccharide
- Bakelite preparation

Teaching guide in digital format

5515

Chemistry set 5516

The four kits mentioned below:

5510 Physical and chemical phenomena
5511 General chemistry basis
5513 Electrochemistry
5515 Organic chemistry

They can be bought separately or as a unique set with a lower cost than the global cost of the four kits because some parts that are repeated in the 4 kits are eliminated when buying the set. The contents and the possible experiments of the set correspond to the sum of those contained in each kit. The kits permit experiments related to topics that are part of Chemistry lessons plan in senior high schools. Two main features that make the set particularly efficient:
- quick assembly of the different parts and ease of use. These features meet user safety and same time;
- Contents clearly and unambiguously explained.

Each kit is supplied with a teaching guide in which every practical experiment is explained in detail.
At the end of every experiment there's a series of questions about the observed phenomena.
These kits are an essential aid for teachers and can also be useful for students collective experiments on specific subjects.

Topics

5510 Physical and chemical phenomena

- Comparison between two types of phenomena
- Sublimation
- Filtration of a suspended solid
- Separation of two liquids in a mixture and separation of a solvent from the solute by distillation
- Crystallization of the copper sulphate
- Preparation of a mixture and preparation of a compound and their determination
- Examples of chemical reaction
- Some flame tests

5511 General chemistry basis

- Lavoisier law
- Proust law
- Flame tests
- Acid or basic character of compounds
- Precipitation reactions
- How to create an aeriform compound
- Redox reactions

5513 Electrochemistry

- Electrolyte conductivity
- Comparison on the electropositivity of some elements
- Construction of the Daniell battery
- Electrolysis of a solution of potassium iodide
- Water electrolysis
- Electrolytic coating of a metallic object

5515 Organic chemistry

- Presence of carbon and hydrogen in organic substances
- Nitrogen research in organic compounds
- Preparation of acetic aldehyde
- Preparation of ethyl acetate
- Presence of amino acids in protein substances
- Fehling test
- Recognition of a polysaccharide
- Bakelite preparation

Teaching guide in digital format

5516

Chromatography 5517

5 feasible experiments

Topics

- Paper chromatography with common filter paper
- Separation of the pigments contained in green leaves through paper chromatography
- Separation of the amino acids coming from a protein substance through paper chromatography
- Separation of colourants included in the ink
- Separation of the mixture of colourants through column chromatography division

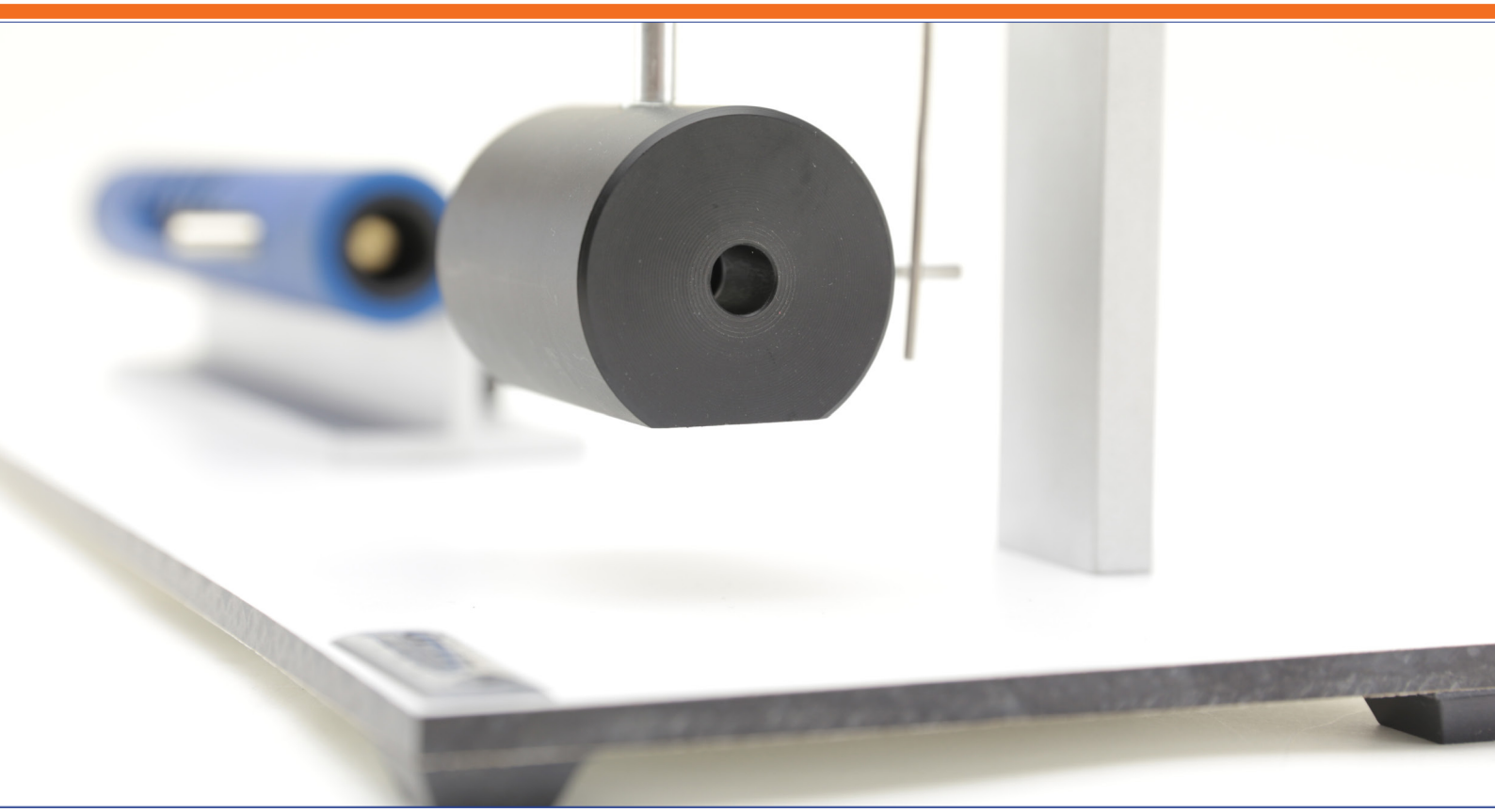
Teaching guide in digital format

5517

Index

Teaching guide in digital format

Minimum invoiced order: € 130,00 + VAT



Masses with double hook

8 masses: 1 g (1pc); 2 g (2pcs); 5 g (1pc); 10 g (1pc); 20 g (1pc); 50 g (1pc); 100 g (1pc) **1352**

10 masses 10 g **1398**

10 masses 25 g **1399**

10 masses 50 g **1066**

1352 - 1398 - 1399 - 1066

Slotted masses

9 masses 10g + holder 10g. **1309**

9 masses 20g + holder 20g. **1310**

9 masses 50g + holder 50g. **1311**

9 masses 100g + holder 100g. **1312**

9 masses: 1g (1pc), 2g (2pcs), 5g (1pc), 10g (1pc), 20g (1pc), 50g (1pc), 100 g (1pc), 200 g (1pc) + holder 50 g. **1353**

1309 - 1310 - 1311 - 1312 - 1353

Rod for lever with stand 1354

Supplied with rectangular base, metal rod, pivot, bosshead, and 2 slotted masses code 1310.

1354

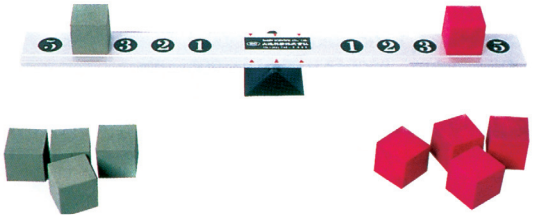
Rod for levers 1152

Aluminum rod, with holes and pivot. Length: 38 cm.

1152

Unequal-arms scale 1313

For experiments on the equilibrium of a lever. It is supplied with 10 masses.



1313

Aluminum pulleys

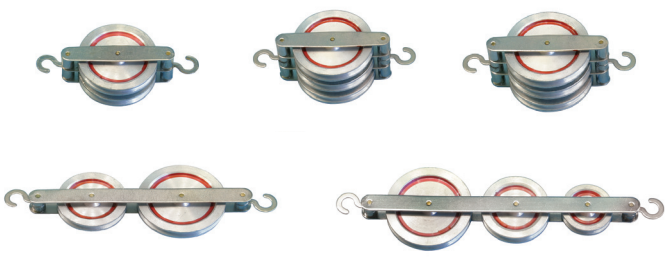
Simple pulley Ø50 mm **1058**

Parallel of two pulleys Ø50 mm **1059**

Parallel of three pulleys Ø50 mm **1060**

Series of two pulleys Ø40 - 50 mm **1061**

Series of three pulleys Ø30 - 40 - 50 mm **1064**



1058 - 1059 - 1060 - 1061 - 1064

Plastic pulleys

Simple pulley Ø50 mm **1227**

Parallel of two pulleys Ø50 mm **1160**

Parallel of three pulleys Ø50 mm **1266**

Series of two pulleys Ø 50 - 40 mm **1228**

Series of three pulleys Ø30 - 40 - 50 mm **1127**

Pulley Ø35 mm with perpendicular axes Ø6 mm **1009**

Pulley Ø50mm with longitudinal axes Ø8 mm **1157**

1227 - 1160 - 1266 - 1228 - 1127 - 1009 - 1157

Force Table 1166

It allows you to study vectorial forces composition.
Graduated metal disk, 400mm diameter. Height 500mm.

Equipment supplied

4 Pulleys	4 Slotted masses 50 g	
4 Masses holder 100 g	4 Slotted masses 20 g	4 String with rings
4 Slotted masses 100 g	4 Slotted masses 10 g	

1166

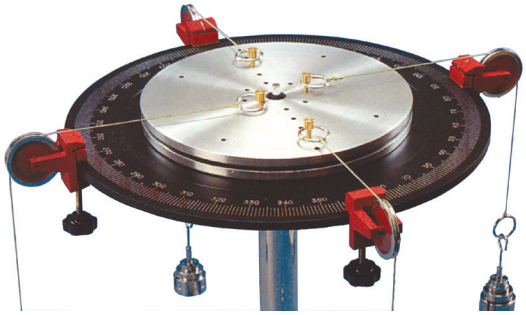
Spool of thread - 50 m 8153

Made of light, twisted nylon, it's thin and flexible.

8153

Disk of the momenta 1380

Accessory of our code 1166. It allows the study the equilibrium of the momenta.



1380

Equilibrium forces composition device 1032

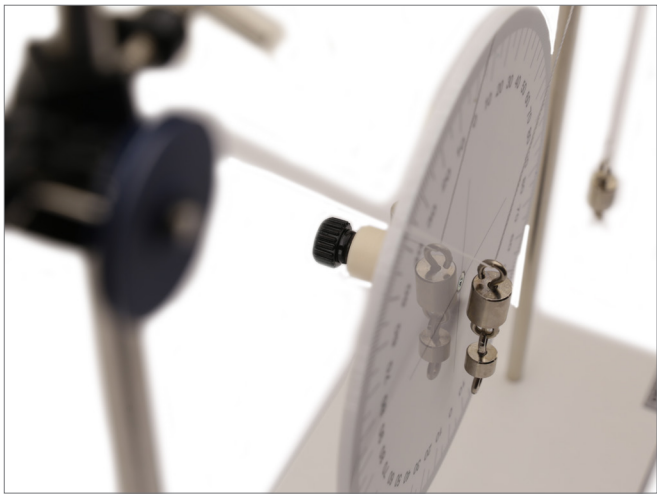
The equilibrium forces composition device allows the examination of the physics laws of concurrent forces composition - the parallelogram law and the parallel forces law.
Dimension: 45x17x60 cm.

Topics

- Forces composition
- Concurrent forces
- Parallel forces

Equipment supplied

1 String
1 Base with rod
2 S-shaped hooks
2 Double bossheads
2 Fixed pulleys
1 Rod with holes
6 10 g masses with double hook
6 25 g masses with double hook
1 200 mm diam. protractor
2 Threaded vertical rods with washers and screws
1 Transversal rod with handwheels
1 Rectangular base



1032

Levers and pulleys experiment kit 1341

12 performable experiments

The proposed experiments can be performed using the force sensor (not supplied) Cod. 12943-00.

Topics

- The spring scale
- How to measure a weight or a force
- Let's learn how to use forces in a wise way
- Equilibrium of a rod pivoted on its centre
- Simple machines
- Levers
- The fixed pulley
- The mobile pulley
- Simple hoist
- Pulleys in parallel
- Pulleys in series

Equipment supplied

1 Rod with hook
1 String
1 Folding metal rod 70 cm
1 Pivot with wing-nut
1 Tripod base
1 Bosshead 13 mm
1 10 masses 50g with 2 hooks
1 Lever rod
2 Pulleys in parallel
2 Simple pulleys
2 Pulleys in series
1 Spring scale 250 g
1 Box

1341

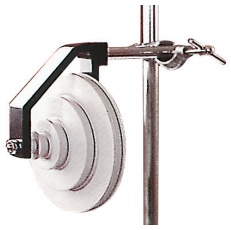
Momenta apparatus 1167

The Momenta apparatus is composed of an aluminium disk rotating around a central pivot.
Different masses can hanged up on the disk in different positions.
Disk diameter 25 cm.
Equipment supplied: 10 masses 10 g; 10 masses 25 g; 4 strings.

1167

Multiple pulley 1362

It is composed of a group of 4 coaxial and solidal pulleys,whose diameter is Ø 2, Ø 4, Ø 8 and Ø 12 cm. It is supplied with a support.
Rod and clamp are not included.



1362

Precision inclined plane 1103

A spring scale (1N/0,01N) and a protractor are included in this kit. Using these instruments you can directly read inclination and force's value.
Plane dimensions: 95 x 500 mm.

Equipment supplied

1 Spring scale 100 g
1 Glider
2 Masses 50 g
4 Masses 10 g
1 Inclined plane with protractor

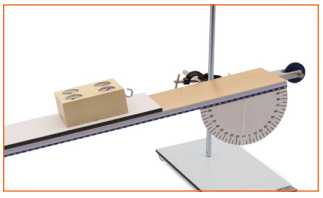
1103

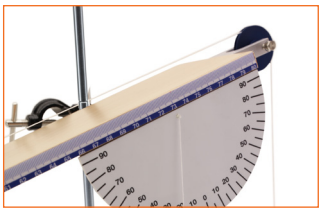
Friction inclined plane 1291

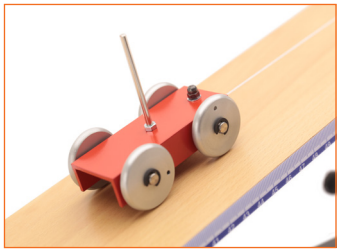
The Friction inclined plane apparatus enables investigation of the physics laws of equilibrium forces, the laws of sliding friction and also the determination of its coefficient. Plane dimension: 800 x 100mm.

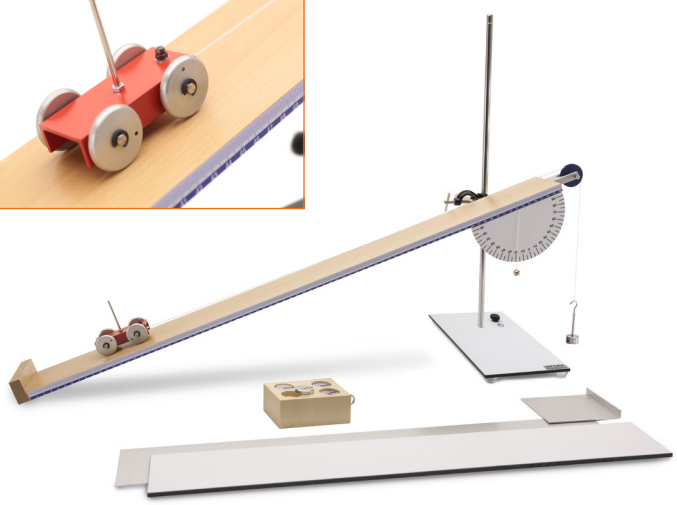
Equipment supplied

1 Metal rod 50 cm
1 String
1 Bosshead
1 Linear ruler
9 slotted masses 10g + holder 10g
9 slotted masses 20g + holder 20g
1 Base
1 Inclination protractor
1 Wooden plane with pulley
1 Aluminium plate
1 Fibreboard panel
1 Aluminium plane with angle
1 Low-friction glider
1 Wooden block









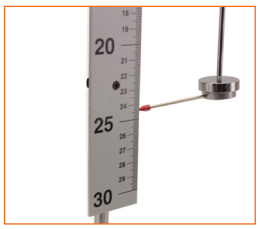
1291

Hooke's law apparatus 1111

It allows you to verify that, within specific limits, the lengthening of a spring is proportional to the intensity of the applied force. The graduated scale has 1 mm division and the perfectly balanced masses-holder has an index which can rotate to consent the perfect allignment with the graduated scale.

Equipment supplied

1 Rod with hook
1 Bosshead
1 Spring Ø 20 mm
1 Base for rod
1 Metric rod
4 Slotted masses 50 g
4 Slotted masses 10 g
1 Masses holder with position indicator
1 Spring Ø 10 mm; L = 75 mm
1 Spring Ø 10 mm; L = 60 mm
1 Spring Ø 10 mm; L = 50 mm
1 Spring Ø 20 mm; L = 60 mm
1 Linear rule



1111

Flexible parallelepiped 1077

It consists of an aluminium framework with flexible corners; in this way it mantains parallel bases as it undergoes deformation. By using the plumb-line it is possible to verify the equilibrium conditions of solid bodies standing on a plane.

1077

Instrument used to study equilibrium states 1078

The equilibrium forces of physics can be demonstrated by moving the two lateral masses in this device. The center of gravity of the system can be moved to different positions, demonstrating how the equilibrium depends on the position of the center of gravity with respect to the basement point.
Dimensions: 20x28 cm.

1078

Set of 5 springs with index 8179

Features:

1° K= 2,4 N/m;	capacity: 0,5N
2° K= 5 N/m;	capacity: 1N
3° K= 9,8 N/m;	capacity: 2N
4° K= 14,5 N/m;	capacity: 3N
5° K= 39,2 N/m;	capacity: 5N

8179

Bodies center of gravity 1195

Thanks to the plumb line, it is possible to determine the vertical passing through the suspension point. Repeating the experiment in several points you will find the center of gravity of the figures supplied.

1195

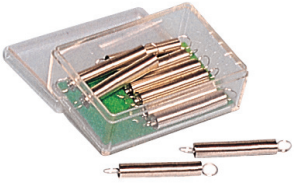
Set of 4 springs and 1 elastic band 8155

Suitable for perform experiments on Hooke's law and on elastic oscillations. Two of the springs have the same features in order to be used in series or in parallel.

8155

Set of 10 springs 8158

With the same elastic constant and same length.
Elasticity constant: K= 6,5 N/m.



8158

Equilibrium, forces, momenta and machines 1123

Set for experiments on solid statics. The proposed experiments can be performed using the force sensor (not supplied) Cod. 12943-00.

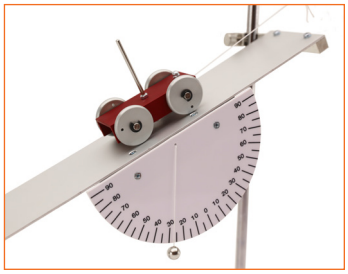
15 feasible experiments

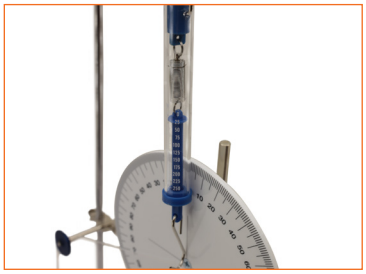
Topics

- Composition of concurrent forces
- Decomposition of a force
- Composition of parallel concording forces
- Composition of parallel discording forces
- The center of gravity
- Hooke's law
- Equilibrium of a bar
- Equilibrium of momenta
- Levers
- Fixed pulley
- Mobile pulley
- Simple hoist
- Hoist with a couple of pulleys in parallel
- Hoist with a couple of pulleys in series
- Inclined plane

Equipment supplied

4 Bosshead 6 mm
10 Modular metal rods 35 cm
2 Hooked rod
2 Spring
2 S shaped hook
3 Bosshead
3 Fixed pulley
1 Centre of gravity foil
1 Spiral spring
1 Linear ruler
1 Rod for levers with pin
2 Couple of pulleys in parallel
1 Glider
1 Mobile pulley
2 Couple of pulleys in series
1 Spring scale 250 g – 2.5 N
2 Series of 10 g masses
1 Series of 20 g masses
1 Momenta disc with pin
1 Metal rod 50 cm with reduction
1 Protractor with pin
1 Inclined plane with protractor
2 Bases for frame
1 Holder for frame





1123

Static kit for magnetic board 1328

Equipment to perforne experiments on solid statics.

Blackboard not included. We recommend the purchase of the code 1329.

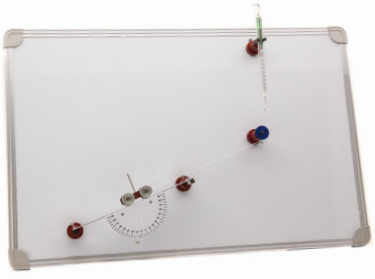
20 feasible experiments

Topics

- Composition of concurrent forces
- Composition of parallel forces
- Decomposition of a force
- Elastic forces
- Hooke's law
- The centre of gravity
- Equilibrium of a pivoted rod
- Equilibrium of momenta
- Levers
- Inclined plane
- The grazing friction
- Pulleys
- Pulleys in parallel
- Pulleys in series
- Combinations of simple machines

Equipment supplied

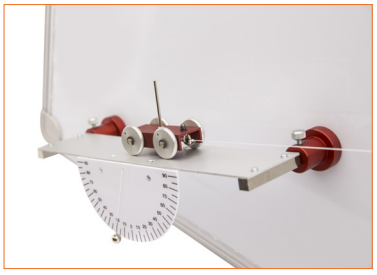
4 Magnetic holders
3 Rods with hook
2 Mobile pulleys
2 Serieas of slotted masses 10 g with holder
2 Slotted masses 50 g
1 Rod for levers with pivot
1 Spring with index
1 Moments' disk
2 pulleys in series
3 pulleys in series
1 Wooden block
2 Strings
1 "S"-shaped hook
1 Spring scale 200 g
2 Fixed pulleys
1 Protractor 360°
1 Slotted masses 20g with holder
1 Metal sheet for center of gravity
2 Triple pulleys in series
1 Linear ruler
1 Bosshead for spring scale
1 Inclined plane with protractor
1 Glider
1 Box



1328

Magnetic board with stand 1329

With white board surface in order to draw diagrams and write formulas.
It can be assembled on a table in vertical position.
Dimensions: 90x60 cm.
Ideal complement for the statics kit (code 1328).



1329

Galilean relativity

NEW

1842

Introduction:

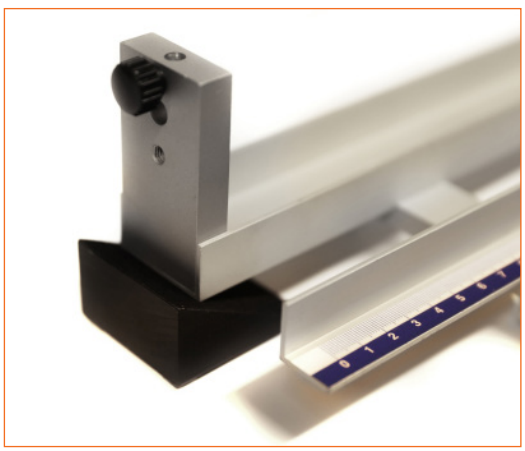
Physics is a science in continuous development, during its evolution many things have changed, such as the problems to be faced and the tools created to solve them.
One thing, however, has remained unchanged: the method of investigation based on experimentation, of which Galileo laid the foundations.
This didactic unit, through the execution of simple experiences, can help the teacher to demonstrate how Galileo's principle of relativity was used by Newton in formulating the laws of mechanics.

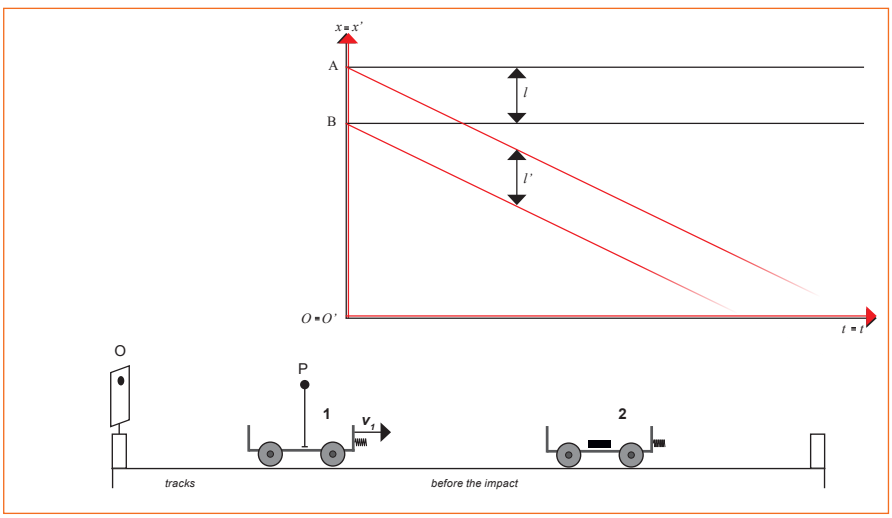
Topics

- When the reference changes
- Galileo's transformations
- The invariant quantities
- The position of an object
- The length of a segment
- The speed
- Acceleration
- The force
- The momentum
- Kinetic energy
- The invariance of mechanical laws
- The first law of dynamics
- The second law of dynamics
- The principle of conservation of momentum
- Conservation of momentum and Galileo's relativity
- The principle of conservation of kinetic energy
- Conservation of kinetic energy and Galileo's relativity
- Pendulum oscillations and Galileo's relativity
- Galileo's crisis of relativity

Equipment supplied

1 track	1 clamp
2 trolleys	1 ball with hook
1 rod with ball 1484	1 rod with hook
1 rod holder with ball	1 linear ruler
1 distance sensor	1 weight 5g with hook
1 skein of string	1 metal rod
1 wedge	1 pulley with rod
1 base	3 weights 10g





The principle of equivalence NEW 8124

Introduction:

Free fall is defined as the movement of an object when only the force of gravity acts on it.

A person who was in a spacecraft in an area of the universe in total absence of gravity would see all the objects around him floating.

If, however, without his knowing it, the rockets under the floor capable of accelerating the vehicle upwards were fired, the person would see the objects fall to the ground, as if the vehicle were in a gravitational field. With this didactic unit it is possible to verify the principle of equivalence between gravity and acceleration proposed by Einstein.

Topics

- The properties of matter
- Newton's first law
- Newton's second law
- The inertial references
- The principle of relativity in classical physics
- The force of gravity
- The free fall
- Inertial mass and gravitational mass
- That strange force of gravity
- Newton's Doubts
- The gravitational oscillator
- When a reference is not inertial; the apparent forces
- The lift
- Einstein's thought
- Equivalence between gravity and acceleration
- The principle of equivalence in general relativity
- Consequences of the principle of equivalence

Equipment supplied

1 Dynamometer 1N
1 Magnetic anchor
1 Rod with hook
1 Metal cylinder with hook 5g
1 Table vise
3 Metal rods
1 Support for vertical magnet
1 Support for horizontal magnet
1 Coil 400 turns
1 Coil 1600 turns
2 Core for threaded reel
2 Threaded disc
3 Electric cable 100 cm
1 graduated glass 250 cc
1 Transparent bottle with iron cap and float
1 Magnet
1 sheet of aluminum foil
1 Newton's tube
1 Hand pump
1 Support for dynamometer
1 Skeins of thread
1 Wooden ball with hook
1 PVC ball with hook
1 Aluminum ball with hook
1 Trolley
1 Metal cylinder with hooks 50g
1 Table vice with pulley

8124

The interactions in physics

NEW

1520

Introduction:

How is it possible that such small elements of matter can give rise to so many different phenomena and, above all, can form bodies that are extremely larger than themselves, such as gigantic planets and clusters of stars?

This question is answered in the fact that, as was previously stated, all particles have properties through which they interact.

This didactic unit allows to verify that there are no single forces as all the interactions satisfy the 3rd principle of dynamics.

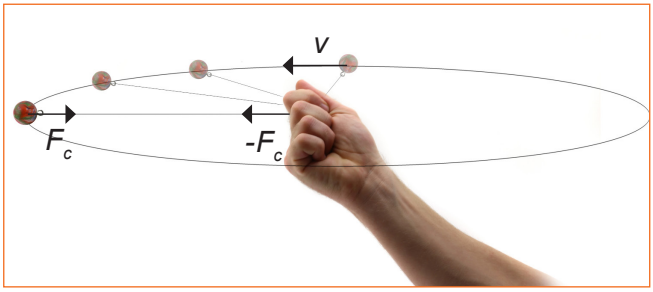
The proposed experiments can be performed using the force sensor (not supplied) Cod. 12943-00.

Topics

- Matter
- The interactions
- The first astronomical systems
- The Copernican system
- Kepler's laws
- The curvilinear motion
- The dynamics of planets with circular orbit
- The gravitational interaction
- The law of universal gravitation
- Electricity
- The electric charge
- The electrostatic interaction
- The electrical state of a body - the electroscope
- Coulomb's law
- The quantization of the electric charge
- Magnetism
- The magnetic poles
- The magnetic forces
- The magnetic interaction
- Electrostatics and magnetism - analogies
- The experience of oersted
- Faraday's experience
- The ampere experience - the electromagnetic interaction
- The unit of measurement of the intensity of electric current in the yes
- The atomic nucleus
- The weak interaction
- The strong interaction

Equipment supplied

1 Apparatus of the ellipse
1 Lanyard
1 rubber ball with hook
1 Dynamometer 2,5 N
1 Pair of cylinders
2 PVC rods
1 Set of five rods with support
2 cables of 100cm
2 Alligator clips
1 glass flask 250ml
1 Rod for electroscope
1 sheet of aluminum foil
1 Roll of adhesive tape
1 Linear magnet
1 Transparent plate
1 Iron filings
1 Teaspoon
1 Pair of magnetic needles
1 Compass
1 Apparatus of electromagnetic interactions
1 Electric cable 25cm
1 protractor
1 Pair of magnetic pendulums



1520

Introduction

The plane of the movement, code 8218, is also described in the section of the catalog dedicated to electromagnetism, since, in addition to allowing the study of linear motions, using RTL techniques, it allows a demonstration of Lenz's law on electromagnetism.
The didactic interest of the experiments that can be performed with this apparatus is manifold and in fact with it the student:
- becomes familiar with the dimensions that characterize the movement;
- learn to relate the distance-time graph with the velocity-time and acceleration-time graphs;
- can measure the intensity of friction forces and the acceleration of gravity;
- can study how potential and kinetic energy vary as a function of time and distance.

Motion plane

NEW

8218

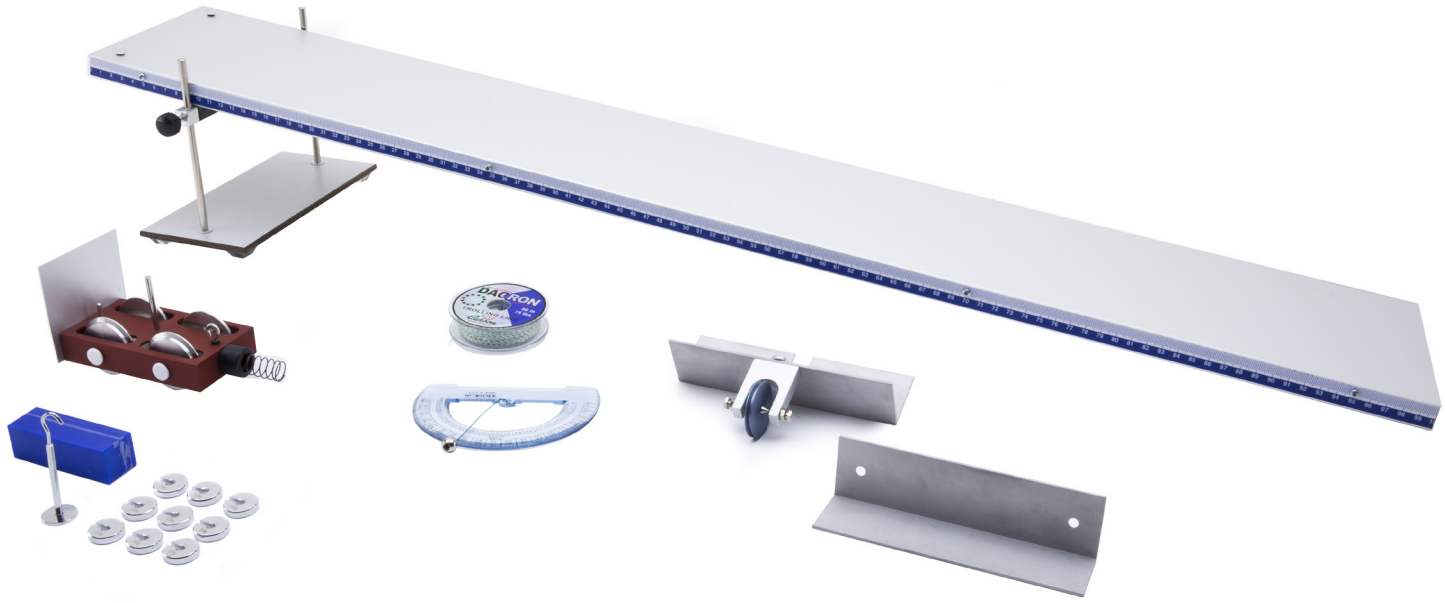
The movement plane, made up of the overlapping of a layer of plastic and one of aluminum, allows for an in-depth study of the basic motions of the dynamics: uniform rectilinear motion and uniformly accelerated rectilinear motion. The uniform motions can be achieved using the plane with the metal surface facing upwards, thanks to the phenomenon of electromagnetic induction generated by the movement of the magnetic carriage on the aluminium. Conversely, by placing the trolley on the plastic surface, it is possible to obtain the accelerated motions. Thanks to the special support, the plane of movement is transformed into an inclined plane which also makes possible considerations on friction and conservation of mechanical energy. For the execution of quantitative experiments it is necessary to have a distance sensor, such as the cod. 9041.

Covered Topics

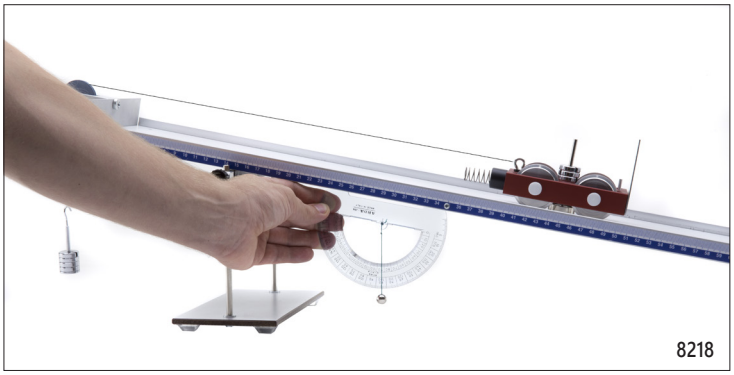
- Motion of a carriage on an inclined plane
- Law of the inclined plane
- Magnetic carriage (electromagnetic induction)

Material Provided

- 1 Double layer aluminum / faesite plane 100 cm long
- 1 Trolley with dimmer and magnet
- 1 Plane tilting device
- 1 Attachable rigid barrier
- 1 Hookable pulley
- 1 Semigoniometer with plummet
- 1 Set of 9 10g masses + 10g sinker
- 1 Wire

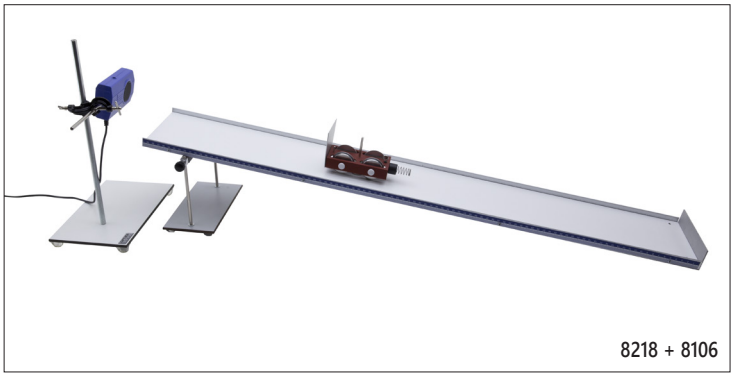


Examples of experiences with an inclined plane



8218

Verification of the law of the inclined plane: the force on the trolley depends on its weight and on the angle of the plane.



8218 + 8106

The accelerated motion is obtained by removing the magnet from the trolley and making it move on the plastic surface while the uniform motion is obtained by applying the magnet to the trolley and making it move on the aluminum plane

8218

The motion plan experience can be expanded with the following add-ons:

Sensor kit (accessory for 8218) 8106

This additional kit to the movement plan allows you to obtain position / time graphs via a simple bluetooth connection, so as to collect the data of the experiences carried out and understand them more deeply.

Topics

- The distance sensor
- Uniform rectilinear motion
- Uniformly accelerated straight-line motion
- Elastic impact

Material Provided

- 1 Base
- 1 Double clamp
- 1 Modular metal rod
- 1 USB distance sensor (Korea Digital)

8106

Friction kit (accessory for 8218) 8102

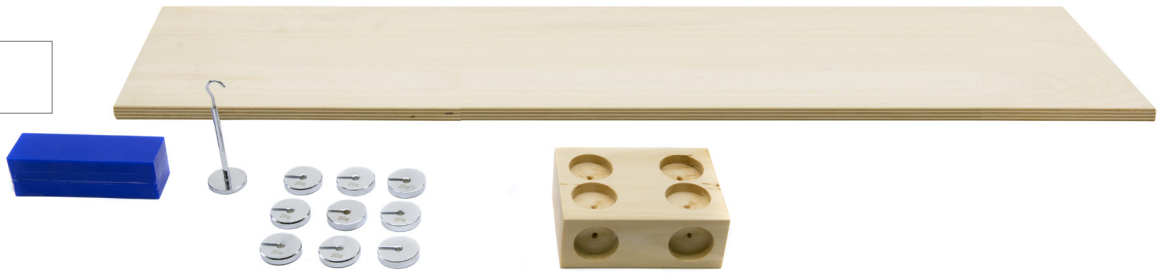
This motion plane add-on kit allows you to measure the coefficient of friction between different materials and understand their mechanisms.

Topics

- Measurement of the static sliding friction coefficient
- Measurement of the dynamic sliding friction coefficient

Material Provided

- 1 wooden block with spaces for weights
- 1 wooden top
- 1 Series of 9 masses of 20g + 20g plate



8102

Rolling kit (accessory for 8218) 8105.1

Thanks to this additional movement plane kit, it will be possible to carry out experiments regarding the dynamics of rolling and how this is linked to the moments of inertia of rolling bodies, leading to unexpected phenomena.

Topics

- The dynamics of rolling
- Rolling of a cylinder on an inclined plane
- Speed race between two different cylinders
- Speed race between cylinders with different mass distribution
- Rolling of a sphere on an inclined plane
- Speed race between two different spheres
- Speed race between a sphere and a cylinder
- Rolling of a sphere on a track
- Speed race between a sphere on an inclined plane and a sphere on a track
- Speed race between different spheres on the same track

Material Provided

- 1 U-shaped aluminum profile 800x30x30 mm
- 1 aluminum cylinder diam. 55mm
- 1 PVC cylinder diam. 55mm
- 1 aluminum cylinder diam. 39mm
- 1 marble diam. 57mm
- 2 marbles diam. 51mm
- 1 External brass cylinder – internal PVC
- 1 PVC external cylinder – brass internal

8105.1

Einstein's lift 1428

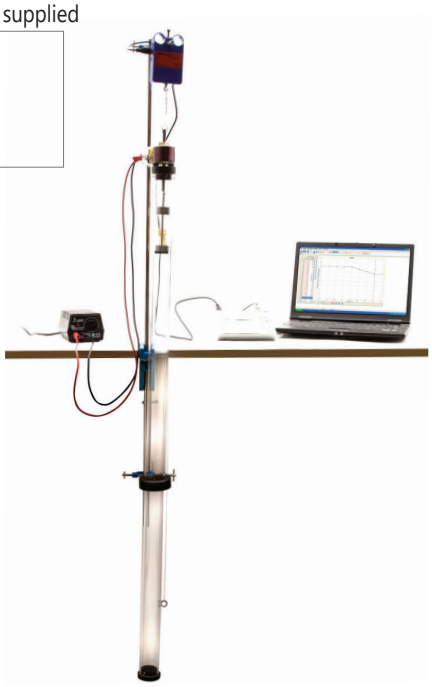
This lift is composed of a pair of aluminum disks fixed to a common pivot, free to slide inside a plexiglass tube. The elevator may be initially anchored to the upper end of the tube by means of an electromagnet. Releasing the electromagnet, the elevator falls in free fall along the tube down to the lower end. A wire is then distributed to the repechage of the elevator. A system of holes, drilled on the caps, prevents the indoor air compression from slowing down in the elevator during the falling.

Equipment supplied

1 110 cm long plexiglas cylinder, equipped with PVC caps
1 Electromagnet
1 Clamp
1 Electromagnet power supply with cables
1 Force sensor support
1 Box
1 Elevator consisting of two aluminium discs fastened to the same pin
1 12 mm diam. rod, L 120 cm
1 PVC ring with rod
1 String
2 Bosshead

Equipment for online use - not supplied

1 Interface code 9001
1 Force sensor code 9032
or
1 USB force sensor code 9068
or
1 Bluetooth force sensor code 12943-00



Suitable to be used with sensors

1428

Kit for measuring short time intervals 1417

With this kit it is possible to measure time interval between two occurences when time is too brief to be measured with a time marker. For example, oscillation time, or the time takes a body, to cover a specific distance, etc.

Equipment supplied

1 Timer and photocells (2pcs)
1 Metal rod 70 cm
1 Base
2 Bosshead
1 Linear ruler
1 Rod with hook
1 Spring
9 masses 10 g
2 Spheres for pendulum
1 String
1 Box

1417

Online low friction track 8119

Anodized aluminium track, length: 120cm, on which two friction trolleys, fitted with two wheels mounted on low-friction bearing, can scroll.

Topics

- How to mount the rail
- Gliders
- The distance sensor
- Uniform motion
- Uniformly accelerated motion
- Newton's second law
- Conservation of energy
- The impulse-momentum theorem
- Elastic collisions
- Inelastic collisions
- Oscillations of a spring-mass system

Equipment supplied

1 Track
1 Stand with one support
1 Stand with double support
1 End run shore
1 End run with pulley
2 Photocell supports
2 Stands with bar
2 Bossheads
1 Mass 500 g
9 slotted masses 10 g with holder
2 Pivots for springs
1 Linear ruler
2 Coil springs
1 Central pivot
2 Side pivots
1 Spring
1 Support for inclined plane
1 Friction-trolley with bumper
1 Friction-trolley without bumper
2 Reflectors
4 Magnets
1 Allen key
1 USB-cable
1 Box

Equipment for online use - not supplied

2 Distance sensor code 9041
1 Force sensor code 9032
1 Interface code 9001
or
2 USB distance sensor code 9066
1 USB force sensor code 9068
1 Interface code 9001

Suitable to be used with sensors

8119

Low friction track 1442

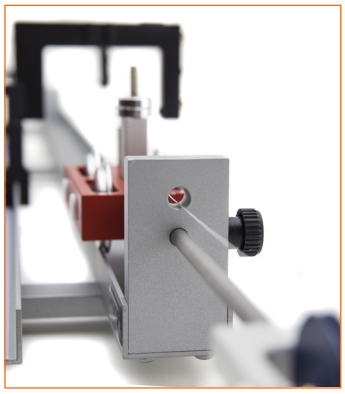
Motion is subject to friction forces which can be reduced but not cancelled.
Thanks to the low friction track you can carry out experiments on kinetics and translational motion.e.
15 feasible experiments

Topics

- Motion
- Motion is relative
- Reference systems
- Physical quantities defining motion
- Trajectory
- Displacement
- The instruments for the experimental study of motion
- Average speed
- Instantaneous speed
- Average acceleration
- Instantaneous acceleration
- Different types of motion
- Uniform rectilinear motion
- Uniformly accelerated rectilinear motion
- The principle of inertia
- The fundamental law of dynamics
- Friction force

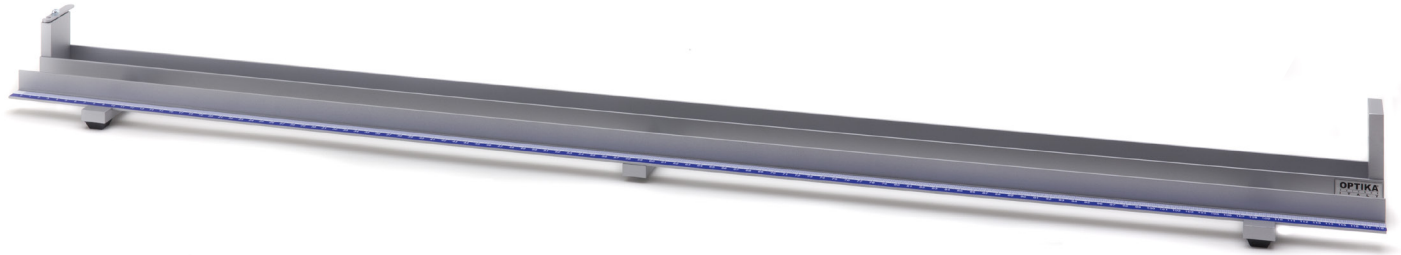
Equipment supplied

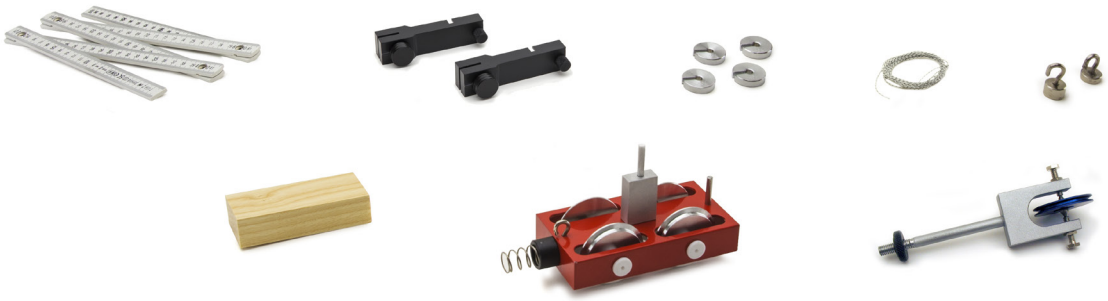
1 String
1 Folding ruler
4 Slotted masses 10 g with masses holder
1 Track
1 Glider
1 Mass with hook 5 g
1 Mass with hook 8 g
1 Wooden block
1 Pulley with rod
2 Photocell holders
1 Box



Equipment required - not supplied

1 Timer e photocells code 9081





Timer system 9081

Recommended for low friction track code 1442.
Description:
2 Photocells.
1 Timer.

Timer description:
- Readability: 0.001s
- 9V battery included
- 2 modes:
To measure darkening time
To measure elapsed time between the darkening of the first photocell and the second one.

9081

1442

150 cm - Air Track	**5588**
190 cm - Air Track	**5589**
200 cm - Air Track	**5590**

Optika Air Tracks are made from the extrusion of a square aluminum tube.
Each Air Track is provided with a side T-shaped aluminum profile on which photocell holders can slide.
On this profile a graduated scale is mounted for a clear reading of the photocell positions.

It is an essential instrument thanks to which students are able to practice with Newton's second law, uniform motion, uniformly accelerated motion, conservation law and collisions.

Topics

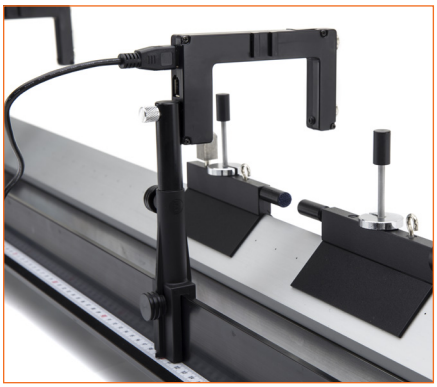
- How to set up the system
- Uniform rectilinear motion
- Uniformly accelerated rectilinear motion
- The fundamental law of dynamics
- I sistemi isolati
- Momentum conservation
- The principle of energy conservation
- Elastic collisions
- Elastic collisions between two gliders
- Elastic oscillations
- Free falling bodies (optional kit using product code 5455)

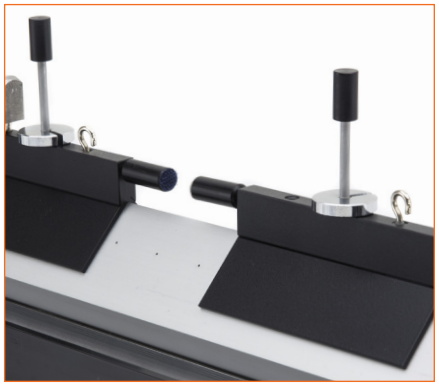
Equipment supplied

1 Track
2 Gliders
4 Cylindrical flags
1 Couple of velcro bumpers
1 Elastic bumper
2 Spring bumpers
4 Hookes for springs
1 Set of slotted masses
2 Photocells holer
1 String
4 slotting masses 20 g
2 Springs
1 Level

Equipment required - not supplied

Photocells	cod. 5453 (2pcs required)
Timer	cod. 5452
Air blower	cod. 5450
Electromagnet	cod. 5454





Air blower 5450

Dimension: Ø 20 cm x h 30 cm.
Electrical socket on top with fuse.
Tube length: 2 m.
Engine power: 300 W.

5450

Photocell 5453

This photogate works as a switch.
The infrared transmitter and receiver are mounted and aligned on a plastic fork.
Lead time: ~ 0.004 ms.
Includes connection cable for timer 5452 and 13 cm metal support rod.

5453

Electromagnet 5454

Release system usable with timer code 5452.
Connection cable for timer code 5452 included.

5454

RTL track kit 5456

Thanks to this kit, students are allowed to study dynamics using a Real Time Laboratory method. This kit is suggested for 150 cm Air Track only (code 5588) and air blower (code 5450).

Equipment supplied

1 Clamp	2 Reflectors for distance sensor
1 Base	1 Square pivot
2 Bosshead	2 Massholder
3 Metallic rod 350x10	1 String

Equipment for online use - not supplied

2 Distance sensors	cod. 9041	1 Interface	cod. 9001
1 Force sensor	cod. 9032	1 Balance	

Suitable to be used with sensors

5456

Timer 5452

Multifunctional control unit for:

- **5588 (5589-5590)**
- **5455**

For these instruments are guaranteed experiments on the following topics:

- Uniform rectilinear motion
- Uniformly accelerated motion
- The fundamental law of dynamics
- The principle of conservation of energy
- Elastic shocks
- Elastic oscillations
- Free fall of a grave

For correct functioning, a maximum of two photocells code 5453 and one solenoid code 5454 are required. Power supply unit included.
Power supply included.

5452

Free falling bodies kit 5455

The free falling apparatus allows student to study the free fall of a body getting accurate and reliable measurements.

Equipment supplied

3 Bosshead
1 Clamp
1 Metallic rod 12 x 1200 mm
1 Saucer
1 Plumb-line
1 Sphere diam. 12 mm
1 Sphere diam. 16 mm
1 Folding ruler
1 Electromagnet support

Equipment required - not supplied

1 Electromagnet	cod. 5454
1 Timer	cod. 5452
(2pcs code 5453 are required)	

5455

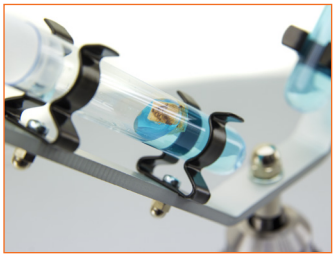
Electrical rotating platform 1443

Optika rotating platform allows students not only to verify the relations between the fundamental quantities which characterize rotational motion, but also to perform experiments on an important topic: inertial and non-inertial systems. What is seen by an observer on an inertial system is different from what is seen by an observer on a non-inertial system. In this way students are allowed to understand which is the origin and which are the results of fictitious forces as the centrifugal force and Coriolis force.

Thanks to this platform, you are able to study a lot of fundamental topics as the effects of Coriolis force on solids and liquids and understand why a mathematical instrument as the cross product was so important. By which magnitudes the centrifugal force depends on? Let's perform some experiences with OPTIKA rotating platform.

Topics

- The relativity of motion
- Galileo equations
- Invariant and non-invariant quantities
- The principle of relativity
- Non-inertial references
- Systems with tangential acceleration only
- Motion in two dimensions
- Uniform circular motion
- Centripetal force
- Systems with only radial acceleration
- Rotating platform
- Centrifugal force
- Effects of centrifugal force
- Conical pendulum
- Coriolis force
- Examples of Coriolis forces
- Properties of Coriolis force
- The Earth: a rotating reference system
- The centrifugal force on the Earth's surface
- Coriolis force on the Earth's surface
- A proof of the Earth's rotation: Foucault pendulum



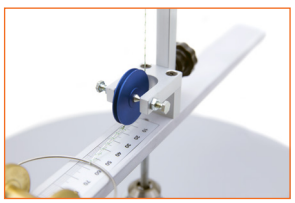
Feasible experiments

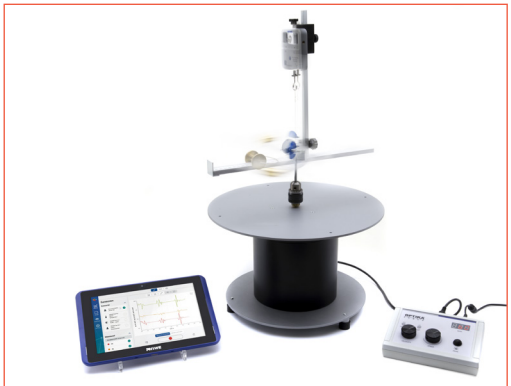
1° Centripetal force
2° A fictitious force: the centrifugal force
3° Lack of centripetal force: what happens?
4° Centrifugal forces in equilibrium
5° How to use centrifugal force to separate a mixture
6° Centrifugal force and Earth shape
7° Watt's regulator
8° White light: Newton's Disk
9° Conical pendulum
10° Properties of conical pendulum
11° How to verify centripetal and centrifugal forces formula
12° Another fictitious force: Coriolis force
13° Coriolis force acting on a water jet
14° Coriolis force acting on a pendulum
15° Observer in a non-inertial system
16° How to verify Coriolis law with an experiment
17° When Coriolis force is zero
18° Foucault's pendulum

1443

Apparatus for measuring centrifugal force for force sensor 1135-SENS

The instrument consists of a rail on which a cylinder can slide.
By putting the # 1443 rotation machine into operation, the device will be able to record the centrifugal force values thanks to the Bluetooth force sensor. For use with sensor # 12943-00.
For data acquisition, the use of the Cobra SMARTlink # 12999-99 data logger is recommended.
By processing the data with the free measureAPP application, you will be able to appreciate the dependence of the centrifugal force on angular speed and arm.





12999-99 + 1443 + 1135-SENS + 12943-00

1135-SENS

Accessories (not included) for Electrical rotating platform

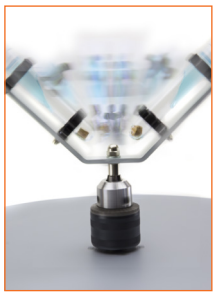
Apparatus for centrifugal force 1445
To performe experiment n° 2


1445

Coaxial cylinders 1447
To performe experiment n° 4


1447

Apparatus with inclined test tubes 1082
To performe experiment n° 5

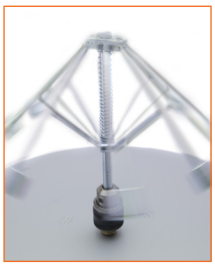



1082

Apparatus with elastic rings 1094
To performe experiment n° 6


1094

Watt's regulator 1093
To performe experiment n° 7




1093

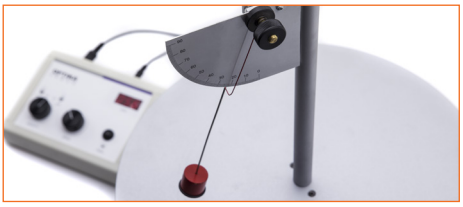
Newton's Disk 1097
To performe experiment n° 8

1097

Bowl with dye 1459
To be used with code 1452 and code 1458.

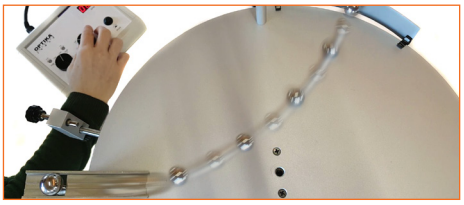
1459

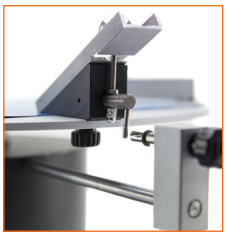
Conical pendulum 1450
To performe experiments n° 9-10-11.



1450

Apparatus for Coriolis force 1451
To performe experiments n° 12-16.

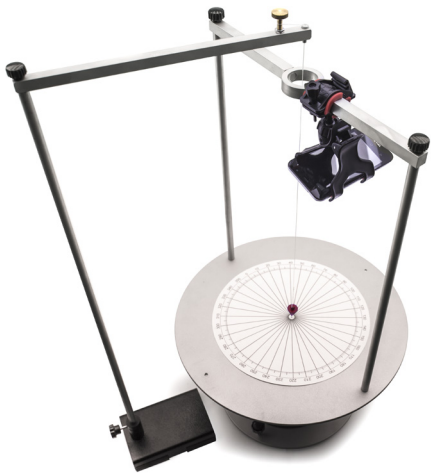




1451

Simple pendulum 1453
To performe experiments n°14-15-18.

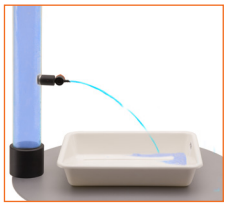
Camera kit 1455



The clamp shown in the photo is a smartphone support.

1453 - 1455

Apparatus for water jet 1452
To performe experiment n° 13.


Bowl not included

1452

Apparatus for falling water 1458
To performe experiment n° 17.



Bowl not included

1458

Small manual rotating machine 1109

Laminated wood top, 180 x 340 mm. The rotating machine is equipped with a metallic spindle for shafts with 6 mm diameter.

1109

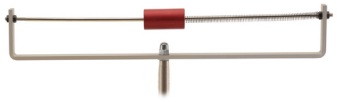
Watt's regulator 1093

It represents a model of centrifugal regulator.
During rotation the two masses move away, compressing the spring.
To be used with a rotating machine.

1093

Centrifugal force device 1081

By mounting the device on a rotating machine, the more the angular velocity increases, the more the cylinder compresses the spring.
To be used with any rotating machine.



1081

Device to measure centrifugal force 1135

It consists of a rail on which a low-friction cylinder can slide. By rotating the device, it is possible to read on the spring scale, the value of the centrifugal force, and it is possible to check the centrifugal force formula.

1135

Elastic rings 1094

They allow to highlight that the centrifugal force grows with the distance from the axis of rotation. During operation they assume an elliptical shape.

1094

Coaxial cylinders 1092

Since one has twice the mass of the other, during rotation there is equilibrium if the distance of the center of gravity of the greater mass from the center of rotation is half the distance of the smaller mass.

1092

Newton's disk 1097

Divided into colored sectors, while rotating, it allows to verify the additive synthesis of spectral colors.

1097

Device to study rotational motion 8109

With this device it is possible to perform experiments on the dynamics of rotational motion and on the moment of inertia of rotating bodies, by using astopwatch (not included).

10 feasible experiments

Topics

- Uniform circular motion and harmonic motion
- Kinematics of rotational motion
- Similarities between translatory and rotational motion
- The dynamics of rotational motion
- The fundamental law of rotational motion
- Inerzia momentum
- The kinetic energy of rotational motion
- Conservation of mechanical energy
- How to use the distance sensor

Equipment supplied

1 Base
1 Rod with chuck
1 Clamping device
1 Rod with sphere
1 Rod for balancer
1 Red mass
1 Green mass
1 Aluminum disk diam. 320mm
1 Mass holder
5 Slotted masses 10 g
5 Slotted masses 20 g
1 Clamp
1 Bosshead
1 Rod with pulley
1 Metallic rod 10x470 mm
2 String
2 Pins
1 Folding ruler
1 Box

Equipment for online use - not supplied

1 Interface	cod. 9001
1 Distance sensor	cod. 9041
or	
1 USB	cod. 9066

Suitable to be used with sensors

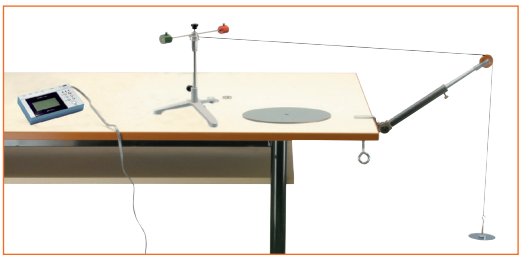
8109

Kit to study translational, rotational and oscillatory motion 8120

This kit has been designed to allow students to perform experiments on translational, rotary and oscillatory motion in real time, using a distance sensor.

Topics

- Rotational motion
- Uniform rectilinear motion
- Uniformly accelerated rectilinear motion
- Measurement of the acceleration due to gravity
- Simple pendulum
- Compound pendulum



Equipment supplied

1 String
1 Base
1 Bosshead
1 Folding ruler
1 Metallic rod 10 x 750 mm
1 Mass-holder 20 g
1 Clamp with telescopic arm
2 Masses 10 g
20 Plumb spheres 0.3 g
1 Aluminum disk
1 Spindle
1 Rod
2 Masses
1 Compound pendulum
1 Simple pendulum
1 Spindle support
1 Atwood machine support
1 Mass-holder
1 Pulley for Atwood machine
1 Box

Equipment for online use - not supplied

1 Distance sensor code 9041 + interface code 9001
or
1 USB distance sensor code 9066

Suitable to be used with sensors

8120

Rotating platform 1177

The rotating platform is characterised by a sturdy metal structure and a couple of conical bearings which allow it to rotate ensuring great resistance to stresses and low friction. Thanks to the didactic guide and the several accessories supplied with this collection, students will be able to carry out experiments on non inertial reference frames which otherwise would be impossible to perform. Our rotating platform is a particular and interactive instrument particularly suited to study angular momentum, moment of inertia and centrifugal force.
Platform diameter: 50 cm

Topics

- Action and reaction principle
- Preservation of the angular momentum
- Non-inertial systems: uniform rotatory motion
- Non-inertial systems: free falling
- Centrifugal force and its effects
- Measurement of centrifugal force
- Centrifugal force depending on the rotation radius
- Centrifugal force depending on the angular velocity
- Coriolis force
- Inertia moment

Equipment supplied

1 String
2 Spring tweezers
1 Rotating platform
1 Aluminum tube 800x35 mm
1 Ring stand for vertical tube
1 Ring stand for falling plane
1 Complete bicycle wheel
1 Plane with cannon
1 Falling plane
1 Device for measuring the centrifugal force
2 Dumbbells 4 Kg
1 Inclination protractor
1 Metal rod 1200 x 18 mm
3 Steel spheres
1 Support for launch system
2 Clamp for round flasks with bosshead

Equipment not supplied (not necessary)

1 Tripod base

1177

Simple pendulum 1272

This Simple Pendulum device can be used to verify the laws of simple oscillations.
More specifically, it can be used to verify that initial potential energy is preserved regardeless of the trajectory (Galileo's pendulum).
The pendulum is supplied with 3 different spheres with strings.
Height: 70 cm.

Accurate measurements can be aken using a distance sensor (not supplied):

-Cod. 9066
or
-Cod. 9041 and -Cod. 9001

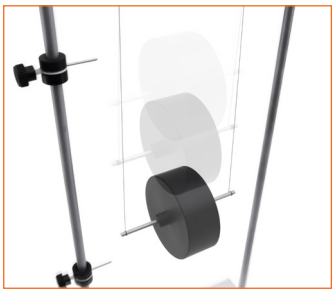
1272

Maxwell's pendulum 1375

Maxwell's pendulum is composed of a wheel suspended by two strings. These strings will be rolled up on an axis passing through the wheel's centre of mass. Releasing the wheel, the two strings are rolled up and down on the axis. If there was no friction, the wheel would reach the initial elevation. This up&down motion will be repeated many times. Its period depends on: the initial height h, from which the wheel was released, the gravity acceleration g and the ratio between the wheel radius and the pivot radius.
Using the distance sensor (not supplied) students are allowed to evaluate the wheel velocity and to make accurate calculations.

Equipment for online use - not supplied

1 Interface	code 9001
1 Distance sensor	code 9041
or	
1 USB distance sensor	code 9066

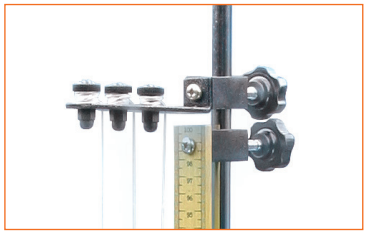


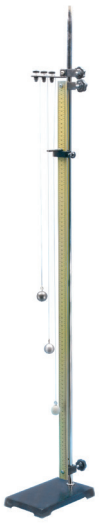
Suitable to be used with sensors

1375

Simple pendulums apparatus 1104

Composed of 3 simple pendulums whose length can be changed through specific handwheel and whose masses are different. Thus, you can demonstrate that the period of a simple pendulum depends on the length, but doesn't depend on the mass. A T-shaped rod able to move along a vertical stand, allow you to release all 3 pendulums at the same time.
Height: 100 cm.





1104

Set of 5 pendulum spheres 1306

Spheres with hook Ø 25 mm.
Material: aluminium, brass, iron, wood, copper.

1306

Forced oscillation apparatus 1302

This device allows the study of the phenomenon of a system's forced oscillations and lets you observe what happens under resonance conditions.

Equipment supplied

1 Base
1 Metallic rod
1 Pulleys system - low friction
5 Springs
1 Slotted masses 20g
1 Slotted masses 10g
1 Bosshead
1 Graduated cylinder
1 Vibrator
1 String
2 Connection cables

We suggest to use our functions generator code 5718, not supplied with this equipment. It has to be use with the vibrator supplied.

1302

Apparatus to study harmonic oscillations 8111

The study of the oscillatory motion of a mass hanging by a spring allows students to be introduced to the motion features of an harmonic oscillator and to get acquainted with one of the most powerful models for the physical interpretation of a wide range of phenomena.

Topics

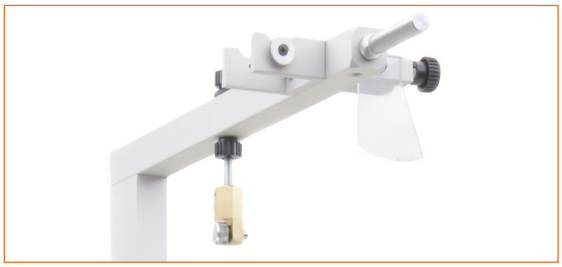
- Hooke law
- Armonic motion
- Mass-spring system
- Simple pendulum
- Physical pendulum
- Torsion pendulum

Equipment supplied

1 Metal support with rod and upper cross-bar for pendulums
1 Kit composed of 4 springs and 1 elastic
1 Wooden sphere for simple pendulum, diam. 50 mm
1 Polystyrene sphere, diam. 50 mm
1 Polystyrene sphere, diam. 160 mm
1 String
1 Compound pendulum
2 Metallic cylinder
1 Lower cross-bar with protractor for torsion pendulum
1 Brass rod 2 x 600 mm
1 Steel rod 2 x 600 mm
1 Steel rod 2 x 300 mm
1 Steel rod 2,5 x 600 mm
1 Torsion pendulum rod
1 Mass holder
1 Reflector disk
4 Masses 10 g
4 Masses 20 g
1 Bosshead
1 Base
1 Allen key

Equipment for online use - not supplied

1 Distance sensor code 9041+ interface code 9001
1 Force sensor code 9032
1 Sensors holders code 4014



Suitable to be used with sensors

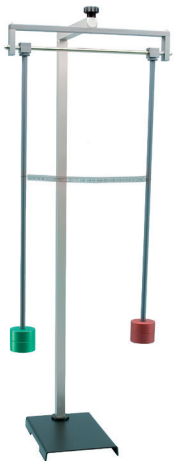
8111

Coupled pendulum 8113

The apparatus of coupled pendulums consists of two pendulums paired through a coil spring slightly stretched out. The spring allows the energy to be transfered between the two pendulums so it is possible to study the phenomena of resonance and beats.
The apparatus of coupled pendulum can be used as optional equipment of the apparatus for the study of harmonic oscillations (code 8111) or with the stand (code 0209), sold separately.

8113

Stand for coupled pendulum 0209



0209

Apparatus to study the moment of inertia 1438

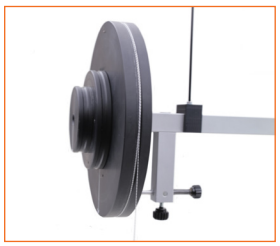
Thanks to this device, students can delve into complicated concepts such as angular velocity and moment of inertia, based on the fundamental law of rotary motion. The discussion also includes the energy balance of the system, including friction.

Topics

- Translational motion and rotational motion
- Analogies between translational and rotational motions
- Definition of rotational motion quantities
- How to calculate torque
- How to evaluate acceleration
- The fundamental law of rotational motion
- The moment of intertia
- Kinetic energy in rotational motion
- How to determine the friction force
- Energetical balance in the presence of friction
- The moment of inertia of composite systems
- The equilibrium of a rigid body

Equipment supplied

1 Base
1 Pillar 20x20 mm
1 Disk support
1 Disk 200 mm; peso 1,1 kg
1 Double disk diam 100 mm
1 Mass holder 2 g
3 String
1 Indice di riferimento
1 Allen key n. 6
1 Slotted mass 0,5 g
1 Slotted mass 1 g
2 Slotted masses 2 g
9 Slotted masses 10 g with holder
1 Measuring tape 2 m



1438

Atwood machine 1437

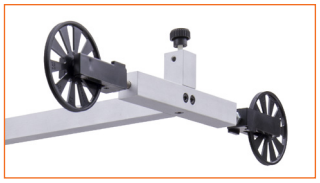
Atwood's machine was invented in 1784 by George Atwood as a laboratory experiment to verify the laws of motion uniformly accelerated. With this apparatus it is possible to conduct experiments on the Dynamics of moving bodies and perform accurate measurements. Using the appliance cod. 8107 it is possible to study even the uniform motion.

Topics

- Newton's second law
- Atwood machine - Theory
- Friction force
- Newton's second law in the presence of friction

Equipment for online use - not supplied

1 Interface code 9001
1 Distance sensor code 9041
or
1 USB distance sensor code 9066



Suitable to be used with sensors

1437

Uniform linear motion apparatus 8107

This item is composed of a couple of neodymium magnets which are dropped into an aluminium tube. During their fall, the tube is the centre of induced forces which, due to Lenz's Law, oppose the magnets motion. The kit of magnets is submitted to a force F = - k v, which is proportional and opposite to the speed. Therefore, after a brief transitional phase, the motion of the two magnets becomes uniform thanks to this force. Connecting trolleys or other objects to the magnets through a cord, it is possible to obtain the uniform motion of these objects. The proposed experiments can be performed using the force sensor (not supplied) Cod. 12943-00.

Topics

- Falling of a magnet in an aluminium tube;
- Verification of the action-reaction law;
- Uniform motion with Atwood machine (code 1437)

In order to realize the third experience of the uniform motion is necessary to have the product code 1437.

Equipment supplied

1 Base
2 Bosshead
3 Rods 350 x 10 mm
1 Spring scale 1000 g
1 Magnets kit
1 Perforated stopper
4 Masses 10 g diam. 4 mm
2 Clamps with bosshead
1 Aluminium tube with ring-shape support
1 Magnets container
1 PVC ring - guide for tube
1 Spring scale support
1 Rod with hook
1 pdf teaching guide

Equipment for online use - not supplied

1 Interface code 9001
1 Distance sensor code 9041
or
1 USB distance sensor code 9066

Suitable to be used with sensors

8107

Newton's cradle 1113

It is composed of five steel balls of equal mass, lined up and in contact with each other. Raising the first ball and then releasing it, its energy are trasmitted to the last ball. This phenomenona doesn't happen if you place a disk of deforming material between the balls.

1113

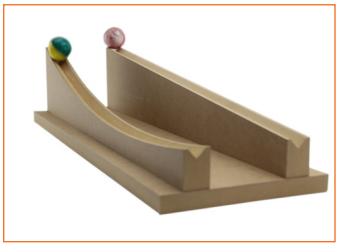
Gyroscope 1435

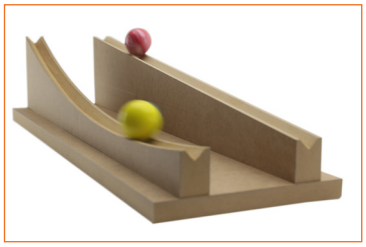
It has a metallic wheel. If you turn this wheel, using a string, you can study angular momentum conservation. Applying a perpendicular force to a rotation axe, you can observe precession motion, in other words the gyroscopic effect.

1435

Downward speed 1364

Two balls with the same diameter roll down at the same time, from the same height difference, but following different trajectories. Departing from the same height, which will be the fist ball to reach the finish point?
Base: 600x200 mm.
Length of tracks: 600 mm.
Starting altitude: 120 mm; Arrival fee: 45 mm.

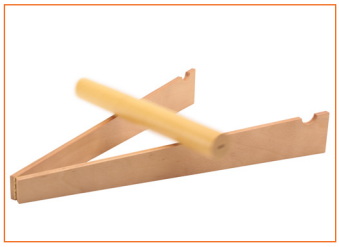




1364

Mechanical paradox 1079

As the cylinder goes down the inclined plane, the double cone goes up, apparently contravening the laws of mechanics. In reality the center of gravity of both moving bodies goes down. Made entirely of wood.
Length of the inclined plane: 50 cm.
Double cone dimensions: 35 cm.
Cylinder dimensions: 35 cm.



1079

Two-dimension collision apparatus 1325

A steel ball rolls down a track to finally fall freely, leaving a trace on the fall plane thanks to a carbon-paper sheet.
It is possible to do calculations on energy conservation and on motion composition by changing the free fall height and by measuring the range.
With two balls, it is also possible to verify the conservation of the motion quantity and of the kinetic energy. The item is supplied with 3 steel balls.
Dimensions: 400x100x20 mm.

1325

Apparatus for the verification of the principle of mechanical energy conservation 1439

All the natural phenomena taking place in an isolated system are governed by a property that, until today, has had no exceptions: there is a magnitude whose value remains the same throughout the course of a phenomenon; this magnitude is named as energy. Thanks to this kit, the student can study the concept of energy and go into the meaning of its conservation.
The experiments suggested can be carried out using measurement sensors:
-Cod. 9095 or -Cod. 12945-00

Topics

- Isolated systems
- What energy is?
- Principle of mechanical energy conservation
- Why mechanical energy is preserved?

1439

Parabolic motion apparatus 1431

This simple apparatus let the students study, in a quantitative way, the parabolic motion. This launching system has 5 launch positions, and the projectile is a plastic sphere. The regulation system allows you to vary inclination from 0° to 90°.

Apparatus to measure launch velocity 9095

Looking for the speed of the projectile, launched by the launching system code 1431, we recommend our product code 9095. It consists of a photocell connected to a timer able of evaluating to the millisecond the obscuration time Δt caused by the passage of the projectile.
If Δx is the diameter of the projectile, its initial velocity is:

$$v = \frac{\Delta x}{\Delta t}$$

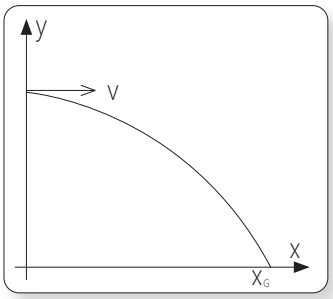
9095

Example

If cannon is h metres from ground, and it is horizontal, the rifle range depends on launch velocity:

$$X_G = V\sqrt{\frac{2h}{g}}$$

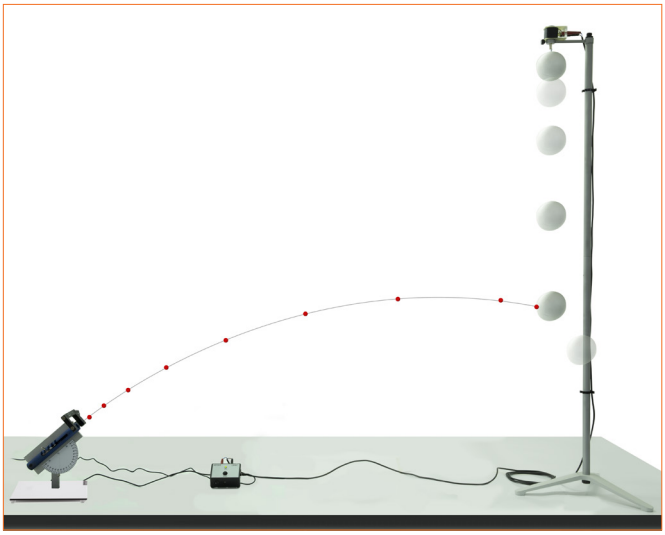
Knowing v, you can determine X_G and knowing X_G, you can appreciate V.



1431

An historical quest 1422

A hunter wants to shoot a monkey hanging from a tree branch, hence he aims his blowpipe at the animal. As soon as the monkey sees the arrow, it loosens the grip to avoid being shot. The hunter, as the monkey jumps, thinks he missed the target; shortly thereafter, however, he can see with great surprise the arrow hit the free falling animal.
It is possible to demonstrate that the monkey would be hit in all cases, whatever the velocity V_0 at which the arrow moves, provided that its value is such as to allow the arrow to hit the animal before it reaches the ground.
At the very instant in which the projectile exits the cannon, the photocell positioned on the muzzle sends a signal, deactivating the electromagnet which holds the polystyrene ball used to simulate the monkey. If the condition mentioned above is satisfied, while falling, the polystyrene ball will be hit by the projectile in any case. The apparatus we offer you is particularly sturdy. Moreover, the anodised aluminum cannon can be rotated and is characterised by a thick high pressure bilaminates base. This apparatus was entirely realised in our factory, from the production of its components to mounting.

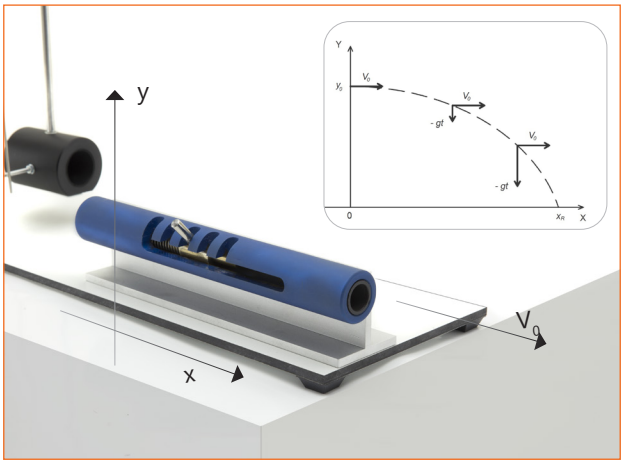


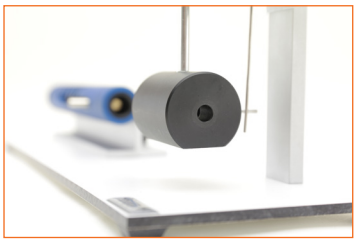
1422

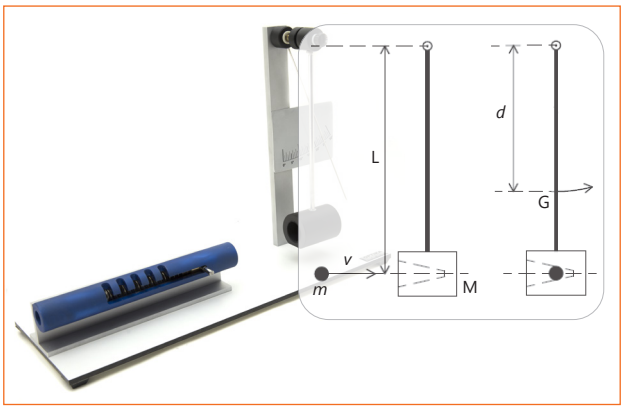
Ballistic pendulum 1436

The ballistic pendulum allows to study the laws of conservation of energy and the conservation of momentum in a perfectly inelastic collision.
The launching system is removable and suitable to verify the initial speed of a projectile according to the laws of parabolic motion.

The cannon is made of anodized aluminum.
It is equipped with 5 launching positions
and can be dismantled, this also allows
an in-depth study of the parabolic motion.







1436

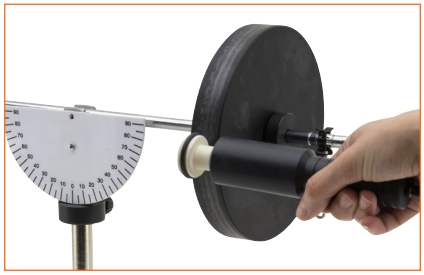
Precession motion 1432

This equipment allows students to study the precession motion thanks to the laws of classical mechanics applied to rigid bodies using simple devices as the spinning top and the gyroscope.

Equipment supplied

1 Gyroscope	1 Folding ruler
1 Giant Gyroscope	1 Launching motor
1 Spinning top	

By the giant gyroscope, you can also perform a quantitative test of the report that provides the value of the angular momentum precession as a function of mechanical momentum and angular momentum of rotation.
The teaching guide as well as a theoretical explanation of the phenomenon, provides instructions for a correct execution of the experiences.



1432

Communicating vessels 1105

For homogeneus liquids.
It is composed of 4 vessels.
Height of water columns 11 cm.

1105

Communicating vessels with capillaries 1062

It is composed of 5 vessels; the last two vessels are capillaries. Height of water columns 11 cm.

1062

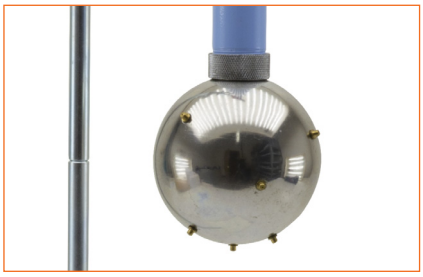
Capillary vessels 1106

It is composed of 4 vessels.
Height of water columns 11 cm.

1106

Pascal's principle apparatus with stand 1185

Pushing the piston, the water creates concentric circles on the basement plane.
Thi products is made of metal and it is supplied with base and stands.
Support height: 35 cm.



1185

Pascal's principle apparatus without stand 1248

The previous item cod. 1185, but without stand.

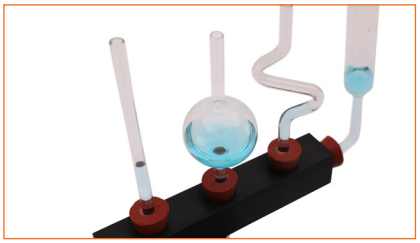
1248

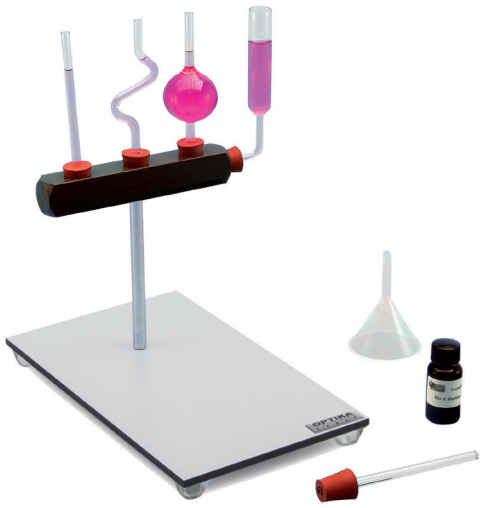
Pascal's apparatus with communicating vessels, modular model 1182

Thanks to this apparatus you will be able to perform experiments on communicating vessels, on capillary vessels, on Stevin's principle and on Pascal's principle.

Equipment supplied

1 Bosshead
1 Base
1 Dropper
1 Methylene blue bottle
1 Metal rod 10x250 cm
1 Funnel
1 PVC support
1 Rubber suction bulb
5 Glass tubes with different shape and rubber plug
3 L-shaped glass tubes
1 Box





1182

Cartesian devil 1125

This small glass object is hollow and has a small hole in its inferior part. If it is immersed in water, it floats. If you press the elestic membrane on the top, the devil fills itself up with water and finally it sinks. It starts floating again the moment the pressure on the membrane ends.
It is supplied with glass jar and rubber membrane.

1125

Archimede's double cylinder 1020

Made of plastic material and brass, it is endowed with hooks.
Dimensions: 53x55 mm.

1020

Apparatus for the study of viscosity 1001

It allows to experiment on the falling motion of a sphere in a liquid to determine the viscosity coefficient.

1001

Archimedes' principle apparatus 1170

Composed of : stand, spring scale, double cylinder, displacement vessel, beaker, graduated cylinder, case.

1170

Stevin's principle apparatus 1042

This apparatus is used to check Stevin's principle. It is supplied with base, manometer, tube, manometric sensor and jar.
Jar height :38 cm.

1042

Submarine simulator 1407

Thanks this instrument it's possible to observe how a submarine can vary immersion depth.

1407

Hare's apparatus 1219

Thanks to this apparatus, it is possible to determine the specific density of a liquid. A small depression done with a syringe, let the two liquids reach different levels, if they have different density. If the first liquid is water, it is possible to find the other liquid's density in relationship to the water's one. The item is supplied with stand, pincers, syringe and glasses. Glass part height 35 cm.

1219

Specific weight kit 1132

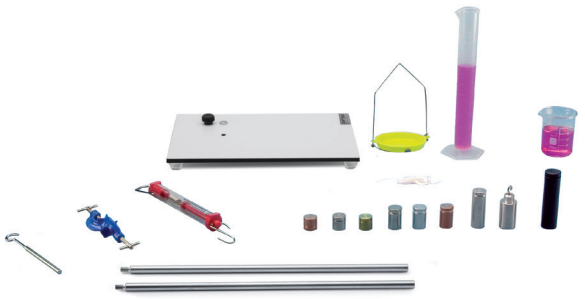
To measure the specific weight of solids and liquids.
The proposed experiments can be performed using the force sensor (not supplied) Cod. 12943-00

Topics

- Determination of the specific weight of a solid
- Bodies with the same weight but different volume
- Bodies with the same volume but different weight
- Determination of a specific weight of a liquid

Equipment supplied

1 Rod with hook
1 String
1 Folding metallic rod 70 cm
1 Bosshead
1 Pan for balance
1 Set of 5 samples with different volume and same weight
1 Set of 3 samples with same volume and different weight
1 Spring scale 2,5N
1 Base for rod
1 Aluminium object with hook
1 Graduated cylinder 100 ml
1 Beaker 100 ml
1 Box



1132

Cylinders with same mass 1368

Suitable for experiments on density-volume relationship. Diameter 15 mm; mass 50 g. Materials: aluminium, copper, brass, zinc, iron and lead.
6 pcs.

1368

Cylinder with same volume 1369

In order to do experiments on the density-volume relationship. Diameter 10 mm, height 40 mm. Materials: aluminium, copper, brass, zinc, iron and lead.
6 pcs.

1369

Series of cylinders 1124

Three cylinders have the same volume and different density; three cylinders have the same density but different volume. To demonstrate that Archimedes' thrust depends only on the volume of the immersed body.
5 pcs.

1124

Cubes with the same volume 1370

They are supplied with hook in order to measure the density of solid bodies. Length of the sides: 32 mm. Materials: aluminium, copper, brass, zinc, iron and lead.
6 pcs.

1370

Displacement vessel 1367

In order to measure the volume of solid bodies. Capacity: 600 ml.

1367

Pycnometer 1371

In order to measure the density of liquid bodies. Capacity: 100 ml.

1371

Density sphere 1372

Its weight allows the sphere to float if immersed in room-temperature water (<20°C) and to sink if immersed in hot water.
Sphere's diameter: 75mm.

1372

Capillarity tray 1366

Plexiglass triangular-shaped tray with 5° opening, suitable to prove the effect of capillarity. It shows the shape of the meniscus of wetting and not wetting liquids.

1366

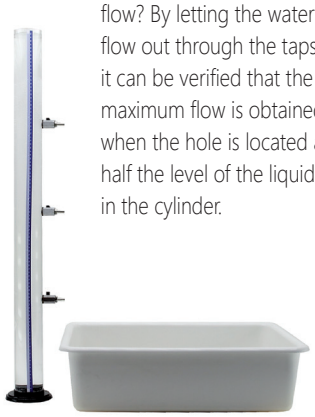
Pellat's apparatus 1381

With this item you can prove that the pressure of a liquid on the bottom of a container doesn't depend on the shape of the container, but it depends on the density and the depth of the liquid.

1381

Torricelli's apparatus 1426

After filling the cylinder with water up to a certain level, at which height should a hole be made to obtain the maximum flow? By letting the water flow out through the taps, it can be verified that the maximum flow is obtained when the hole is located at half the level of the liquid in the cylinder.



1426

Instrument to study superficial tension 1200

It allows you to calculate superficial tension of a liquid using Lecomte du Nouy'ring. The surface tension value is obtained from the difference between the ring weight and the maximum tension read on the spring scale one second before the ring leaves the water surface. Height: 75 cm.

Topics

1 Elevator table
1 Rod with base
1 Beaker 600 ml
1 Boss head with hook
1 Spring scale 1N
1 Aluminium ring

Equipment for online use - not supplied

1 Interface code 9001
1 Force sensor code 9032
or
1 USB force sensor code 9068
or
1 Bluetooth force sensor code 12943-00

Suitable to be used with sensors

1200

Vessel for hydrostatic and hydrodynamics experiments 8121
Spare part - glass - for code 8121 8121.1

Thanks to this item and to a pressure sensor it is possible to check that the pressure on each surface element immersed in a liquid is independent from the surface's orientation and its value is equal to the weight of a liquid's column having the considered surface element as a base and as the height the height difference between the center of this surface and the free surface of the liquid. It is also possible to experiment with the outflow's speed of a liquid under the gravity's effect and with the thrust that a solid body receives when it is immersed in a liquid (Archimede' principle).

Topics

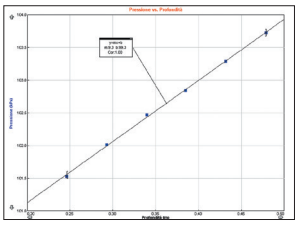
- Experimental verification of Stevino's Law;
- Experimental verification of Toricelli's Law;
- Experimental verification of Archimede's principle.

Equipment supplied

1 Glass cylinder with base and tap
1 Sensor holder and probe holder cap
1 PVC tube with drainage
1 Beaker 1 dm3
1 PVC cylinder
1 Aluminum cylinder
1 Base

Equipment for online use - not supplied

1 Interface code 9001
1 Pressure sensor code 9034
1 Force sensor code 9032
2 Metal modular rods
1 Bosshead code 0159
1 Metal rod 25 cm code 7108
1 Base code 1462



Suitable to be used with sensors

8121 - 8121.1

Vessel for experiments on hydrostatic-equilibrium 8122
Spare part - glass - for code 8122 8122.1

This vessel is an accessory of the cod. 8121 for the study of hydrostaticequilibrium. With the vessel code 8121 and the accessory code 8122 you can perform two additional experiments about communicating vessels:

- Water balance with two vases having the same capacity;
- Water balance with two vases having different capacity.

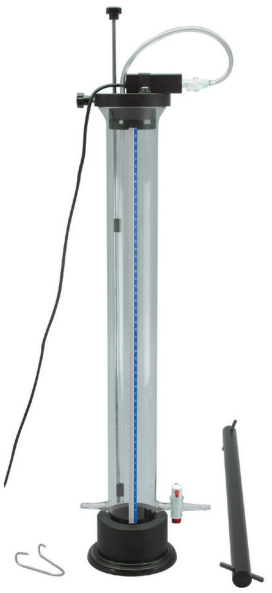
In particular, when two vases containing the same liquid at different levels are connected, a flow of liquid occurs from the vase in which the level is higher to the vase in which the level is lower. The flow goes on until the height difference is cancelled. During the transitory phase the higher level decreases over the time following an exponentially decreasing law.

Equipment supplied

1 Glass cylinder with base, tap and rubber holder
1 Sensor holder and probe holder cap
1 Transparent PVC tube
1 Base
1 PVC rod
1 PVC rod support

Equipment for online use - not supplied

1 Pressure sensor type B code 9034



Suitable to be used with sensors

8122 - 8122.1

Single stage rotary pump 1415

The rotary vane vacuum pump is designed to create vacuum in a sealed container.
Single-stage; recycled lubrication, tank, fan, silencer.
Voltage: 220V 50Hz
Flow rate: 2.55 m^3/h
Ultimate pressure: 0.05 mbar
Power: 1/4 hp
Oil tank capacity: 170 ml
Dimensions: 243x114x207 mm
Weight: 6.5 kg

1415

Kit for vacuum pump faucet 1413

1413

Double stage rotary pump AV-12

Nominal displacement: 3,6 m^3/h @50 Hz
Pumping speed: 3,1 m^3/h @50 Hz
Ultimate pressure: 0,01 hPa(mbar)
Motor power: 0,12 Kw
Electric supply: 1ph ~ 220/240 V 50/60 Hz
Noise: 57 dB(A)
Weight: 6,5 Kg
Inlet dimension: 1/4"G
Oil filling: 0,3 Lt

AV-12

High vacuum silicone grease 6147

Tube pack 50 g.

6147

Oil refill for pumps 0069

500 ml.

0069

Rubber tube for vacuum pumps 0090

Dimensions: 7x17x1000 mm.

0090

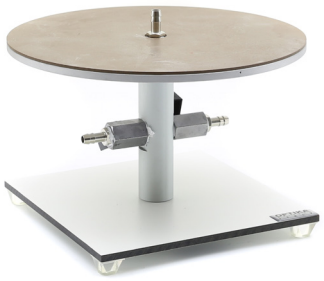
Bell jar 1069

It is made of very thick cast glass.
Dimensions: ø external 220 mm / internal 190 mm; h = 230 mm. The lower rim is frosted to have a perfect seal. Rubber cap with hook for electric bell.
To use with plate code 1068.

1069

Plate for bell jar 1068

This plate is made of metal with a perfect sealing.
Ø 250 mm.



1068

Vacuum bell with buzzer 1410

To show that acoustic waves do not propagate in a vacuum. For use with the pump code 1415 or code AV-12.

1410

Vacuum bell with plate 1402

Plate diameter: 20,5 cm.
Bell height: 19 cm.
To be used with a pump. It comes with a 1m vacuum hose. Resistance up to 1 bar.

1402

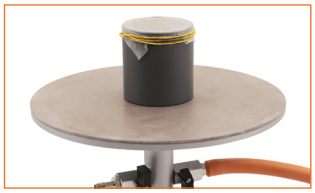
Electric bell 1074

For bell jar.
Powered by batteries.

1074

Pressure tear device 1072

The pressure tear device is made of PVC, with perfect seal.
It is supplied with its paper.



1072

Newton's tube (to be emptied) 1070

The tube is provided with stoppers and a tap and contains two objects of different masses and shapes.
It has to be connected to a vacuum pump. 1 meter long, made of glass.

1070

Magdeburg's hemispheres 1242

They are made of metal, with ground rims, supplied with rubber-holder so that they can be fitted to a vacuum pump through a rubber tube.
Diameter: 80 mm.

1242

Baroscope 1071

The baroscope demonstrates the Archimedes
push. In the air, the beam reaches the equilibrium, while in the vacuum it tilts on the balloon side, because the Archimedes push stops working.
It can be used with bell jar corde 1069.

1071

Torricelli's experiment apparatus 1043

It enables you to perform the classic Torricelli's experiment, thanks to the tube (length 85 cm, diametr 6 mm) with chemically carved millimetric division on the glass all along the interested part. It is supplied with base, basin, stands and funnel.
Mercury is not provided.

1043

Boyle Mariotte's Law apparatus 1414

A graduated cylinder made of transparent material is linked, at its bottom, to a manometer. Acting on the piston through a screw with hand-wheel, it is possible to reduce the volume of the air inside the cylinder and, at the same time, to read its pressure value on the manometer. The item is supplied with digital thermometer.

1414

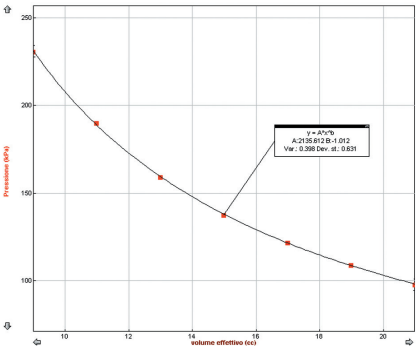
Device to study Boyle's Law 8216

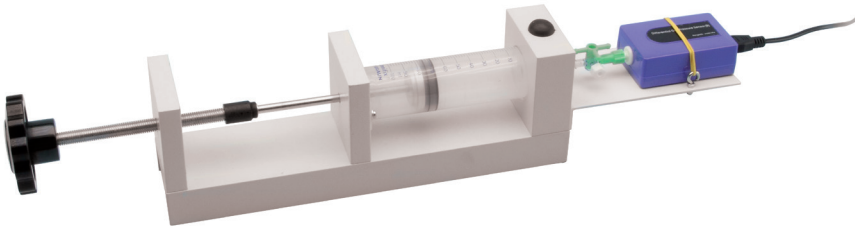
Thanks to this item it is possible to study quantitatively the isothermal conversions of gases. A transparent graduated cylinder is linked to a pressure sensor through a dual tap. Acting on the control knob the piston moves varying the volume of the air contained in the cylinder. Connecting the sensor to a real time data acquisition system it is possible to obtain the pressure Vs volume chart at a constant temperature.

Equipment for online use - not supplied

1 Interface code 9001
1 Pressure sensor code 9034
or
1 USB pressure sensor code 9069

Pressure graph according to volume, obtained point by point thanks to data acquisition system based on a PC. The interpolating curve approximates with precision the equation p V = cost.

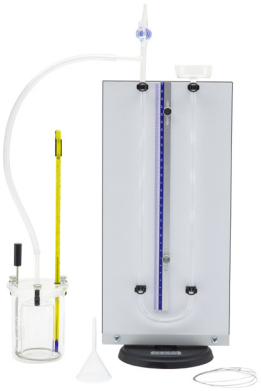




8216

Gay-Lussac's Law apparatus 1122

The Gay-Lussac's Law Apparatus allows us to verify the physics law that rules the pressure variation of a gas (at constant volume), as its temperature varies. The burner, the tripod and the wire gauze are sold separately.
The experiments can be performed using the temperature sensor (not supplied) Cod. 12903-00.



1122

Charles'Law apparatus 1137

The Charles Law Apparatus allows us to verify the physics law that rules the volume variations of a gas (at constant pressure) as its temperature varies. Therefore we can measure the dilatation coefficient (at constant pressure). The burner, the tripod and the wire gauze are sold separately.
The experiments can be performed using the temperature sensor (not supplied) Cod. 12903-00.

1137

Equipment for the verification of the laws of gases 1217

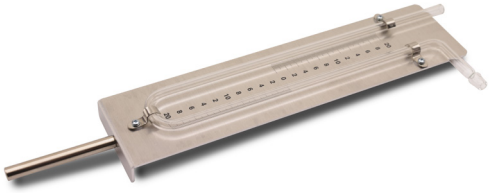
The kit for the verification of the laws of gases contains two devices - Charles' Law apparatus (code 1137) and Gay-Lussac's Law apparatus (code 1122).
The proposed experiments can be carried out using the temperature sensor (not supplied) Cod. 12903-00.

Saving on the items which are common to both devices, the price is more attractive than the sum of the two prices. Mercury is not provided.

1217

Free air manometers

Height 20 cm, without stopcock.	**1047**
Height 20 cm, with stopcock.	**1050**
Height 30 cm, with stopcock.	**1051**



1047 - 1050 - 1051

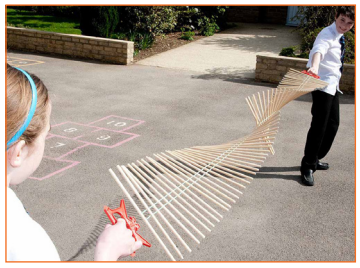
Set of 3 elastic strings 3011

To visualize the propagation of longitudinal and transversal impulses and their reflection and consequent creation of stationary waves.
This set includes:
1 elastic string Ø 4 mm, static length: 3 m, maximum extension length: 6 m.
1 coil spring Ø 10 mm, static length: 50 cm, maximum extension length: 5 m.
1 coil spring Ø 17 mm, static length: 50 cm, maximum extension length: 12 m.

3011

Device for the study of the waves 3006

With this simple device students can perform experiments on wave propagation and related phenomena. It is composed of an elastic rope with wood sleepers which visualize the vibratory state.

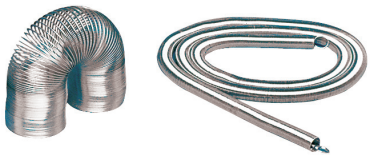


3006

Set of 2 coil springs (3025A+3025B) 3025

It is usefull to perform experiments on longitudinal and transversal waves' propagation, on the creation of stationary waves, on reflection and on other wave-related phenomena. Includes coil spring Slinky 3025A and coil spring 3025B.
Dimensions 1ª spring: Ø75x150 mm 2ª spring: Ø20x1900 mm.

Slinky spring Ø75 x 150 mm. 3025A
Coil spring Ø20 x 1900 mm. 3025B



3025 - 3025A - 3025B

Vibrator 3015

The vibrator should be used with the low frequence signal generator (code 5718), which is not supplied with this apparatus.
Height: 140 mm
Mass: 1 kg
Base diameter: 80 mm
Impedance: 8 Ω
Base height: 80 mm
Power: 10 W
Frequency range: 0-20 kHz

3015

Stationary wave apparatus 3014

The Stationary Waves Apparatus allows observation of the phenomenon of longitudinal and transversal stationary waves. The vibrator can be used with the low frequence signal generator (code 5718), which is not supplied with this apparatus.

Equipment supplied

1 Electromagnetic vibrator
1 Elastic string
1 Coil spring
1 80 mm rod with fixing thumbscrew
1 Table clamp with pulley
1 Rod with hook
1 Metallic rod 10 x 750 mm
1 Base
1 Bosshead
9 masses 10 g

3014

Kit to study stationary waves 3014.1

We recommend using the signal generator cod. 5718.

Equipment supplied

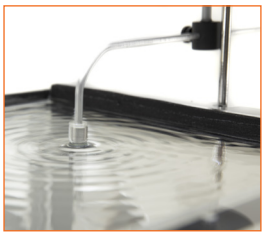
1 Vibrator
1 Elastic cord
1 Coil spring
1 80 mm rod
1 Table clamp with pulley
9 masses 10 g

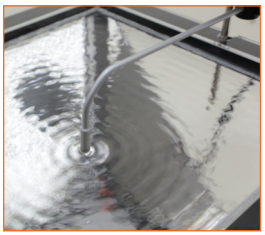
3014.1

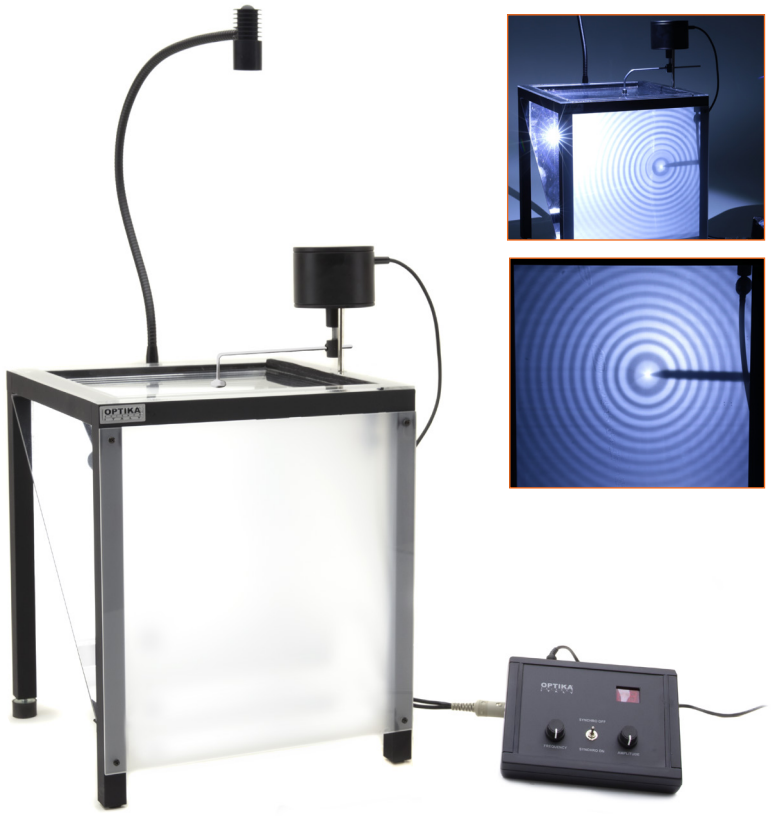
Ripple tank 3032

OPTIKA Ripple Tank has the following advantages:
-Simple to assemble
-Easy to carry out experiments
-Reliable and repeatable results
-Excellent visual resolution of the wave front

The stroboscopic lamp is fitted with an extra-bright 3W LED, which is synchronised with the surface wave generator. The control unit is equipped with a digital display and allows to set or to stop the synchronism of the vibrator with the lamp, the modulation of wave amplitude and its frequency. The vibrator is of an electro-dynamic type. The tank is provided with two adjustable feet and with an easy-to-use drain pipe ending with a tap.







Topics

- Superficial waves on water
- Wavefront
- Wavelength
- Propagation speed
- Reflection
- Refraction
- Interference
- Stationary waves
- Diffraction
- Huygens' principle

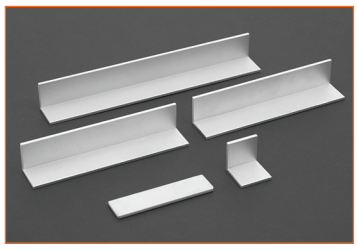
Equipment supplied

1 Ripple generator
1 Vibrator
3 Dipper
1 White LED
5 Barriers
3 Acrylic lens
1 Convex reflector

This ripple tank is delivered in a preformed polystyrene packaging.

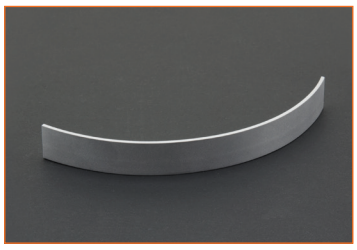
Barriers

For experiments on diffraction, reflection and for measuring wavelenght.



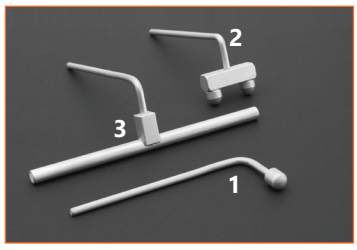
Convex Reflector

For extra experiments on reflection.



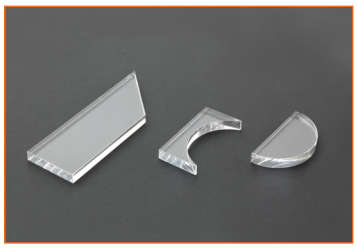
Dippers

1. Single Dipper
2. Double Dipper
3. Dipper for parallel waves



Acrylic Lens

Acrylic lens, convex
Acrylic lens, concave
Acrylic trapezium
For experiments on refraction.



3032

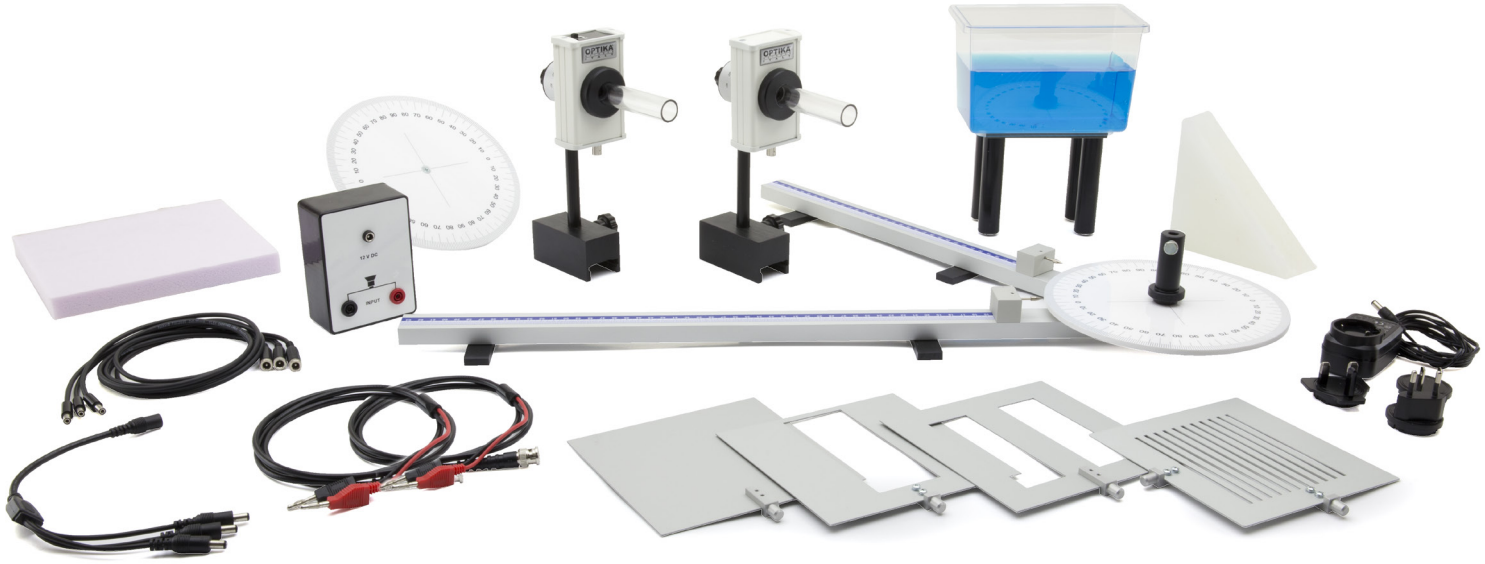
Trolley for ripple tank 3037

The truck is supplied with three drawers.

3037

Microwaves optics kit 5436

The microwave optics kit includes a transmitter, a receiver, a loudspeaker and other accessories that allow you to perform various experiences, through which you will discover how microwaves have the same characteristics as light waves and cause the same reflection, refraction and diffraction phenomena.
The presence of the protractor and the millimeter track and the ability to connect an oscilloscope Cod. 5195(not provided) to the BNC output of the receiver allow you to carry out a quantitative analysis as well.
The transmitter is equipped with a switch that allows you to choose between internal and external modulation of the carrier signal.

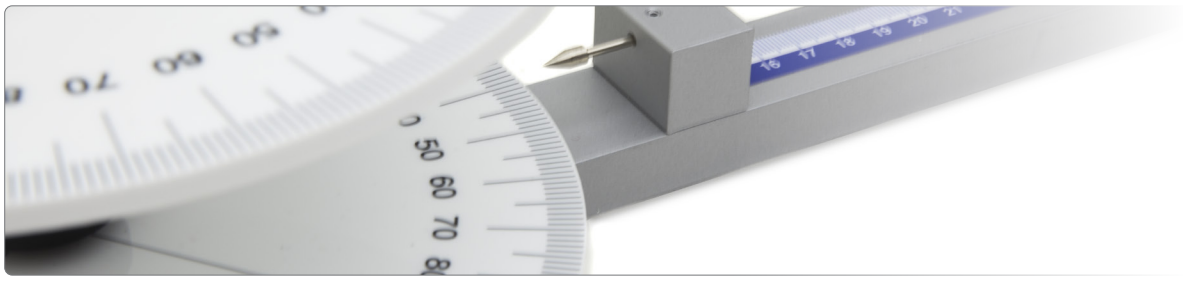


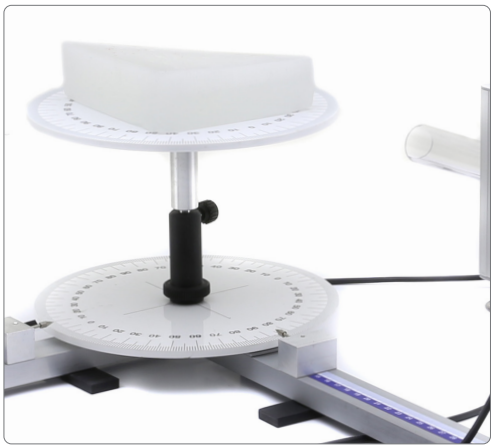
All the components shown in the picture are included.

Performable experiments

- Operational test
- Transmission and absorption by polystyrene body
- Transmission and absorption by water
- Transmission and absorption by the human body
- Transmission and absorption by a metal body
- Microwaves reflection
- Microwaves refraction
- Total reflection of the microwaves
- Microwaves polarization
- Microwaves polarization plane
- Diffraction due to a slit
- Diffraction due to a double slit (Young's experiment)

This microwaves kit includes one transmitter, one receiver and several accessories.
It is useful to study several experiments on microwaves:
it allows students to observe that microwaves have the same characteristics of light waves and they result in the same phenomena as
reflection, refraction and diffraction.



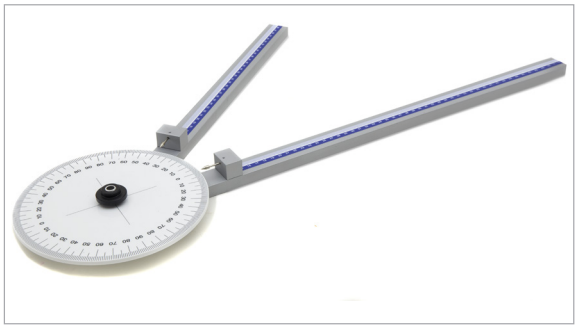


Transmitter
- power supply: 12 V - 1.5 A DC
- carrier wave frequency: 10.5 GHz
- wavelength: 2.85 cm
- switch between IM and EM
- BNC input

Internal modulation mode (IM)
- square wave
- modulation frequency: 676 Hz

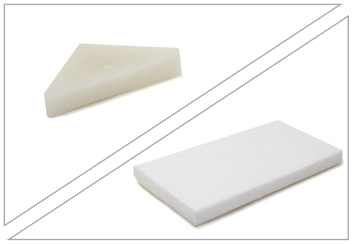
External modulation mode (EM)
- allowed frequency range: 100 Hz - 20 MHz
- max amplitude: 5 V peak to peak

Receiver
- power supply: 12 V - 1.5 A DC
- max operational distance: 1.5 m
- BNC output



Jointed bench
Microwave aluminium bench with two arms, respectively 500 mm and 650 mm long.
Provided with plate holder and protractor to perform quantitative measurements.

Paraffin prism
Useful to practice experiments on microwave refraction.

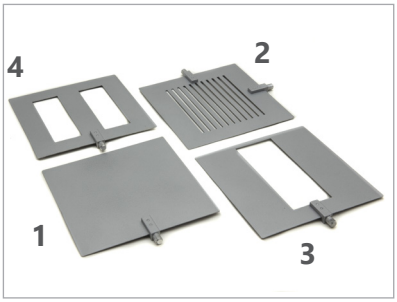


Polystyrene body
For experiments on microwave absorption.

Set of 4 metal plate

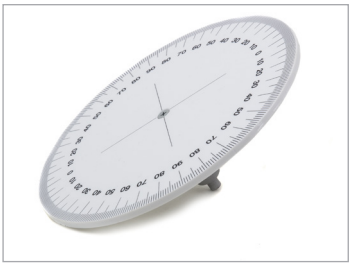
Dimension: 155x155 mm

1. Reflection plate
2. 11 slits grating plate
3. Single 50 mm slit plate
4. Double slit plate, single slit: 35 mm



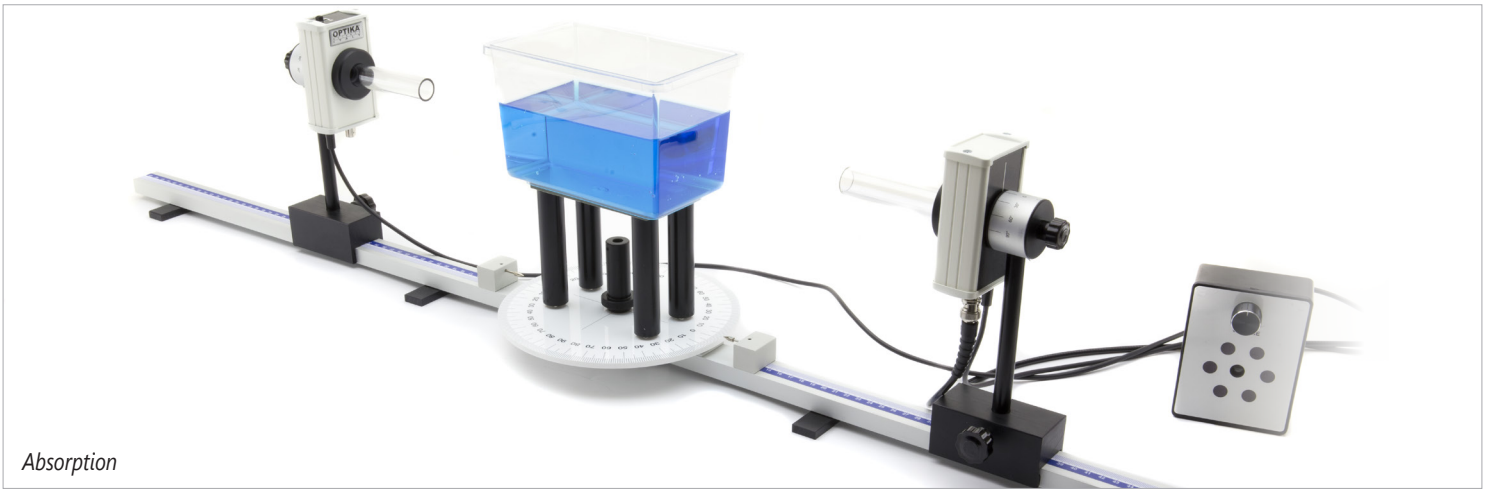
Protractor

With an accuracy of 1°.
The graduated scale is screen-printed on a polycarbonate plate for a simple and quick measurement reading.

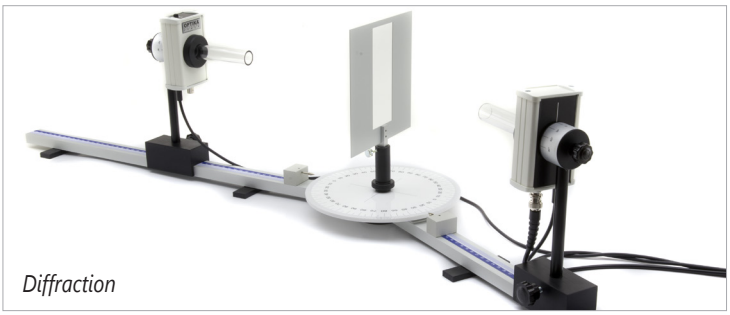


Water tank

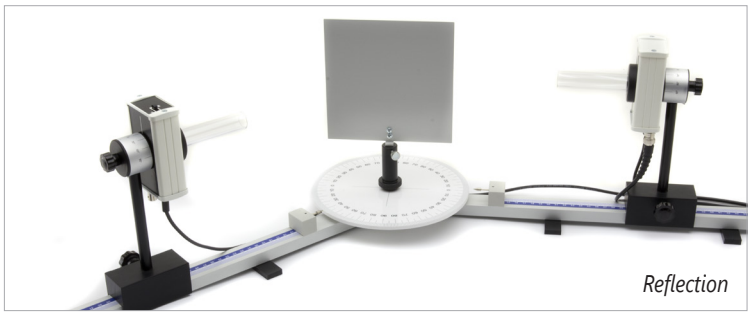
Useful to practice experiments on microwave absorption.



Absorption



Diffraction



Reflection

5436

Set of 8 tuning forks 3020

The items are made of chrome steel, with different length and section of 4.0x7.5 mm. Hz frequencies : 256(DO) - 288 (RE) - 320 (MI) - 341,3 (FA) -384 (SOL) - 426,6 (LA) - 480 (SI) - 512 (DO) Hz.
Suitable for demonstrating the tones-frequencies relationship.

3020

Tuning fork 3003

Oscillation frequency: 440 Hz. It is supplied with resonance box and hammer.

3003

Couple of tuning forks 3029

Oscillation frequency: 440 Hz. With resonance box, hammer and spare mass for beats.

3029

One-string metallic sonometer 3115

This instrument is composed of a single string, placed over a resonance box and fixed at both ends. The string is laid on an intermediate bridge which can be moved so that the sound reaches different frequencies.
The monochord was already used by Pythagoras in the 6th century B.C. to study acoustics.

3115

Vibrant bell 3002

The pendulums oscillate when the bell is hit with the hammer, thus demonstrating that the sound is generated by the bell's vibrations. Height 40 cm.

3002

Acoustic resonance apparatus 3010

By acting on the discharge tap of a tube full of water, it is possible to let the air column above the liquid enter in resonance with the tuning fork.

3010

Digital phonometer 3031

This instrument is easy-reading and it is particularly indicated for schools.
Range:
low values: 35 to 100 dB.
high values: 65 to 130 dB.
Resolution: 0,1 dB.
Accuracy: 1,5 dB.
Frequency: 31,5 to 8 kHz.
DC/AC output for external voltmeter.
With battery.

3031

2,5W, Loudspeaker 3017

Supplied with two bushings for the connection to the oscillationso generator code 3016 or 5718.
Impendance: 8 Ω.

3017

0,5W, Loudspeaker 3021

With stand (10 mm) in order to be housed on a base (code 0010). To be used with the oscillation generator code 3016 or 5718.
Impedance: 8 Ω.
Base not included.

3021

Piezoelectric microphone 3022

With stand (Ø 10 mm); predisposed to be linked to the amplifier. Base not included.

3022

Signal generator acoustic frequency 3016

Frequency field: 5Hz - 50 kHz on 4 ranges.
Variable amplitude continuously 0-8 V peak-to-peak.
Undistorted output power: 1 W (into 8Ω load). It is supplied with two 60 cm long cables.

3016

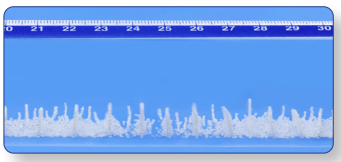
5W, Amplifier for code 3022 3114

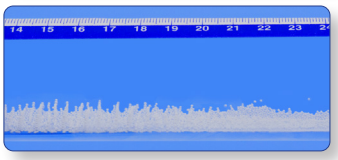
Power: 5W. You can use it also with loudspeakers code 3017 and code 3021

3114

Kundt's tube 3008

The incident acoustic wave interferes with the reflected one, creating the stationary waves. The polystyrene balls visualizes nodes and bellies, so making wavelength measurement possible. Now, knowing the frequency, you can measure the acoustic waves' speed in the air. The item is supplied with tube, stands and bases, piston and the polystyrene balls spreader. It must be used with a loudspeaker code 3017 and an oscillation generator code 5718 sold separately.





3008

Apparatus to measure acoustic waves' velocity in air 3034

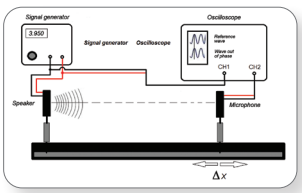
This equipment can measure the speed of sound measuring the displacement Δx between the loudspeaker and microphone to ensure that between the two waves, initially in phase, there is a delay time equal to the period of oscillation T or a multiple of T. The speaker is connected to the function generator that produces a sinusoidal signal of known frequency displayed on channel 1 of the oscilloscope. The output signal from the microphone receiver is instead displayed on the channel 2 of the oscilloscope. Changing the distance between the loudspeaker and microphone the two signals could be initially in phase. In practice, this is possible keeping the speaker fixed and moving the microphone, or vice-versa.

Equipment supplied

1 Bench 50 cm	1 Microphone with amplifier
2 Holders	2 Leads
1 Loudspeaker	2 BNC Leads

Equipment required, not supplied

1 Acoustic signals generator code 5718
1 Double traces oscilloscope code 5195



Using the bench you can measure the distance λ (wave length) at which the delay is a period T. So:

$$v = \frac{\lambda}{T}$$

3034

Crookes' radiometer HS7610

The radiometer's whirl starts to spin when exposed to a light source; the greater the intensity of the radiation, is the quicker it spins around. This fact is due to the gas particles inside the radiometer: when they hit the black sides of the whirl's paddles, which are warmer than the white sides because of a greater light-absorbent power, the particles bounce quicker and, therefore, give an impulse which is greater than the one given to the white sides. Thus the whirl's rotation is generated.

HS7610

Gases' kinetic model 2110

With this model it is possible to simulate the thermal temperature related movements of gases' particles. In the vertical cylinder there are very small balls agitated by a piston; the latter is linked to a vibrator with an electric motor (3-6 V) whose speed can be djusted.
It is provided without power supply.
The purchase of the power supply - code 4991 - is recommended.

2110

Ball and ring apparatus 2076

With the following experiment we can verify the thermal expansion of a metal.

2076

Bi-metallic strip 2062

Two foils fixed together, made of iron and copper, expand in different ways, causing the strip to bend.

2062

Ball and ring apparatus, with stand 2070

In order to prove the volumetric thermal expansion.
It can be used with the alcohol (or gas) burner.
Height: 30 cm.

2070

Dilatometer for liquids and gases 2137

With this simple apparatus it is possible to determine the thermal expansion coefficient of liquids and of air. The proposed experiments can be carried out using the temperature sensor (not supplied) Cod. 12903-00

2137

Precision linear expansion apparatus 2095

The precision linear expansion apparatus is provided with two metal hollow rods of different materials that are heated by the steam passing through them. The linear expansion of the different metals is measured using a dial gauge, while temperature is measured using a thermometer placed in contact with the rod.
In this way students can obtained all the information necessary to calculate the coefficient of linear thermal expansion.

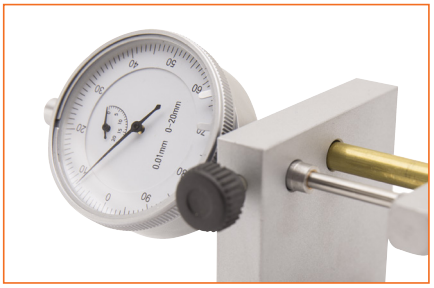
Equipment supplied

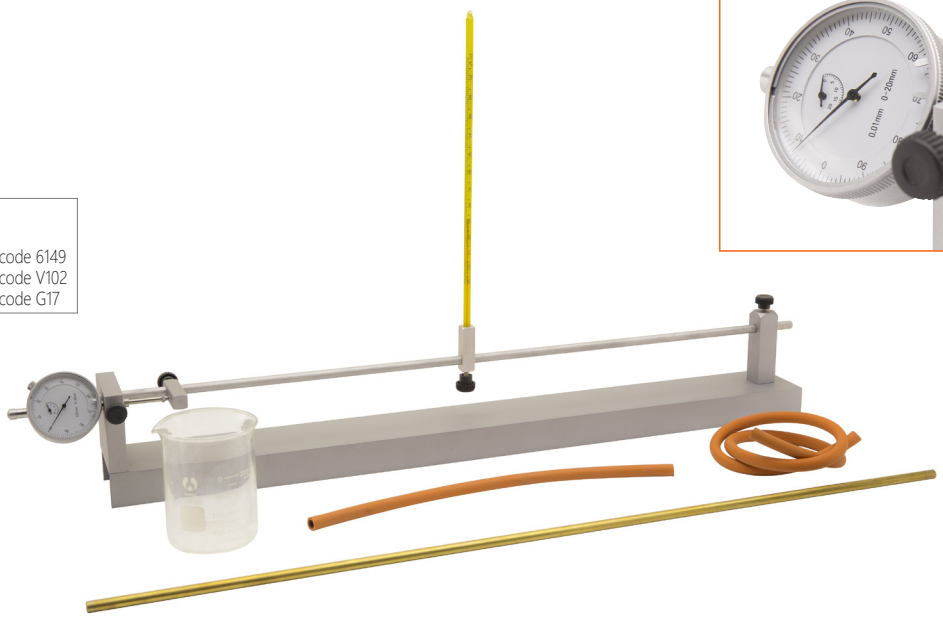
1 Linear expansion apparatus
1 Aluminum rod 700 mm
1 Brass rod 700 mm
1 Dial gauge 0-10 mm, 0.01 mm
1 Thermometer
1 Beaker
2 Silicone tube 50 cm

Equipment required, not supplied

Steam generator kit:

1 Heating plate	code 6149
1 Filtering flask	code V102
1 Rubber stopper	code G17





2095

Linear expansion apparatus 2046

To prove the thermal expansion of a bar. It works with cotton wads soaked in denatured alcohol and it is supplied with three rods: iron, brass and aluminium.
Dimensions: 30x13 cm.

2046

Specific heat kit 2030

It allows you to calculate the ratio between Q (heat supplied) and T (temperature increase). The proposed experiments can be carried out using the temperature sensor (not supplied) Cod. 12903-00.

Equipment supplied

1 Aluminium cylinder 800 g	1 Base
1 Copper cylinder 800 g	2 Insulated handles
1 Brass cylinder 800 g	1 Thermometer
1 Iron cylinder 800 g	1 Case
1 Electric heater 12V	

Equipment required, not supplied

1 Balance	1 Power supplier (max 3V; 2A cc)
1 Voltmeter	5 Leads
1 Ammeter	1 Stopwatch

2030

Set of 4 samples with equal volume 2036

For the measurement of specific heat through water calorimeter up to 350 ml. They are made of iron, brass, aluminium and PVC. Dimensions: Ø 20 mm. Height: 50 mm.

2036

Set of 4 samples with same mass 2087

For the measurement of specific heat through 1000 ml water calorimeter. They are made of iron, brass, aluminium and PVC. Mass about 500 gr.

2087

Electric calorimeter 200 ml 5283

The item is supplied with two stoppers; one stopper has an electric resistor. Maximum voltage: 6V. Supplied with thermometer and stirrer. Aluminium packaging. Capacity 200 ml. The proposed experiments can be carried out using the temperature sensor (not supplied) Cod. 12903-00.

5283

Thermoscope 4/T

It is suitable for experiments on the thermometer calibration. Length: 30 cm.

4T

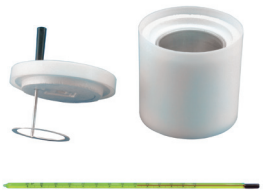
Thermal conductivity apparatus 2131

It is composed of 5 tubes, of different metals (aluminum, brass, copper, stainless steel, iron). If you heat the central cylinder on a flame, the pieces of wax placed at the ends of the tubes melt down at different times.

2131

Water calorimeter 350 ml 2099

This item is suitable for measuring the specific heat of solid and liquid samples. It is supplied with thermometer and stirrer. Plastic material packing. High thermal insulation. External dimensions: Ø130 mm, height 130 mm. Capacity: 350 ml. The proposed experiments can be carried out using the temperature sensor (not supplied) Cod. 12903-00.



2099

Water calorimeter 1000 ml 2056

Supplied with thermometer and stirrer and has double aluminium walls insulation from heat.
Dimensions: Ø 150 mm. Height: 150 mm.
The proposed experiments can be performed using the temperature sensor (not supplied) Cod. 12903-00.

2056

Electric calorimeter 350 ml 8201

Suitable for the verification of Joule's law; capacity 350 ml. It is supplied with two resistors you can use alone or in series. Maximum working voltage: 6V. Supplied with stirrer and thermometer. The proposed experiments can be performed using the temperature sensor (not supplied) Cod. 12903-00.

8201

Kit to study processes to achieve thermal equilibrium 8202

Through the use of two temperature sensors, this item lets you study how the transfer of heat occurs between two bodies, solids or liquids, with different initial temperature. As in each balance phenomenon, the warmer body gives heat to the colder body until the cancellation of the thermal difference. The Law, states that the temperature of the warmer body varies over the time is exponentially decreasing, while the Law according to which the temperature of the colder body increases is exponentially increasing. It is possible to establish an analogy with the water balance phenomenon and electric balance.

Topics

- Thermal equilibrium between two bodies with the same thermal capacity;
- Thermal equilibrium between two bodies with different thermal capacity.

Equipment supplied

1 Thermostatic container, capacity 350 ml
1 Alcohol thermometer
1 Hollow aluminium cylinder wire, mass 400 g
1 Aluminium cylinder to be inserted into the previous one , mass 400 g
1 Brass cylinder to be inserted into the hollow cylinder, mass 1000 g
2 PVC hose

Equipment required, not supplied

1 Heating plate code 6150 1 Balance

Equipment for online use - not supplied

1 Interface code 9001
2 Temperature sensor code 9061
or
2 USB Temperature sensor cod. 9085
or
2 Bluetooth Temperature sensor cod. 12903-00

Suitable to be used with sensors

8202

Heat dissipation kit 8206

With this kit and two temperature sensors (not supplied with this kit), it is possible to compare the different speeds at which two bodies with the same mass and the same initial temperature dissipate heat. The dissipation is quicker when the exposed surface is bigger and it is decelerated if the body is protected by a heat-insulating material.

Topics

- Study of a body cooling according to its thermal capacity;
- Study of a body cooling according to its surface;
- Study of a body cooling according to the difference of temperature compared to the environment;
- Study of a body cooling according to the interaction with the surrounding air.

Equipment supplied

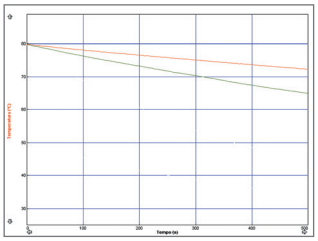
1 Brass cylinder with hook
2 Aluminium cylinders with hook
1 Aluminium thermal radiator
1 Insulating-material tube
1 Handle
1 Hardboard support plate

Equipment required, not supplied

1 Heating plate code 6150
1 Balance

Equipment for online use - not supplied

1 Interface code 9001
2 Temperature sensor code 9061
or
2 USB Temperature sensor cod. 9085



Cooling bend of two cylinders with the same size but made of different material: brass (red) and aluminum (green).

Suitable to be used with sensors

8206

Device to study thermal conductivity in solids 8203

The propagation of heat in solids occurs by conduction. The speed at which the heat spreads varies according to the substance. As regards metal, the speed is high while in other substances such as glass or plastic, it is very low. For this reason metals have been defined good conductors of heat.
Thermal conductivity can be studied thanks to this kit using three temperature sensors. An aluminium rod, a brass rod and a PVC rod, with a temperature sensor connected to each of them, are immersed simultaneously in a glass containing warm water. It is possible to observe the heat propagation speed difference between each rod.

Topics

- Comparison of the thermal conductivity of three different materials, both during heating and cooling;
- Comparison of thermal sensations and actual temperature measurements.

Equipment supplied

1 Beaker 400 ml with base
1 PVC disk with three holes
1 Aluminum rod
1 Brass rod
1 PVC rod

Equipment required, not supplied

1 Heating plate code 6150

Equipment for online use - not supplied

1 Interface code 9001
3 Temperature sensor code 9061
or
3 USB Temperature sensor cod. 9085

Suitable to be used with sensors

8203

Thermology kit 8212

Thanks to these items it is possible to perform some experiments related to thermal phenomena. For data collection and representation, 3 temperature sensors are enough. The real-time data acquisition system allows to obtain a graph of the temperature as a function of time during many thermal phenomena, which are essential to the Physics' program in secondary schools, for example, thermal balance, heat propagation, state changes, etc.

Topics

- Relation between heat and temperature
- Thermal equilibrium
- Thermal equilibrium
- Heat capacity in solids
- Cooling
- Thermal conductivity
- Greenhouse effect
- Evaporation
- Boiling
- The solidification and fusion.

Equipment supplied

1 Electrical calorimeter
4 Metallic samples
1 Kit for thermal balance
1 Kit for conductivity
1 Kit for cooling
1 Glass flask 250 ml
2 Rubber caps
1 Base
1 Metal rod
1 Clamp with clamp
1 Bottle of denatured alcohol
1 Glass tube
2 Lead cables
1 400 ml beaker
1 Bosshead
1 Thermometer -10 ° + 110 ° C

Equipment required, not supplied

1 Power supply
1 Heating plate
1 Electronic scale accuracy 1g
1 Table lamp 100 W
1 Timer
1 Distilled water
1 Sodium chloride
1 Vaseline oil

Equipment for online use - not supplied

1 Interface code 9001
3 Temperature sensor code 9061
or
3 USB Temperature sensor code 9085
or
3 Bluetooth Temperature sensor code 12903-00

Suitable to be used with sensors

8212

Gas thermometer 8209

In a gas thermometer, temperature readings are practically independent from the aeriform contained in the volume in which an isochoric process transformation (the variation in pressure and temperature at a constant volume) is produced if pressure and temperature conditions allow you to consider the aeriform used to be perfect. The kit consists of an aluminium container, with a capacity of about 330 cc, immersed in a glass container. Pressure and a temperature sensors allow you to characterize the system's evolution when it is heated or cooled. The straight line p = f (T) defined by the experimental data is the calibration curve of the air thermometer. The temperature value which is obtained extracting the graph up to the value p = 0, indicates that there is a temperature minimum value which is physically meaningful.

Topics

- Verifications of the Gay-Lussac Law
- Absolute zero
- The gas thermometer

Equipment supplied

1 Rubber tube
1 Beaker, 1000 ml
1 Base
1 Aluminium container with bung
1 Cover supporting the sensors

Equipment required, not supplied

1 Heating plate code 6150

Equipment for online use - not supplied

1 Interface code 9001
1 Temperature sensor code 9061
1 Pressure sensor code 9034
or
1 USB temperature sensor code 9085
1 USB pressure sensor code 9136

Suitable to be used with sensors

8209

Joule's effect apparatus 5711

It is a kind of electrical calorimeter with double transparent walls. It is possible to change the resistor without taking out the water. Working voltage:6V D.C. Resistors: 5 ; 10 Ohm. Capacity: 800ml.
The proposed experiments can be performed using the temperature sensor (not supplied) Cod. 12903-00.

5711

Apparatus for the measurement of the mechanical equivalent of heat (Callendar machine) 2055

This apparatus is composed of a 7 cm long brass calorimetric cylinder width 5 cm and supported by ball bearings. A copper ribbon is rolled around the cylinder and retained by a spring; a 5 kg weight hangs from it. Because of the friction between the ribbon and the cylinder during the rotation, the water inside the cylinder warms up. If you measure the work done and the heat produced, it is possible to determine the mechanical equivalent of heat.
The apparatus is supplied with boss-heads and 1/10 degree digital thermometer.

Questo cilindro calorimetrico, in ottone, può essere facilmente montato e smontato dal perno dell'apparecchiatura.

2055

Convection apparatus 2058

Glass spare part of code 2058 2058.1

This apparatus allows to see how heat transmission happens through convection, in liquids. Through the upper opening, you have to introduce into the tube a small amount of glitters (approx. 1 g) and then seed oil (approx. 150 ml, not supplied). By heating the bottom of the tube, it will be seen that glitters spread circularly. Alcohol burner to be purchased separately.

2058 - 2058.1

Absorbent and emitting powers apparatus 2031

It is supplied with 3 aluminium bodies.
One body is black-black, another is black-white and the last one is white-white.
If you expose them to the energetic flux of the light bulb, you can verify how the absorbent power and the emitting power depend on the colour of the surface.

2031

Kit to study radiation 8205

The heating of a body occurs when it is exposed to electromagnetic radiation, and it depends on its surface, on its mass and its absorption power. Exposing two disks, with different characteristics, at a radiation flow emitted by the same source (the sun, or simply a lamp – not supplied), it is possible to observe in real time the different temperature trend.

Topics

- Comparison between the absorption power of a disc with two polished faces and that of a disc with a polished face and a blackened face;
- Comparison between the absorption power of a disc with two polished faces and that of a disc with two blackened faces;
- Comparison between the absorption power of a disc with two blackened faces and that of a disc with a polished face and a blackened face;
- Verification of the irradiation Law as a function of distance.

Equipment supplied

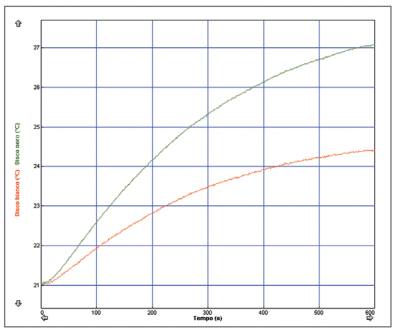
1 Platform with two adjustable supports	1 Aluminium disc with two blackened faces
1 Aluminium disc with two polished faces	1 Aluminium disc with a polished face and a blackened one

Equipment required, not supplied

1 Lamp 100 W

Equipment for online use - not supplied

1 Interface code 9001	or
2 Temperature sensor code 9061	2 USB temperature sensor code 9085



Two identical aluminium discs, a black-painted one and a polished one, are exposed to the light of a 100W lamp. A temperature sensor located on the discs demonstrates that the absorption coefficient of the black disc (green) is higher than the coefficient of the polished disc (red).

How to use the equipement

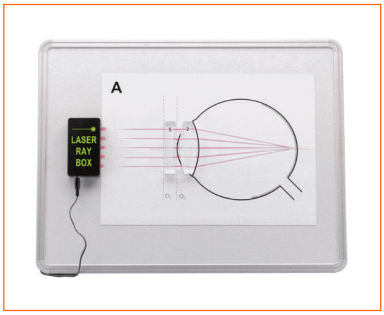
Suitable to be used with sensors

8205

Geometrical optics with pentalaser - version with magnetic board and red pentalaser 4095

These two collections allow very effective demonstrations of geometrical optics. They include a metallic board with back holder, a series of 6 magnetic plastic-coated tables with assembly schemes, a set of 3 mirrors, a series of 10 plexiglas optical bodies and a red pentalaser, all equipped with a power supply. Since the components are provided with a magnetic base, experiments can be made both horizontally (by students) and vertically (by teachers), taking advantage of the magnetic board.
Board dimensions: 45×60 cm.

10 feasible experiments

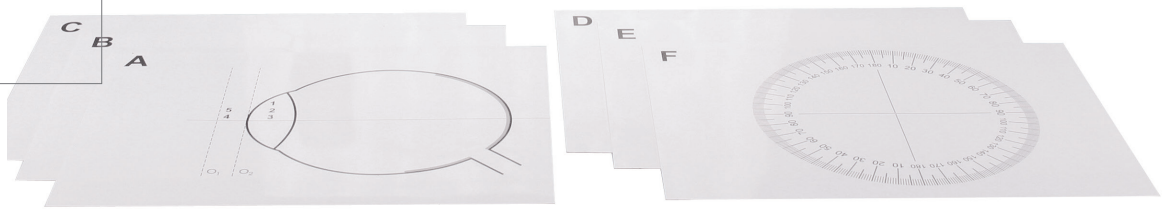


Topics

- Reflection and its laws
- Reflection in the concave spherical mirrors
- Reflection in the convex spherical mirrors
- Refraction and its laws
- Total reflection
- Refraction in the prisms
- Refraction in convex lenses
- Refraction in concave lenses
- Eye and its defects
- Optical instruments

Equipment supplied

1 5-Ray laser generator with power supply
1 Magnetic board
1 Plane mirror
1 Concave mirror
1 Convex mirror
1 Plate with parallel sides
1 Plane-cylindrical lens, diameter 150 mm
1 Plane-cylindrical lens, diameter 90 mm
1 Prism
4 Biconvex lenses
1 Biconcave lens
1 Plane-concave lens
6 Magnetic boards: A-B-C-D-E-F



4095

Geometrical optics kit with laser ray box 5607

Geometrical optics kit with laser ray box - Magnetic version with board 5609

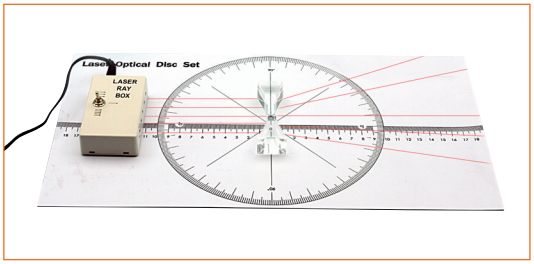
With this kit you can easily and quickly perform all basic geometrical optics experiments. The laser ray box is endowed with a switch which allows three different beam configurations (1-3-5). The high-quality optic bodies allow you to observe the trajectory of reflected and refracted beams. Because of its good quality/price ratio and because of the number and quality of possible experiments, this kit represents the best solution for geometrical optics experimentation for primary and secondary school.
Board dimensions: 45×60 cm.

Topics

- Pentalaser
- Reflection's laws
- The reflection in concave mirrors
- The reflection in convex mirrors
- Refraction's laws
- The refraction across a plate with plane and parallel faces
- The converging lenses' refraction
- The divergent lenses' refraction
- Measure of the liquid refraction index
- Total reflection
- Total reflecting prisms
- The periscope

Equipment supplied

1 Pentalaser with its power supply
1 Flexible mirror
1 Plate with plane and parallel faces
1 Semicircle lens
1 Converging lens
1 Diverging lens
1 Hollow semicircle
1 Rectangular prism
1 Trapezoidal prism
2 Rubber gloves
1 Cleaning cloth
1 Magnetic board (included only in code 5609)
1 Case



5607 - 5609

Red laser ray box 4328

The optic source is composed of 5 parallel laser. Through a smart solution, the light beams from the laser, which have circular section, are turned into linear section rays, i.e. into mono-frequency light blades; these light blades allow the performance of all main geometrical optics experiments.
A switch enable you to select different combinations, from 1 to 5 rays,in order to choose the most suitable configuration for the experiment.
Power supply included.

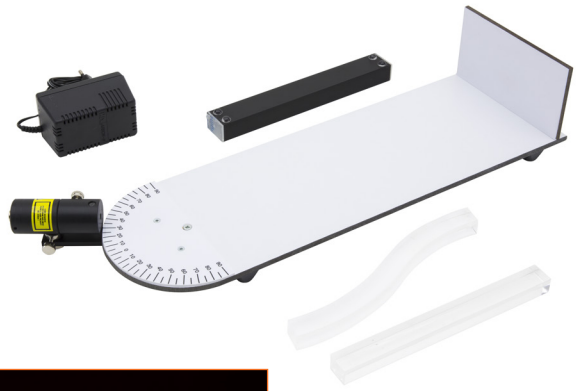
4328

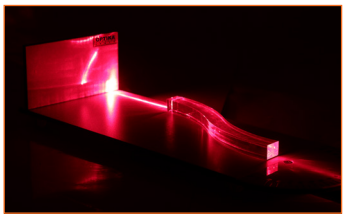
Optical fibre kit 4329

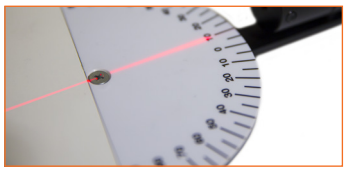
This educational model allows the observation of a wave guide's behaviour and the measurement of the numeric opening of an optical fibre as the refractive index of the mantle varies (air, water, alcohol).

Equipment supplied

1 Base with protractor and screen
1 Laser diode with turnable stand
1 Plexiglas basin
1 Plexiglas panel
1 Plexiglas curved silhouette







4329

Flat mirror 4077

It shows the simmetry of images.
Dimensions: 70x120 mm

4077

Optic prism 4032

The prism is made of a glass with a high refraction index, in order to show the phenomenon of white light's decomposition. Stand included. Dimensions: 10x2.5x2.5 cm.

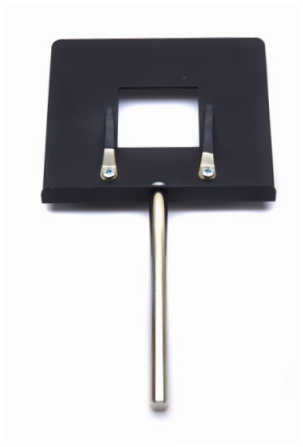
4032

Set of 6 glass lenses 4201

It shows the properties of different types of lenses: bi-convex, plane-convex, meniscus-converging, bi-concave, planediverging and meniscus-diverging. Lenses diameter:50 mm.

4201

Filter holder 4390



4390

Lens holder 4363

The item supports lenses and circular mirrors.

4363

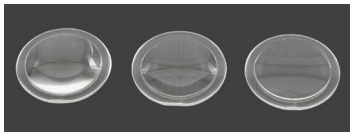
Concave and convex mirror 4061

Focus+/-10 cm. Diameter 5 cm
To be mounted on lens-holder code 4363.

4061

Set of 3 plexiglass lenses 4060

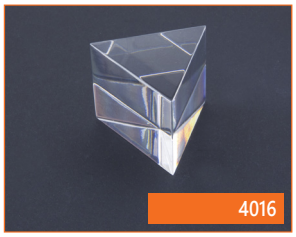
Focus +6, +10, -10 cm. Diameter 5 cm
To be mounted on lens-holder code 4363.

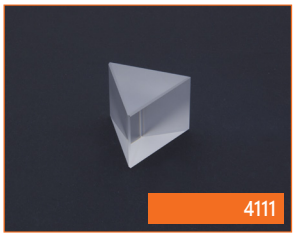


4060

Prisms

Plexiglass equilateral prism 40x40 mm	**4016**
Crown glass prism. Faces dimensions: 32x32 mm. Equilateral, n_D = 1,55	**4111**
Flint glass prism. Faces dimensions: 32x32 mm. Angle 60°, n_D = 1,67	**4112**
Hollow equilateral prism: The item allows the performance of experiments on refractometry of liquids. Sides dimensions and height: 45 mm.	**4144**





Set of 7 optical bodies 4158

Equipment supplied

- 1 Trapezoidal prism
- 1 Rectangular Prism
- 1 Adjustable concave-convex mirror
- 1 Bi-concave lens
- 1 Isosceles prism 45°-45°-90°
- 1 Semi-circular prism
- 1 Bi-convex lens
- 1 Protractor

4158

LED light source 4361

This projector has a white LED as a light source. It comes with a power supply. Base not included (hole Ø 10 mm).

4361

Solar Focometer 4357

This device allows easy and accurate measurement of the focal length of converging and diverging lenses, taking advantage of solar radiations.

4357

Projector of optical rays and color mixer 4129

This fundamental item for the study of light phenomena, is composed of a rectangular case (175x90x55 mm) containing a lamp with vertical filament (12V - 36W) placed in the upper part. A system of cylindrical converging lenses enables you to obtain converging, diverging or parallel light beams.
On the front of the case there are three windows with clasps, whose internal part are mirror-like and endowed with guides for inserting diaphragms and other colour filters. All equipment is contained in a plastic case. Power-unit included.

Topics

- Law of reflection
- Refraction in diverging lenses
- Reflection in mirrors
- Refraction in prisms
- Laws of refraction
- Dispersion of white light
- Total reflection
- Filters
- Refraction in a plate
- Primary and secondary colours
- Refraction in converging lenses
- Colour composition

4129

Digital luxmeter 4125

To measure illuminance.
Digital 4-colour LCD display.
Measurement range: 0 ~ 200kLux, 0 ~ 20kFc.
Resolution: <1000:0,1 >1000:1.
Accuracy: ± 3% reading ± 8 digits (<10,000 lux).
± 4% reading ± 10 digits (>10,000 lux).
Temperature range: -20°C ~ 70°C.
Temperature accuracy: ± 1.5°C/2.7°C.
Power supply: 3x1.5V AAA batteries.

4125

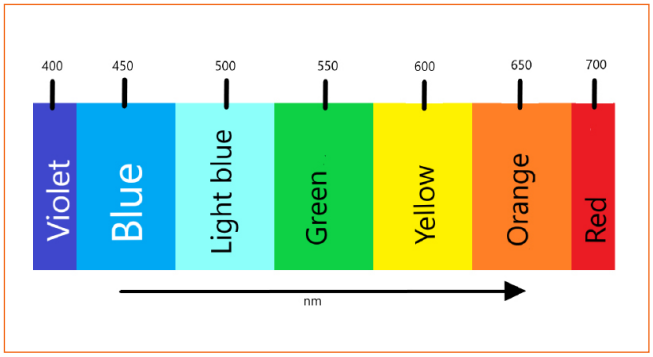
The principle of digital imaging 5335

This instrument is thought for experimenting and carrying out measurements on what physically lies at the basis of the digital imaging.
The main objective is to understand, also quantitatively, the connection between the digital features
and the physical quantities involved in the coloring menaging of a PIXEL, that is the unit of the digital imaging.

Dimensions:
188.5x133.5x76.5 cm

Topics:

- LIGHT. Fundamental Properties
- ADDITIVE COLOR THEORY. WHY and HOW?
- LEDs. What are they? How do they work?
- RGB LANGUAGE. Connection between Digital and Physical worlds
- ELECTRONICS. What happens into the Circuit?
- PIXEL. So simple now!



5335

Hand Newton's disk 4048

If the cranck handle is spined, the disk looks
like it's white because of the
light recombination.
Disk diameter: 17 cm.

4048

Electric Newton's disk 4200

The item is linked to an electric motor which is powered by voltage
of 6 Vdc. It is supplied with 5 disks to show the additive colour synthesis. Power
supply not included.

4200

Transparent coloured spades 4135

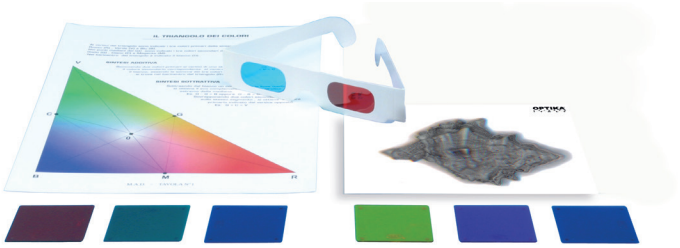
Six different colours. Superimposing the spades and exposing them to a light source, it is possible to learn the concept of primary and secondary colours.

4135

Colours and vision Kit 4015

Equipment supplied

1 Set of 3 primary colour filters;
1 Set of 3 secondary colour filters;
1 Chart with colour triangle;
1 Chart with stereoscopic figure
1 Pair of stereoscopic spectacles



4015

Disks for Newton's rings 4116

Couple of glass disks; one has plane, parallel faces; the other has a slightly spherical curve. They are superimposed so to produce Newton interference rings, which are monochromatic if you use laser light and become coloured if you use white light. Disk diameter: 55 mm.

4116

Additive colour synthesis apparatus 4352

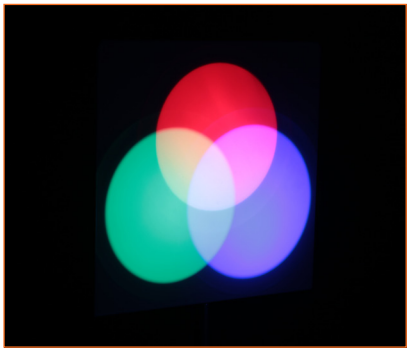
With this apparatus it is possible to perform the additive colour synthesis of the primary colours : red, green and blue. The apparatus is composed of 3 led projector, whose intensity can be changed with continuity. In this way it is possible to obtain the white colour and all the other colours of the colour triangle.

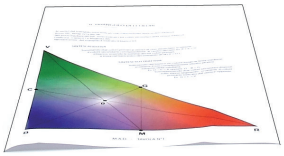
Topics

- Binary colour synthesis
- Complementary colours
- The trichromatic coordinates
- Colour triangle
- Colour reproduction

Equipment supplied

3 led projector: red, green, blue
1 Stand
1 Power-unit
1 Tripod base
1 White screen
1 Colour triangle chart





4352

Fresnel's double prism 4115

Double prism with very small refractive angle, obtained from a whole block of glass. Insert it in a thin light beam and it refracts the beam's two halves, superimposing them to generate interference fringes.

4115

Red diode laser device with magnetic base and lens 4354

This continuous emission laser device is supplied with a lens to obtain a linear ray of light. Moreover base and battery-holder are supplied with magnets in order to be applied to a magnetic blackboard.
Wavelength : approx. 635 nm.
Power: 1mW.

4354

Diaphragm with 1 slit 4104

On a frame 50x50 mm, to be mounted on filter-holder code 4390.
Slit width: 0.1 mm.

4104

Diaphragm with 2 slits 4105

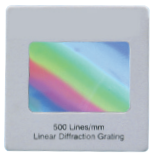
On a frame 50x50 mm, to be mounted on filter-holder code 4390.
Slit width: 0.1 mm.

4105

Diaphragm gratings

On a frame 50x50 mm, to be mounted on filter-holder code 4390.

80 lines/mm	4106
500 lines/mm.	4212
1000 lines/mm.	4213



4106 - 4212 - 4213

Set of 3 diffraction gratings 4143

100 Lines/mm
300 Lines/mm
600 Lines/mm

4143

Red diode laser device with stand 4207

Continuous emission device with power-unit.
Visible up to 35 m; power: < 1 mW; wavelength : 635 nm.
It is supplied with a removable lens which is able to turn the circular section of the ray into a linear one.
Jointed stand diameter: 10 mm.
Supplied with base and transformer.

4207

Green diode laser device with stand 4151

It has a continuous emission; power-unit included.
Power: 3mW; wavelength: 532 mm.
It is supplied with a lens to obtain a linear trace.
Adjustable stand diameter: 10mm.
Supplied with base and transformer.

4151

Kirchoff-Bunsen's spectroscope 4028

The item is mounted on a circular metal platform, it is composed of: 1 collector with adjustable slit, 1 collector with graduated scale and 1 collimator with 2 interchangeable eyepieces. The slit of the collector is supplied with a small prism which allows you to compare the spectrum of two different sources. While the collector, equipped with achromatic objective, is fixed to the platform, the collimator can rotate on an alidade, keeping the directional axis in the centre of the apparatus. The collector with graduated scale requires a small white light source to project the image of the scale in the eyepiece of the collimator by means of the reflection on a face of the prism. The equilateral prism made of highly dispersive material. With this device you can study the spectrum of a source of monochromatic or polychromatic light. We recommend the use of interferential filters to the check of the wavelength.

4028

Spectrometer 4209

This instrument has very good optic and mechanical features which allow the exact measurement of the optical ray deviation angles; therefore it can determine the refractive index of solids and liquids and the wavelength of monochromatic sources.
Base: made of firevarnished cast-iron. Goniometer: Ø 17.5 cm and divided in 360° with a precision of 1°.
It is equipped with a vernier, which allows to measure with an accuracy of 1/10°.
Telescope: it has achromatic objectives with an 178 mm focal length and an eyepiece 15x. Focusing allows fine regulation.
Collimator: endowed with achromatic objective with 178mm focal length and with a steady adjustable slit up to 6 mm.
Plane of the prism: it can be adjusted both vertically and horizontally and it is supplied with boss-heads for the fixing of the diffraction grating. Diameter: 80 mm. Equipment: 1 Crown glass equilateral prism 32x32 mm; 1 diffraction grating 500 lines/mm; 1 magnifying lens.
Dimensions: 48x33x33h cm. Weight: 1,2 Kg.
The purchase of the diffraction gratings 80 lines/mm and 1000 lines/mm is suggested to verify the variation of the spectral resolution.

4209

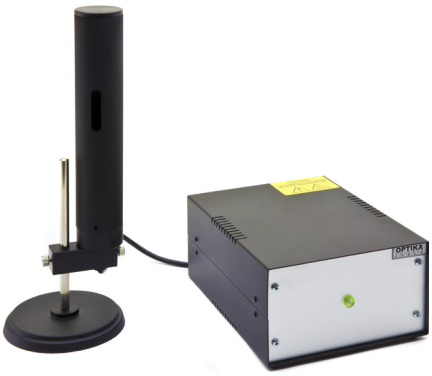
Light source for spectroscope 4326

When the item is placed in front of a tube with graduated scale, it illuminates the scale , thus allowing the operator to read the wavelength of the spectrum rows. The base is sold separately (code 0010).

4326

E27 Spectrum lamps holder with power unit 4035

The item is composed of a lamp-holder with lamp-shade, whose height is adjustable in order to allow a perfect allignment with the collimator of the spectroscope. Power supply is provided.



4035

Spectrum lamp 8 PIN

These lamps are the most convenient light source for spectroscopy.

Mercury spectrum lamp	**4054**
Sodium spectrum lamp	**4056**

4054 - 4056

Spectral lamps E27 connections

To be used with lamp holder/power supply cod. 4035

He (helium) spectral lamp E27	**4173**
Hg (mercury) spectral lamp E27	**4174**
Spectral lamp Na (sodium) E27	**4176**
Spectral lamp Ne (neon) E27	**4177**

4173 - 4174 - 4176 - 4177

Spectrum tubes power unit 4337

Power-unit able to provide electric high voltage, in order to use all spectrum tubes.
Power supply: 220V.
To be used: 30 s on and 30 s off.

4337

Spectrum tubes 4337

Oxygen	**4338**	Water vapour	**4342**	Hydrogen	**4346**
Carbon dioxide	**4339**	Nitrogen	**4343**	Mercury	**4348**
Air	**4340**	Neon	**4344**	Iodine	**4349**
Helium	**4341**	Argon	**4345**	Kripton	**4350**

4338 - 4339 - 4340 - 4341 - 4342 - 4343 - 4344 - 4345 - 4346 - 4348 - 4349 - 4350

Spectrum tubes kit, with power unit 4123

This kit is composed of the power-unit code 4337 and of 12 spectrum tubes previously described. (codes 4338, 4339, 4340, 4342, 4344, 4346, 4348, 4341, 4343, 4345, 4349, 4350).

4123

Kit for spectral analysis 4120

This set has been designed to allow students to practice the emission spectroscopic analysis.

Equipment supplied

1 Portable spectroscope
10 Needles
1 Bottle of sodium chloride
1 Bottle of potassium chloride
1 Bottle of strontium chloride
1 Bottle of copper chloride
1 Bottle of barium chloride
1 Bottle of sodium nitrate
1 Bottle of potassium nitrate
1 Bottle of strontium nitrate
1 Bottle of copper nitrate
1 Bottle of barium carbonate

4120

Ni-Cr string for spectral analysis 6107

Glass handle.
Wire length: 6-7 cm.

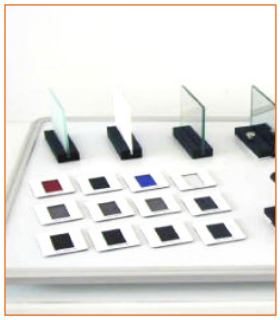
6107

Wave optics kit 4327

A coherent light source (diode laser divice) is exploited to show the priciples of the wave optics: polarization; interference; diffraction and holografy. Components are endowed with a magnetic base, in order to be placed safely on a magnetic whiteboard (included).

Topics

- Light's interference
- Interference on a thin plate
- Michelson's interferometer
- Light diffraction
- Circular hole diffraction
- Squared hole diffraction
- Diffraction grating
- Holography
- Light polarization
- Light absorption



4327

Light diffusion kit 4336

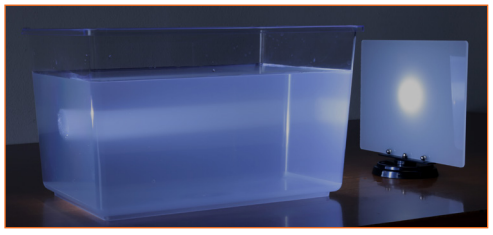
Why is the sky blue at midday while it turns red at sunset? When the light passes through particles with comparable size of the light's wavelength, light diffusion (elastic scattering) takes place.
The molecules in the air have a size comparable to the wavelength of blue component of the light.
Consequently, the molecules scatter blue light from the sun much more efficiently than the other components. For this reason, our eyes see the blue sky.
On the contrary, at sunset, light passes through a larger layer of the atmosphere and it goes through many solid particles (dust) that scatter the red component of the sun rays. With this kit, you can observe on a screen the phenomenon of progressive diffusion. With the polarizing filter it is also possible to study the polarization of the diffused light. The optic projector must be bought separately.

Equipment supplied

1 Dropper
1 Polarizing filter
1 Semi-transparent screen
1 Glass stirrer
1 Basin

Equipment required, not supplied

1 LED projector
1 Base
Milk



4336

Basic optical bench 4203

9 feasible experiments

Topics

- Dioptric projector
- Rectilinear propagation of light
- Reflection of light into spherical mirrors
- Lenses
- Images in spherical mirrors
- Images in converging lenses
- Conjugate points of converging lenses
- The eye and its defects
- Correction of the eye defects

Equipment supplied

1 Optical bench 2 mt	2 Lens holders
4 Holders	2 Aluminium rods
1 LED projector with power supply	1 Concave mirror +10
1 Set of 6 glass lenses	1 Convex mirror -10
1 White screen	1 Box

4203

Small optical bench 4202

29 feasible experiments

Topics

- Dioptric projector
- Rectilinear propagation of light
- Eclipses
- Moon phases
- Lighting law
- Diffusion of light
- Reflection of light
- Reflection of light into spherical mirrors
- Refraction of light
- Refractive index and the colours of light
- Total reflection
- Refraction of light through a prism
- Dispersion of the white light
- Lenses
- Images in flat mirrors
- Images in spherical mirrors
- Conjugate points of spherical mirrors
- Images in converging lenses
- Conjugate points of converging lenses
- The eye and its defects
- Correcting eye defects
- The compound microscope
- The slide projector

Equipment supplied

1 Linear ruler	1 Convex mirror - 10
1 Equilateral prism	1 Optical bench 90 cm
1 Red filter	1 Optical projector LED 6V
1 Green filter	1 Lamp
1 Blue filter	1 Earth-Moon system
1 Semi transparent screen	1 Lens +6 cm with lens holder rod
1 Slide 50x50	1 Lens +10 cm with lens holder rod
1 Plexiglas semi cylinder	1 Lens -10 cm with lens holder rod
1 Screen with squared hole	1 Protractor
1 Plane mirror	1 Filter holder
1 Small plane mirror	1 White screen
1 Isosceles prism	1 Microscope slide with holder
3 Holders	1 Square ruler
1 Holder for the projector	1 Beaker
1 Concave mirror + 10	1 Box

4202

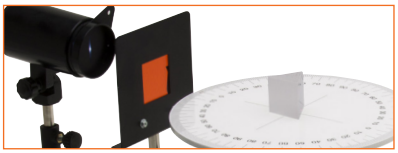
120 cm wave and geometrical optics bench 4080

With this optical bench, the teacher can perform a great number of quantitative and qualitative experiments on both geometrical and undulating aspects of optic waves. This bench is a necessary educational instrument in order to make a lesson a real moment of union between theory and experimental reality, and this is because of the quickness of its assembly and the ease in performing the experiments.

25 feasible experiments

Topics

- Rectilinear propagation of optical waves
- Lunar and solar eclipse
- Light scattering
- Radiation law
- Reflection laws
- Reflection in spherical mirrors
- Images in spherical mirrors
- Refraction laws
- Total internal reflection
- Refraction through a prism
- Refraction through lenses
- Images in lenses
- The eye and its imperfections
- Optical instruments
- The diode laser
- Diffraction through a hole
- Diffraction through a slit
- Measuring the wavelength of a laser
- Interference of light
- Interference according to Young
- Measurement of a wavelength with Young's method
- Diffraction grating
- Measurement of a wavelength with a grating
- Measuring the wavelength of white light
- Linear polarization
- Polarized light
- Natural rotatory power



Equipment supplied

1 Linear ruler	1 Diaphragm with 1 slit	1 Earth – Moon system
1 Red filter	1 Diaphragm with 2 slits	1 Adjustable slit
1 Green filter	1 Crown glass optical prism	1 Horizontal goniometer
1 Blue filter	1 Red diode laser with 3V power supply	1 Lens +6 cm with lens holder
1 Semitransparent glass	4 Holder	1 Lens +10 with lens holder
1 Slide	1 Projector holder	1 Lens -10 with lens holder
1 Plexiglas semicylinder	1 Sphere with stem diam. 30 mm	1 Filter holder
1 Diaphragm with square hole	1 Double spherical mirror +10	1 Microscope slide with holder
1 Plane mirror	1 Optical bench 120 cm	1 Grating 500 lines/mm
1 Double symmetrical arc	1 LED projector with 6V power supply	1 Square ruler
1 Rectangular isosceles prism	1 White screen with graduated scale	1 Beaker
1 Diaphragm with hole 2 mm	1 Pair of polarizers	1 Box
1 Diaphragm with hole 0,4 mm	1 Polarimetric tube	
1 Diaphragm with hole 0,2 mm	1 Punctiform bulb	

4080

90 cm Optical bench to study diffraction 8403

The optical bench allows you to study qualitatively and quantitatively the phenomena of diffraction.

A beam of laser light is directed on a revolving support which has some splits, holes and openings. The diffraction figures which are formed are collected by a light sensor which is in line with the linear position sensor. Moving the sensor horizontally with a handle, you will get a voltage which is proportional to the light intensity related to the position of the light sensor.

Connecting the outputs of the two sensors to a data acquisition system, it is possible to obtain the curves that show how the light intensity varies according to the position. Knowing the geometrical features of the openings and holes and evaluating the distance between the diaphragm and the light sensor, it is possible to quantitatively verify these phenomena.

Topics

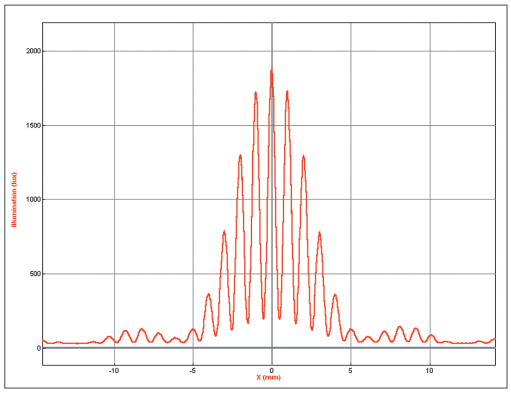
- Diffraction phenomena
- Interference phenomena

Equipment supplied

1 Optical bench provided with brightness sensor and potentiometer for linear position
1 High quality diode laser
1 Power supply for diode laser
1 Support with laser holder
2 Set of revolver diaphragms with slots of different size
1 Support for disk with slots (to place directly on the laser source)
1 White screen
1 Support for white screen
2 Cables for brightness and potentiometer sensors
2 Sensor adapters

Equipment for online use - not supplied

1 Interface code 9001
1 Adapter code 9058



The graph illustrated above was obtained directing the laser ray on a dual slit. It clearly shows the overlap of two wave phenomena: the Young interference produced by the two slits and the diffraction generated by each slit. Also in this case it is possible to check the relation which provides the distance from the center of the secondary maximums and minimums.

Suitable to be used with sensors

8403

Modular Optical Benches

100 cm, optical bench	**4401**
150 cm, optical bench	**4402**
200 cm, optical bench	**4404**

Thanks to this modular system it is possible to choose between benches of different lengths. It is also possible to connect a joint extension of 50cm to each of them: this is very useful to perform optical experiments where the optical beam, due to the effect of reflection or refraction, comes out from the main axis of the bench.
Thanks to these optical benches, the teacher can perform a large number of experiments on optics core topics. To satisfy teaching needs, we offer various accessories to complete your own optical bench.

4401 - 4402 - 4404

Optical Bench Extension 50cm 4362

4362

LED Light Source 4361

4361

Green Diode Laser 4151

Power: 3 mW
λ: 532 nm

4151

Red Diode Laser 4207

Power: 1 mW
λ: 635 nm

4207

Punctiform Lamp 4376

4376

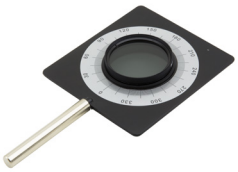
Lens Holder 4363

4363

Filter Holder 4390

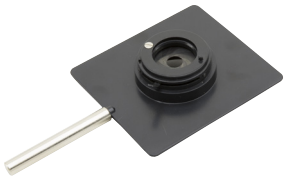
4390

Couple of Polarizing Filters 4370



4370

Iris diaphragm 4375



4375

Adjustable slit 4380

4380

Earth-Moon system 4377

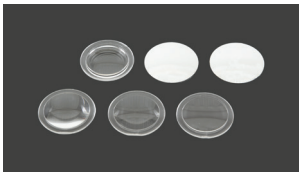
4377

Holder 4301

4301

Set of lenses and mirrors 4381

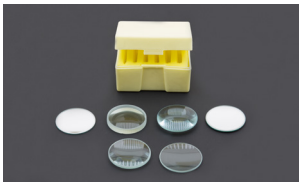
Plexiglass lenses



4381

Set of lenses and mirrors 4382

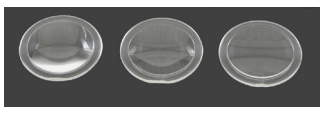
Glass lenses, mirrors with box.



4382

Set of three lenses 4060

Plexiglass lenses.



4060

Mirrors 4061

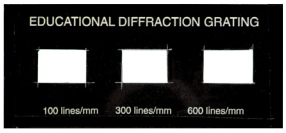
Concave and convex.

4061

Microscope slide 4393
With support.
Honey bee, hind leg.

4393

3 Diffraction Gratings 4143
100/300/600 lines/mm.

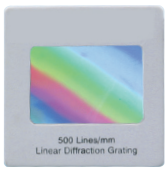


4143

Diffraction Grating 4106
80 lines/mm.

4106

Diffraction Grating 4212
500 lines/mm.



4212

Diffraction Grating 4213
1000 lines/mm.

4213

1 Slit Slide 4104

4104

2 Slits Slide 4105

4105

Primary colours filters 4168
Blue, green and red.

4168

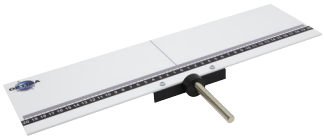
Secondary colours filters 4169
Cyan, yellow and magenta.

4169

Plexiglas screen 4365

4365

Screen with ruler 4366
36 mm, millimeter scale.



4366

Screen Support 4367

4367

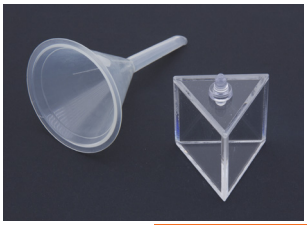
Horizontal Goniometer 4383

4383

Set of 7 Optical Bodies (glass) 4158

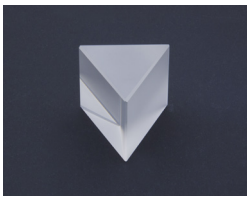
4158

Hollow Equilateral Prism 4144



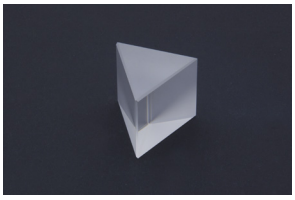
4144

Flint Glass Prism 4112



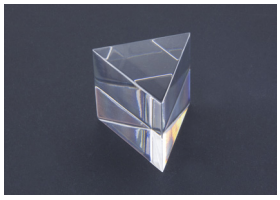
4112

Crown Glass Prism 4111



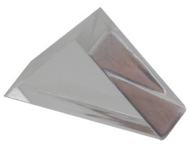
4111

Equilateral Prisms 4016
Plexiglass made.



4016

Rectangular Isosceles Prism 4072



4072

Semicylinder 4025
Plexiglass made.

4025

Polarimetric Tube 4371

4371

Optical bench lux meter 4374

4374

Friction rods

Hard rubber rod. Diameter 12mm length 25mm.	**5139**
Plexiglas rod. Diameter 12mm length 25mm.	**5002**
PVC rod. Diameter 12mm length 25mm	**5003**
Glass rod. Diameter 12mm length 25mm.	**5058**

5139 - 5002 - 5003 - 5058

Set of 5 friction rods 5348

The set is composed of 5 electrifiable rods: plexiglas, nylon, hard rubber, glass, hard rubber-brass. With wool cloth, silk cloth and rod stand.
Diameter 12 mm length 25 mm.

5348

Electroscope 5280

If you bring an electrified body near the plate of the instrument, the leaf diverges because of the electrostatic repulsion with the rigid stand. With graduated scale. 12,5 x 7,5 cm, h 17 cm

5280

Double electric pendulum 5090

If you bring an electrified body near the instrument, its two balls diverge because they acquire an electric charge of the same sign, due to the electric induction.

5090

Volta's Electrophore 5431

The item is composed of a polystyrene base that you can electrify by rubbing it; on this base there is an aluminum disk with insulated handle.

5431

Wimshurst Machine (premium version) 5085

The item has two special disks which don't deform over the course of time.
Two Leyda decomposable bottles.
Adjustable distributor. Spark: 50-60 mm.
Disk diameter: 400 mm.

Plexiglas

5085

Wimshurst Machine (economic version) 5115

It is a light and handy economic version.
Disc diameter 24 cm.
Sparks up to a length of 50 mm can be obtained.
The most significant electrostatics experiments can also be carried out with this generator.

5115

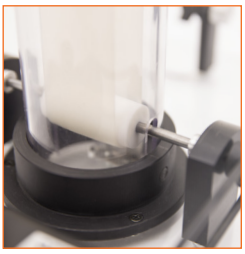
Van de Graaff generator 5549

The Van de Graaff generator is an electrostatic machine which uses a moving belt to accumulate electrostatic charge on a hollow metal globe on the top of a transparent and insulated column, that allows students to see how the system operates.
It is provided with a 225 mm sphere which can generate approximately 150 ÷ 200 KV.
It is provided with an electric variable speed motor or hand driving. Discharge sphere, electrostatic plume and electrostatic whirl are included.
It is possible to adjust the distance between the globe and the discharge sphere thanks to an articulated joint placed on the base.

Dimensions:
Spheres' diameter: 225 mm and 70 mm
Height: circa 650 mm
Base: 250 x 350 mm

Equipment supplied

1 Electrostatic plume
1 Electrostatic whirl



5549

Kit for electrostatic machines (advanced) 5404

Equipment supplied

1 Universal stand
1 Spark panel
1 Metal sphere with insulating handle
1 Electric pendulum
1 Electrostatic whirl
1 Blowing tip
1 Dance of the balls
1 Electrostatic plume
1 Faraday's cage
1 LED with support
1 Faraday's well
2 Crocodile clips
1 Electrostatic engine
2 Leads
1 Articulated discharger

5404

Kit for electrostatic machines (basic) 5051

Equipment supplied

1 Circular base
1 Isolated support with hook
1 Candle with holder
1 Universal support
1 Support with tip
1 Point-shaped conductor
1 Electric whirl
1 Dance of the balls
1 Copple of balls
1 Electrostatic plume
2 Crocodile clip
2 Leads

5051

Electric whirl 5099

It can show the dispersive power of the points thanks to the mechanical effect.

5099

Electrostatic blower 5046

It can show the dispersive power of the points.

5046

Point-shaped conductor 5204

Made of nickel-plated brass, it enables you to experiment on charge distribution in insulated conductors.
Length: 220 mm.
Height: 300 mm.

5204

Articulated discharger 5092

With insulated handle.

5092

Electrostatic bell ring 5073

If you connect the apparatus to an electrostatic machine, the pendulum hits the two bells alternatively because of the electric actions.
Height: 380 mm.

5073

Spherical conductor 5091

For experiments on electrisation (through contact and through induction), on the potential and charge density in conductors. Sphere diameter: 100 mm. Height: 370 mm.

5091

Coulomb's sphere 5087

For experiments on electrostatic induction (Faraday's well, for example). It is supplied with an electric spoon. Sphere diameter: 100 mm.
Height: 370 mm.

5087

Couple of cylindrical conductors 5071

Being a kind of divisible conductor, this apparatus, equipped with two pairs of balls, verifies the electric poles through the phenomenon of the electrostatic induction.

5071

Couple of conductors with electroscope 5089

They have the same function as the previous couple of conductors code 5071, with the advantage of being connected to a two leaf electroscope.

5089

Faraday's cage 5140

The item is supplied with double electric pendulum, thus allowing the performance of experiments on the electrostatic screen. Diameter: 120 mm. Height : 265 cm.

5140

Leyda's bottle 5088

Cylindrical condenser for experiments on the electric capacity. It is supplied with insulated handle to extract the inner framework when the condenser is charged. An electrostatic generator (not supplied) code 5115 or 5085 or 5549 is required to charge the capacitor.

5088

Device for showing the flux lines of the electric field 5351

The item is composed of a tray made of transparent material, to be placed on an overhead projector, and of electrodes to be fixed along the rim of the tray. The latter is filled with castor oil; semolina grains float on the oil's surface. If you connect two electrodes to the poles of the high-voltage generator (code 5324) or to an electrostatic machine, the behaviour of the flux lines of the electric field becomes visible. The item is supplied with 250 ml of castor oil and a bottle of semolina grains.

5351

Plate capacitor 5093

It is a capacitor which allows you to prove that the electric capacity depends on the distance from the framework and on the dielectric material. It can be used to show the flux lines of a uniform electric field too. Products, not provided, but required for doing experiments: wimshurst machine code 5085 and electroscope code 5280.

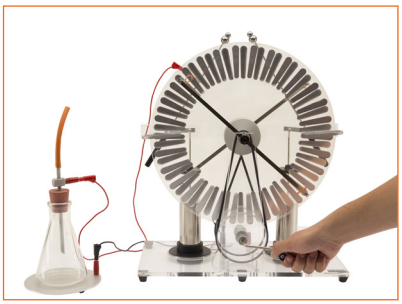
5093

Electrostatic smoke precipitator 5703

The smokes and powders coming out of the chimneys of those mills where toxic substances are used, contribute greatly to air pollution. With this apparatus you can show how to obtain their elimination. Using a rubber tube, a lit sigarette is put in communication with the inside of the flask. If you suck out the air using the pump, the flask fills up with smoke. The internal electrode, which is pointed, and the external plate must be connected to an electrostatic machine (we suggest the code 5085). Switching on the machine, you will notice that , at first, the smoke spins around and then it disappears. If you repeat this operation several times, the walls become black. Cleaning the flask with a bit of white spirit, the tar contained in the cigarette's smoke melts down, allowing the teacher to show the damage caused to the airways.

Equipment supplied

1 Erlenmeyer flask for filtration 500 ml
1 Pointed electrode with rubber cap
1 Manual suction pump with hose
1 Aluminium base
1 Mohr Clamp
1 Bottle of white spirit 250 ml
2 Cables
2 Crocodile clips



Smoke precipitation

5703

Electrostatic cell 5714

An hermetically sealed acrylic case, containing polystyrene tiny balls. When the upper part is rubbed for a long time with a cloth, the electrostaic charge generated makes the balls move, demonstrating the action among charges.

5714

Electrometer with accessories 5045

The item is able to measure electrostatic potentials up to 5kV. The metal stand has a hole for the grounding. It is supplied with disk condenser, Faraday's well and electric spoon.

5045

Franklin Motor 6440

By connecting the terminals to an electrostatic machine, the sphere of insulating material is put in rapid rotation.

6440

Electrostatics S87

18 feasible experiments

Topics

- Electrification
- Protons ed electrons
- Electric forces
- Electrostatic induction
- The pith-ball electroscope
- Conductors and insulators
- The gold leaf electroscope
- How to determine the sign of an electric charge
- The sign of an electric charge
- The wimshurst machine
- Flashes and lightnings
- The electric field
- How to reveal the existence of electric fields
- The power of points
- The electric whirl
- The dancing beads
- The electrostatic plume
- Franklin's electrostatic engine

S87

Elementary circuits kit 5422

This kit enables beginners of the study of the electrical physics, to do experiments on the simplest electric circuits.

Topics

- Lamp with switch;
- Lamps in series;
- Lamps in parallel

Equipment supplied

1 Battery holder - 4 positions
2 Knife switches
2 Lamps with lamp holder - 6V
6 Leads

5422

Electrical leads, safety plugs

Available in black or red
Type: banana - banana
Diameter: 4 mm.
Max current: 8 A
Max voltage: 1000 V
Metal part with protective retractable sheath in order to avoid accidental contacts.

Single, length 25 cm	5160
Single, length 50 cm	5161
Single, length 100 cm	5162

5160 - 5161 - 5162

Set of 10 cables 5191

Type: crocodile - crocodile
Length 50 cm. Max current: 5A.

5191

Rack for cables 5325

24 spaces, it can be fixed to the wall.

Knife switch 5147

Max voltage: 12 V. Max current: 5 A.

5147

Lampholder 5164

Lampholder with two 6 V lamps.

5164

Bulb E10 12V-3A 5271

Suitable for bulb-holder code 5164.

5271

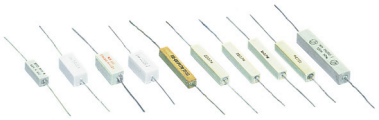
Bulb E12 6V/2W 5010

To be used with bulb-holder code 5009.

5010

Series of 10 resistors 5176

Values Ω: 10 - 12 - 15 - 18 - 22 - 56 - 68 - 100 - 120 - 150.
Power: 5 W. To be used with bases code 5056 (sold separately) in order to produce batteries in series and in parallel.

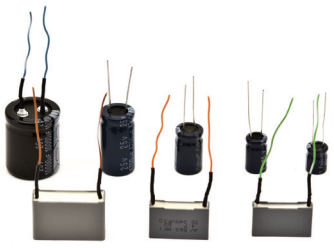


5176

Set of 10 capacitors 8502

To be used with bases code 5056, sold separately, in order to constitute batteries in series and in parallel. Maximum voltage: 25V.
Equipment supplied:

2,2 µf - 1 pz
4,7 µf - 1 pz
10 µf - 1 pz
470 µf - 1 pz
1.000 µf - 2 pz
2.200 µf - 2 pz
4.700 µf - 1 pz
10.000 µf - 1 pz



8502

Nickel-chrome wire 5076

Length 100 cm.
It has terminal piston pins to make tests on Ohm's laws.

5076

Black crocodile clip 5062N
Red crocodile clip 5062R

5062N - 5062R

Crocodile clip 5192

With insulation, with button.

5192

Lamp holder E12 on base 5009

To be used with code 5010.
Dimensions: 103x54x30 mm.

5009

Resistor-holder and Capacitor-holder base 5056

Dimensions: 103x54x30 mm.

5056

Switch on base 5008

Dimensions: 103x54x30 mm.

5008

Silica diode on base 5146

Dimensions: 103x54x30mm.
It can straighten up a half-wave.

5146

Deflector on base 5136

Dimensions: 103x54x30 mm.

5136

Thermistor NTC on base 5144

Dimensions: 103x54x30 mm.
Its resistance varies with a negative temperature.

5144

Rheostat 22 Ω on base 5132

Dimensions: 103x54x30 mm.

5132

Thermistor PTC on base 5389

Dimensions: 103x54x30 mm.
It's resistance with a positive temperature.

5389

Inverter on base 5137

Dimensions: 103x54x30 mm.

5137

Photoresistor on base 5133

Dimensions: 103x54x30 mm.
It varies its resistance as a function of the light received.

5133

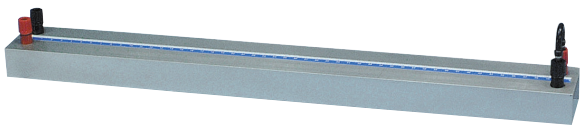
Series of conductors 5098

For the verification of Ohm's laws. Dimensions: 1000 x 100 mm.
Composed of:
1 Kanthal wire, Ø 0,30 mm; 2 Nichel-chromium wire, Ø 0,3 mm; 1 Constantan string wire, Ø 0,4 mm; 1 Bridge; 1 Base.

5098

Ohm's law table 8504

To be used with the set of wires code 8503 (see above) in order to test Ohm's laws. Dimensions: 500x60 mm.
It is supplied with a short-circuit bridge.



8504

Set of 4 metal wires 10 m 8503

Composed of:

Nichel	1,376 Ω/m	Ø 0,3 mm	Nichel-Cromo	15,63 Ω/m	Ø 0,3 mm
Constantan	3,918 Ω/m	Ø 0,4 mm	Kanthal	19,45 Ω/m	Ø 0,3 mm

8503

Kit for experiments on the electric circuits 5130

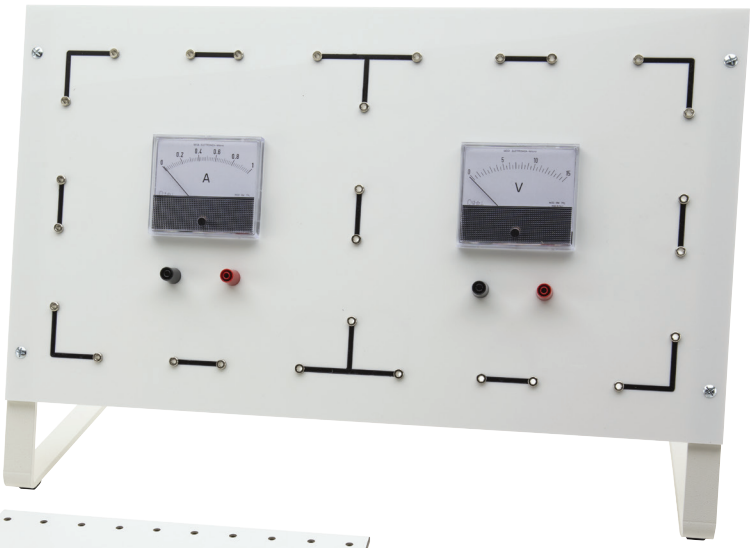
To be used with an electric, low-voltage power unit ,which can be adjusted from 0 to 12V DC.
Structure made of painted metal.Panel dimensions: 57x33 cm.

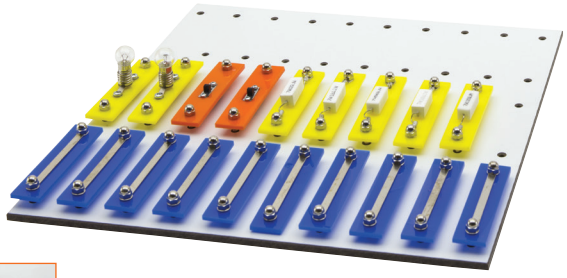
Topics

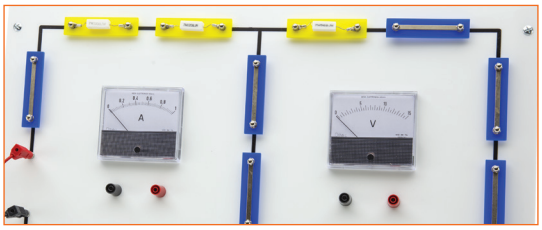
- The electric circuit
- Use of the instruments
- Verification of Ohm's first law
- Dependence of resistance on temperature
- Lamps in series
- Lamps in parallel
- Resistances in series
- Resistances in parallel
- Electrical net

Equipment supplied

4 Electrical leads 30 cm	2 Bridges with switch
2 Electrical leads 100 cm	1 Resistor bridge = 12 Ω
2 Iron holders for panel	1 Resistor bridge = 18 Ω
1 Panel with instruments	1 Resistor bridge = 56 Ω
1 Plate for circuits	1 Resistor bridge = 100 Ω
10 Bridges with short-circuit	1 Resistor bridge = 120 Ω
2 Bridges with lamp	



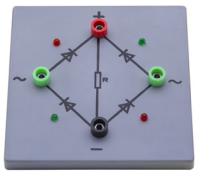




5130

Graetz's bridge 5233

The item is mounted on base 100x100 mm. It can strighten up two half-waves, visualizing the conduction state of the diode through the use of LED.



5233

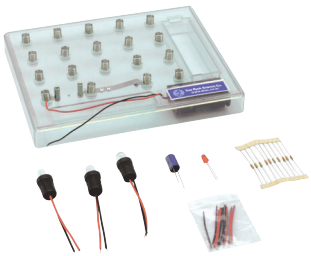
Resistances box 5270

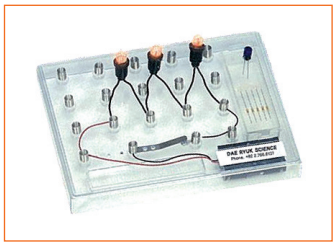
With six decade boxes.
Percentual mistake 0,1%.
Plastic case.
Measurement range: from 0 to 1.111.110 Ω with 1 Ω step.

5270

Board for simple electric circuits 5712

This apparatus enables you to create connections in series and parallel between different electrical dipole, such as light bulbs, resistors, condensers, leds, etc. simply through the use of spring connectors. It includes a small space to store all different components and a battery-holder to insert two AA type batteries.





5712

Linear didactic rheostats

For voltages up to 24 V.

Resistance 10 Ω Max current 2 A	5218
Resistance 50 Ω Max current 1,5 A	5219
Resistance 200 Ω Max current 1,25 A	5220

5218 - 5219 - 5220

Support for mounting boards 5333

For a better view of the circuits assembled on the table.
It should be used with codes 5332 and 5334.

5333

Modular kit to study electric circuits 5332

This modular kit enables the performance of many experiments on electrical conduction, reducing to a minimum, the use of connecting cables. In this way, besides simplifying the operating production of circuits, their layouts are highlighted. We suggest our power supply code 4991, not supplied with this apparatus.
Assembly table dimensions: 45x33 cm

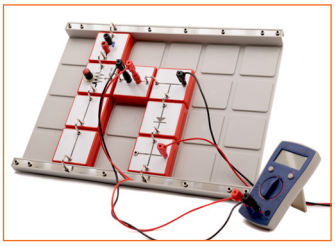
14 feasible experiments

Topics

- Bulb with switch
- Protection fuse
- Bulb Series with single point
- Parallel Bulbs with single point
- Parallel Bulbs with 2-way switch
- Bulbs with dual control with 2-way switch
- Bulbs with dual control with relay
- Use of the voltmeter and the ammeter
- First ohm's law
- Second ohm's law
- The rheostat
- The potentiometer
- Series circuits
- Parallel circuits

Equipment supplied

2 Modules with bulb holder	1 Module with 20 Ω rheostat
2 Bulb 6V 2W	1 Module with relay
6 Electrical leads 60 cm	1 10 metres of kanthal wire
1 Assembly table	1 Couple of resistors 22 Ω - 56 Ω
4 Linear conductors	1 Nickel-chromium wire
2 L-shaped conductors	2 Crocodile clips
1 T-shaped conductor	10 U bolts
1 Set of 4 insulators	1 Voltmeter DC
2 Modules with switches	1 Ammeter DC
1 Module with fuse holder	10 Fuses
4 Universal connectors	1 Box



5332

Modular kit for the study of basic electronics 5334

This modular kit allows the performance of several experiments on electronical principles: from reactive components to semiconductors. The main advantage lies in the minimum use of the connecting cables. In this way, besides simplifying the operative production of circuits, their schemes are highlighted. The function generator (code 5718) required to perform the experiments with alternating current must be purchased separately.
Assembly table dimensions: 45x33 cm.

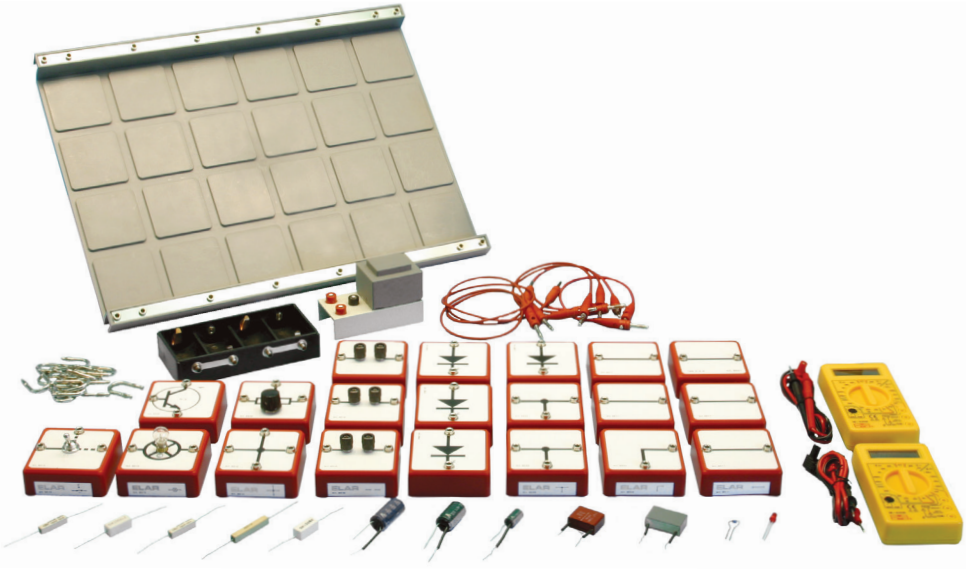
18 feasible experiments

Topics

- The condenser with direct current
- Effective voltage and current
- The condenser with alternating current
- The capacitive reactance
- The inductive reactance
- The RCL circuit
- Low-pass filter
- High-pass filter
- Conductivity in metals and semiconductors
- P-N junction: the diode
- The half-wave rectifier
- The double half-wave rectifier
- The filtered rectifier
- The transistor
- The transistor as interrupter
- The transistor as amplifier
- The photoresistor
- The thermistor

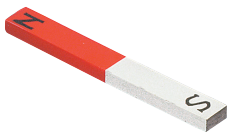
Equipment supplied

1 Module with bulb holder
1 Bulb 6V 2W
6 Electrical leads 60 cm
1 Mounting boards
5 Linear conductors
1 L-shaped conductor
2 T-shaped conductors
1 Module with deflector
6 Universal connectors
1 Set of 5 different condensers
1 Set of 5 different resistances
1 Module with potentiometer 2 KΩ 2 A
4 Modules with silicon diodes
1 Module with transistor
2 Universal digital Multimeter
1 Cross conductor
16 U bolts
1 Battery holder
1 Module with inductor
1 Photoresistor
1 NTC 47 Ω - 50 Ω
1 Box



5334

Rectangular magnet 5279
Dimensions: 170x20x10 mm..



5279

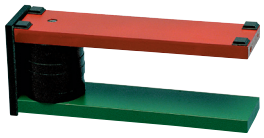
U-shaped magnet
Dimensions: 55x10x14 mm. **5281**
Dimensions: 75x16x40 mm. **5286**

5281 - 5286

Magnet 5206
U-shaped.

5206

U-shaped magnet 5173
Dimensions: 200x75x45 mm.



5173

Al- Ni-Co alloy magnets
Made of cobalt and nickel alloy, these magnets are able to create magnetic fields much more intense than those created by steel magnets.
Moreover, their magnetisation lasts for decades.

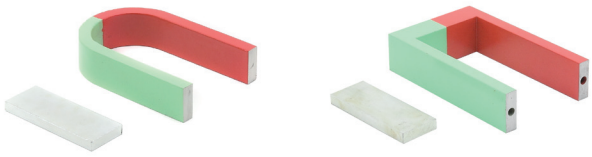
Linear magnets with round section
Dimensions: 60 x 6 mm circular, single. **5238**
Dimensions: 100 x 10 mm circular, single. **5024**
Dimensions: 150 x 12 mm circular, single. **5169**
Dimensions: 150 x 12 mm circular, couple. **5170**

5238 - 5024 - 5169 - 5170

U-shaped magnets with stand
Dimensions: 30 x 20 x 21 mm. Rod Ø 6 x 135 mm **5077**
Dimensions: 45 x 29 x 30 mm. Rod Ø 6 x 135 mm **5141**

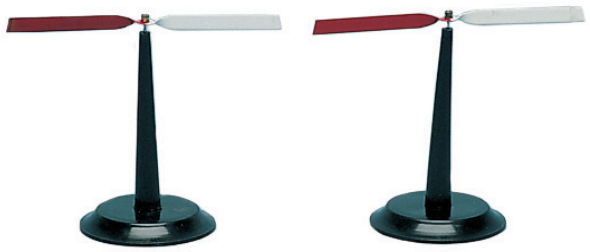
5077 - 5141

U-shaped magnets without stand
Dimensions: 80 x 52,7 x 21 mm. Poles distance: 40 mm. **5382**
Dimensions: 130 x 80,5 x 30 mm. Poles distance: 60 mm. **5383**



5382 - 5383

Couple of magnetic needles 5225
The item can show the interaction between magnetic poles
Needle length: 140 mm. Height: 120 mm.



5225

Disk magnet 5182
SINTEROX/F alloy
Diameter: 18 mm.
Thickness: 5 mm.

5182

Ring magnet 5183
SINTEROX/D alloy
Outer diameter: 51 mm.
Inner diameter: 24 mm.
Thickness: 9 mm.

5183

Neodymium magnets
Made of Neodymium-Iron-Boron alloy, they produce a magnetic field of exceptional intensity (about 1 Tesla).

Disc magnet 8516
Diameter 25 mm, Thickness 10 mm.

8516

Ring magnet 8517
Outer diameter: 25 mm.
Inner diameter: 10 mm; thickness 8 mm.

8517

Magnetic needle 5174
Magnetic needle with protractor.
Mounted on rod 100 mm and base.
Needle length: 60 mm.

5174

Rotating stand for magnets 5250
It consists of a stand ,rotating on a point, so to highlight the actions between magnetic poles.

5250

Set of 10 magnetic needles 5296

Needle length 30 mm; the neddles allow you to draw the flux lines of a magnetic field.

5296

Set of 10 magnetic in-box needles 5358

Diameter 20 mm, height 8 mm.

5358

Set of 12 compasses 5359

Diameter 25 mm, height 6 mm.

5359

Apparatus to show the magnetic spectrum 5027

Equipment supplied

1 "U"shaped magnet
1 Circular base
1 Plexiglas plate
1 Iron filings bottle

5027

Magnetic forces apparatus 5125

This item lets you visualise the remote action of magnetic forces.
With two ring magnets.

5125

Magnetoscopes 5293

Part 1

It is composed of a transparent cube (80 x 80 x 80 mm) containing a silicon oil solution with iron filings in suspension into it. Inserting the supplied linear magnet in the central hole, the wire-like iron particles line up to the space flux-lines of the field generated by the linear magnet.

Part 2

It is based on the same principle of the previous apparatus; it enables a bidimensional representation of the flux lines both of a linear and "U"-shaped magnet, both supplied as apparatus'equipment. Dimensions 120 x 60 mm.

5293

Magnetism kit 5414

The item can show, in an elementary way, the properties of magnets. It can also discover which substances are not subject to magnetic force.

5414

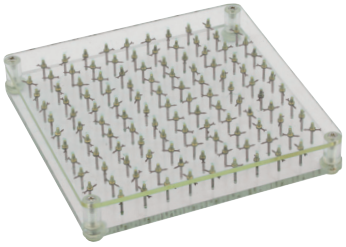
Magnetoscope 5405

98 iron bars protected by a housing are free to be arranged randomly.
Under the action of an external magnetic field, for example by inserting the magnet model into the extensible solenoid, code 5178, the bars align like the magnetic moments of the molecules of ferromagnetic bodies. It can be used to display the force lines of the magnetic field.
With magnets code 5024 or code 5286. Dimensions 75x150 mm.

5405

Magnetoscope with needles 5420

As in 5405, 117 small iron bars, protected by a case, are free to move randomly.
Dimensions: 150x150 mm.



5420

"Play and learn" kit 5541

You can learn the properties of magnetic bodies enjoying yourself.

Equipment supplied

1 Magnetic spade	50 Magnetic clips
1 Horseshoe magnet	24 Coloured magnetic tokens
10 Magnetic balls	1 Magnets stand

5541

Set of accessories for experiments on magnetism 5322

Topics

- The magnet
- Two magnetic poles
- The compass
- Magnetic forces
- Magnetic induction
- The magnetic spectrum

Equipment supplied

2 Magnetic needles
2 Linear alloy-made magnets
1 "U"-shaped steel magnet with stand
1 Plexiglas plate
1 Rotating stand
1 Iron filings bottle
1 Compass
1 Case

5322

Precision compass 5231

Diameter: 100 mm.
With wind rose.

5231

Simple compass 18/E

Diameter: 45 mm.

18/E

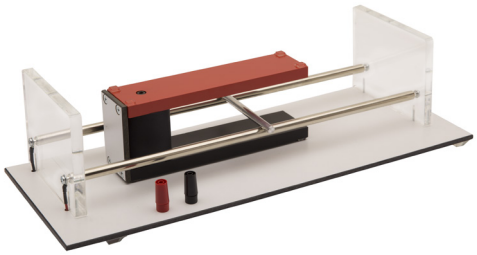
Walk compass 5171

Liquid pocket compass Ø 45mm with cover, ring and indicator. Plastic body.

5171

Apparatus for the verification of Lorentz force 5177

It consists of two metal tracks where a cylindrical aluminium bar can roll while positioned in order to be immersed in the field of a permanent magnet. Allowing the current to flow in the aluminium bar through the use of generator code 5248, the bar is given a force whose direction is determined through the "the left hand" rule.
Track length: 45x17 cm.



5177

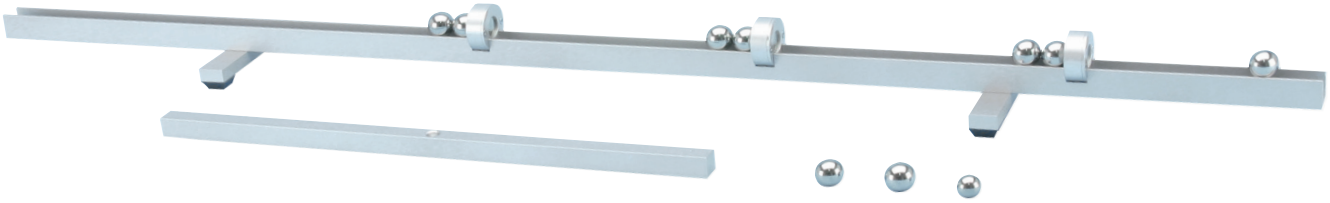
1 Stage magnetic gun (Gauss gun) 5369

The magnetic field of a permanent magnet decreases quickly as distance increases. The sphere in the charger, is located in the field of a powerful neodymium magnet; therefore it is abstracted by a force which increases quickly as the sphere's distance from the magnet decreases.
Once delivered, its potential energy turns into kinetic energy.
Two 1 stage guns may be connected in series to create a 2 stage gun.
Gun length: 40 cm.

5369

3 Stage magnetic gun 5370

The magnetic gun is a mechanical model that allows you to explore in a simple and intuitive way, without any calculation, concepts such as energy configuration, exothermic systems and reversible reactions.
It is also a very useful exercise to understand mechanical systems using energy balances and symmetries rather than analytical or mathematical details.
Supplied with 3 magnets, 2pcs Ø 16 mm spheres and 8pcs Ø 20 mm spheres.
Track length: 100 cm.



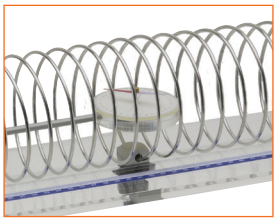
5370

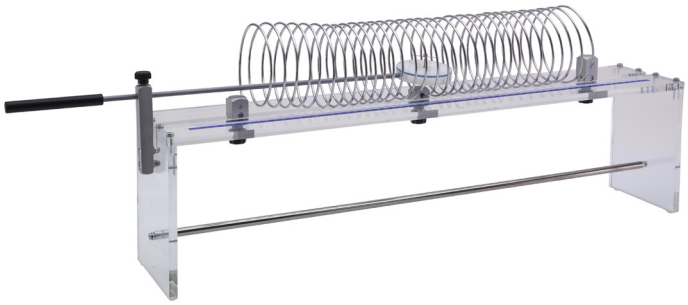
Extensible solenoid 5178

This item allows the study of the magnetic field generated by a solenoid, because it is possible to vary the coil number per length measurement unit. Once the magnetic needle has been positioned toward the earth field and the solenoid has been positioned in a perpendicular direction, the tangent of the needle's deviation angle is proportional to the intensity of the magnetic field and, therefore, to the intensity of the electric current and to the number of coils per length measurement unit.
To be used with generator code 5360. Dimensions: 63x15x20 cm.
It is possible to study the dependence of the magnetic field by the number of turns per meter using a magnetic field sensor.

Equipment for online use - not supplied

1 Sensor holder	code 5399
1 Magnetic field sensor	code 9091
1 Current sensor	code 9027
1 Interface	code 9001
or	
1 USB magnetic field sensor	code 9067
1 USB current sensor	code 9073





Suitable to be used with sensors

5178

Electromagnetic scale 5179

The electromagnetic scale has a solid and elegant plexiglass structure. One of the two arms ends with a rectangular aluminium coil immersed in the field of a powerful permanent magnet. The other arm has two sliding masses, which allow the item to obtain equilibrium at rest. Allowing the current to flow through the use of apparatus code 5361, a force F appears between the magnetic field B and the electric current i, whose value is given by the Ampere law:

$F = B \cdot l \cdot i \cdot \text{sen } \alpha$

where l is the length of the conductor and α is the angle created between the conductor and the magnetic field. It is possible therefore to verify that the intensity of the force reaches its maximum when α=90° and it is zero when α=0°. Using the power supply, the value i of the electric current can be read with an ammeter and, therefore, it is possible to deduce the permanent magnet's induction value B. The experiment can be repeated replacing the permanent magnet with the solenoid. In this way it is possible to verify the ratio which gives the value of the magnetic field inside a solenoid. Scale sensibility: 10 mg. Dimensions: 58x18x17cm.

Equipment supplied

1 Electromagnetic scale
1 Permanent magnet
1 Solenoid
1 Weight box 200 g with gram fractions

5179

Electromagnetic actions kit 5184

With this apparatus it is possible to experiment on currents-magnets and currents-currents interactions. Recommended power supply code 5360 not provided.

Equipment supplied

1 Frame
2 Electrical leads 60cm
1 Rectangular reel
1 "U"conductor
2 Crocodile clips
1 Linear magnet
1 Magnetic needle
1 "U"shaped magnet
1 Set magnetic needle

5184

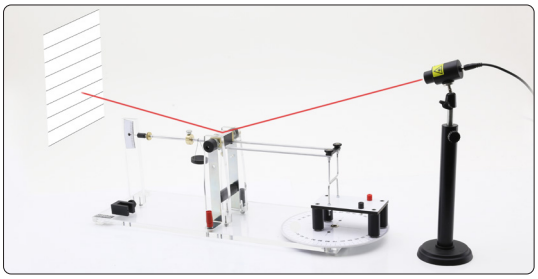
Accessories for electromagnetic scales

Set of accessories for 5179 5458

Thanks to this set it is possible to deepen the Ampère principle and the Ørsted experiment.

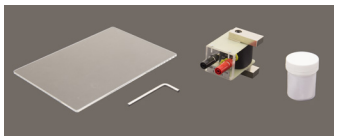
Laser for optical lever 5459

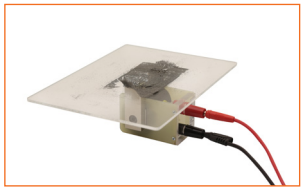
Thanks to the optical lever, every small angle variation is amplified for easier measurement.



Apparatus to show the field of an electromagnet 5356

It consists of a plastic material plate and an electromagnet (composed of an inductor and a metal nucleus) which must be placed under the plate. The item is supplied with a bottle of iron filings and an allen screw to assemble the electromagnet.
Maximum voltage: 6V.





5356

Coil 400 turns, 0,69 A 5375

Internal hole for core: 28x28 mm.

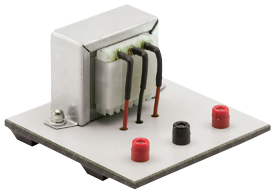
5375

Coil 1600 turns, 1A 5078

Internal hole for core: 20x20 mm.

5078

Inductor 8510

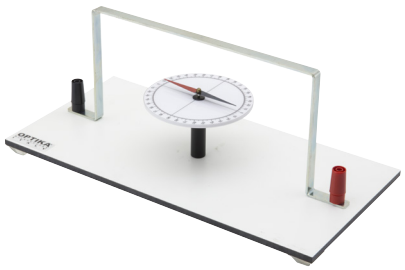


Features in alternating current 1 kHz:
L=0,22 H, R= 56 Ω between two extreme poles;
L= 58 mH, R= 24 Ω between an extremity and the intermediate pole
Features in direct current:
R= 0,6 Ω between two extreme poles, R= 0,3 Ω between an extremity and the intermediate pole.

8510

Linear Ørsted apparatus 5857

The item can show the magnetic effect of electric current flowing in a linear conductor.
Provided with magnetic needle and goniometer that allows you to take measures during the experimentation. To be used with a power supply: 5 A.



5857

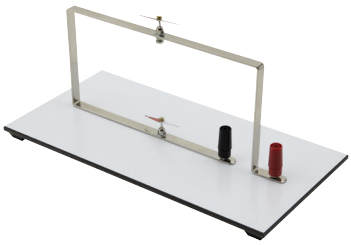
Circular Ørsted apparatus 5858

The item can show the magnetic effect of the electric current flowing in a circular conductor.
Provided with magnetic needle and goniometer.
To be used with a power supply: 5 A.

5858

Ørsted apparatus with two needles 5122

The item can show the magnetic effect of the electric current flowing in a circular conductor through the use of 2 magnetic needles. To be used with a power supply: 5 A. (Recommended Code 5360).



5122

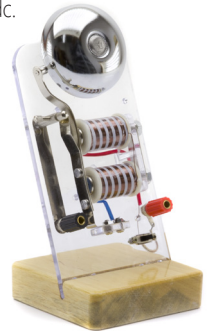
Horseshoe-shaped electromagnet 5274

With anchor and stand.
Voltage: 3 Vdc. Height: 35 cm.

5274

Electric alarm model 5186

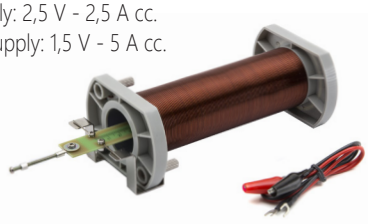
It can show the functioning principle of an electric alarm. Dimensions: 9x9x19 cm.
Voltage: 6 V dc.



5186

Apparatus for the electrodynamic actions 5288

This apparatus consists of a solenoid containing a linear conductor positioned perpendicularly to the flux lines. Being possible to balance the electrodynamic interaction force, it is possible to perform quantitative experiments too.
Dimensions: 200x90x90mm. Internal diameter: 38mm.
Scale power supply: 2,5 V - 2,5 A cc.
Winding power supply: 1,5 V - 5 A cc.



5288

Faraday's experiments kit 5128

With this kit it is possible to perform the fundamental experiments on electromagnetic induction.

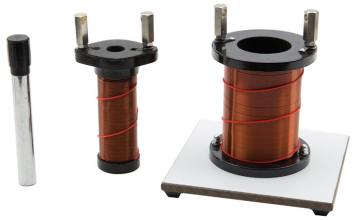
Equipment supplied

1 Battery	2 Electrical leads 60 cm
1 Switch	3 Electrical leads30 cm
1 Galvanometer	2 Crocodile clips
1 Linear magnet	1 Box
1 Double coil	

5128

Double coil for induced currents 5273

This item enables you to perform the most important experiments of Faraday on electromagnetic induction. The closure or the opening of the primary solenoid , its movement or that of its iron nucleus, produce induced currents in the secondary solenoid; these currents can be highlighted with the galvanometer code 5047.
Primary number of coils: 400. Secondary number of coils: 1150.
Work voltage: 6 - 10 V. Dimensions: 65 x 65 mm.



5273

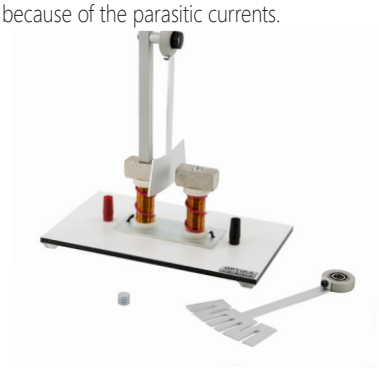
Apparatus for the verification of Lenz's law 5285

This simple apparatus allows the verification of Lenz law in a simple way. If you insert a linear magnet into the non-interrupted ring, the ring is rejected , while it is attracted during the extraction of the magnet; this fact proves that the induced currents' direction is always opposite to the one of what has generated them. The same thing doesn't happen with the interrupted ring.

5285

Waltenhofen pendulum 5120

If you allow two aluminium sectors, one whole and the other cut, to oscillate with the excited magnet, you can see that the oscillation slows down more quickly in the first instance, because of the parasitic currents.



5120

Ruhmkorff's coil 5208

For 50 mm long sparks; power supply :6-12 V dc.
A power supply is required (code 4991, not provided).

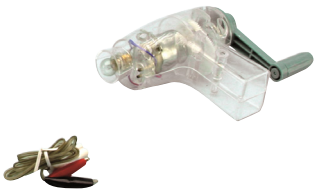
Weight
2.450 Kg
Length
295 mm
Width
180 mm
Height
208 mm

Input voltage
9-12 V, DC
Max current
5 Amp
Maximum sparkle
50 mm

5208

Manually operated dynamo 5393.1

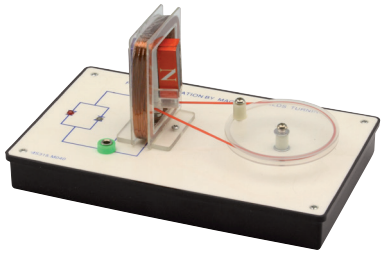
It is contained into a transparent case, in order to let you see how electromagnetic induction can be exploited to produce electric energy. Moreover it is possible to verify the dynamo's principle of reversibility. With double-ended crocodile clips cable.



5393.1

Alternator-engine model 5419

By turning the handle, the magnet rotates inside the coil, inducing an electric current which turns on the LEDs. Dimensions: 205 x 125 x 25 mm.



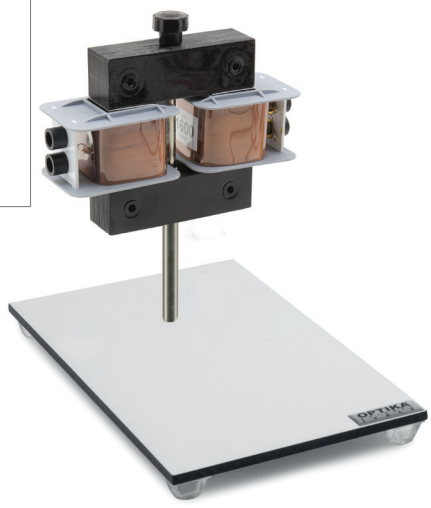
5419

Modular transformer 5114

It consists of a nucleus made of laminated ferromagnetic material which can be divided into two parts (one is "U" shaped, the other straight) in order to replace the coils. Max. applied voltage: 6 V ac.

Equipment supplied

1 base
1 "U"shaped nucleus made of laminated iron
1 Closure yoke
1 Asta di sostegno
1 Coil 1600 turns
1 Candle
1 Aluminum ring with cut
1 Coil 400 turns
1 Coil 50 turns
1 Aluminium ring
1 Melting pot with handle



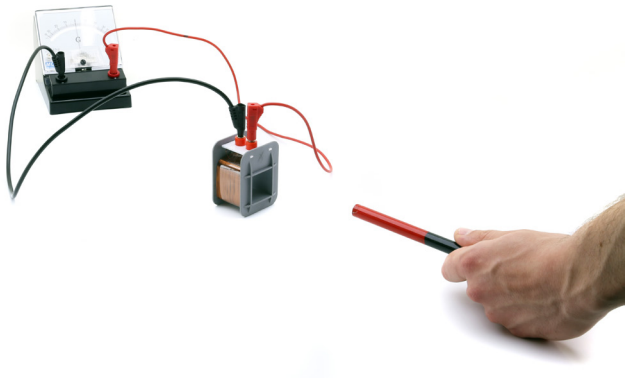
5114

Introduction

The plane of movement, also mentioned in the section of the catalog dedicated to mechanics, is made up of the superimposition of a layer of plastic and one of aluminium, so as to allow for an in-depth study of the basic motions of dynamics: the uniform rectilinear motion and the uniformly accelerated motion in a straight line.
Particularly interesting is the fact that the uniform rectilinear motion is achieved by arranging the plane with the metal surface upwards, and using the phenomenon of electromagnetic induction generated by the movement of the magnet placed under the carriage.
When the carriage begins to move along the metal plane, the movement of the magnet applied to its base causes a variation of the magnetic flux which, according to Lenz's law, produces a force which makes the motion of the carriage uniform.
Instead, by placing the trolley on the plastic surface, it is possible to obtain accelerated motions.
Thanks to the special support, the plane of movement is transformed into an inclined plane, which also makes possible considerations on friction and conservation of mechanical energy. The supplied material allows the use of a distance sensor for the study of the movements in real time, in order to be able to graphically and analytically deepen the laws that govern these movements.

Faraday's law - Neumann - Lenz 8217

Electromagnetic induction is the operating principle of many everyday appliances such as, for example, voltage transformers. This collection proposes the execution of the experiments carried out by the Englishman M. Faraday around 1820.
After the Danish H. C: Oersted demonstrated that it was possible to create a magnetic field using an electric current, contemporary physicists realized that there must be a correlation between electricity and magnetism. To discover the nature of this connection, they performed a series of experiments which can be accomplished with the simple means provided in this collection. In experimental subjects, such as physics, it is not enough to read the description of experiences performed by others. It is educationally essential to carry out these experiences in person.



8217

Topics

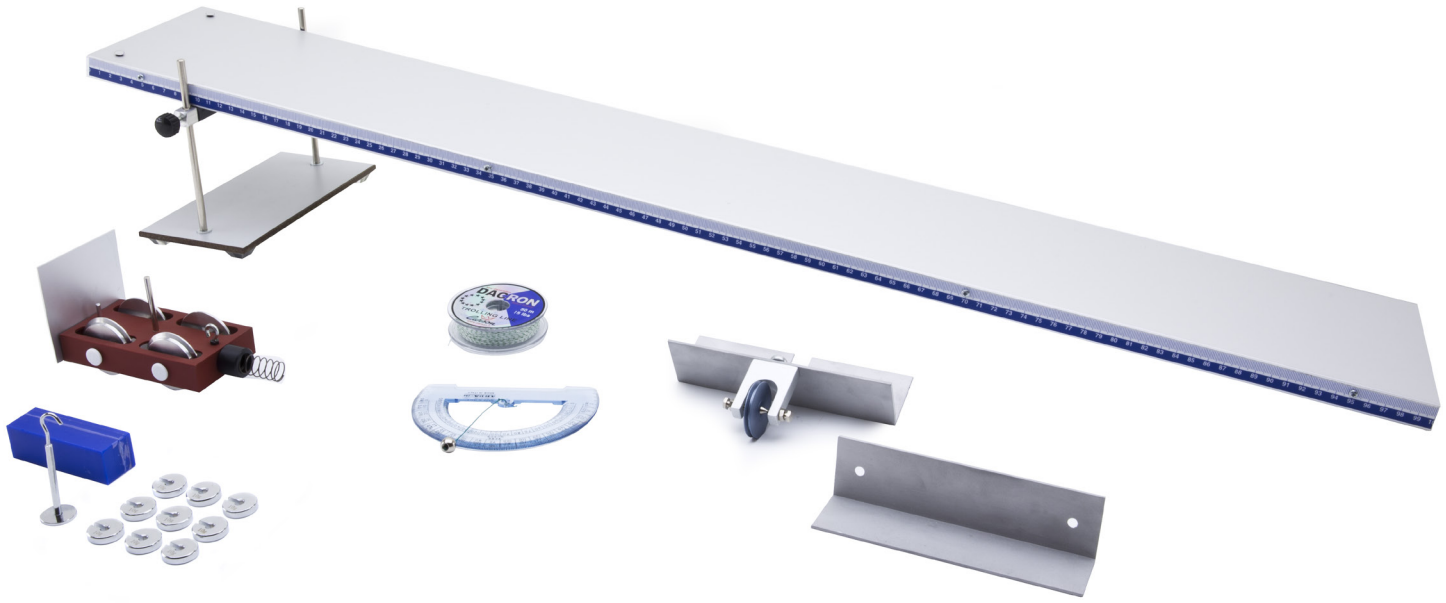
Faraday's law - Neumann	Experience N.3
Faraday's law - Neumann - Lenz	Experience N.4
Experience N.1	Conclusions
Experience N.2	

Material supplied

1 galvanometer
1 coil 1600 turns
1 linear magnet
2 cables 50cm.

Motion plan NEW 8218

The movement plane, made up of the overlapping of a layer of plastic and one of aluminum, allows for an in-depth study of the basic motions of the dynamics:
uniform rectilinear motion and uniformly accelerated rectilinear motion. The uniform motions can be achieved using the plane with the metal surface facing upwards, thanks to the phenomenon of electromagnetic induction generated by the movement of the magnetic carriage on the aluminium. Conversely, by placing the trolley on the plastic surface, it is possible to obtain the accelerated motions. Thanks to the special support, the plane of movement is transformed into an inclined plane which also makes possible considerations on friction and conservation of mechanical energy. For the execution of quantitative experiments it is necessary to have a distance sensor cod. 9041.



8218

Sensor kit (accessory for 8218) 8106

This additional kit to the movement plan allows you to obtain position / time graphs via a simple bluetooth connection, so as to collect the data of the experiences carried out and understand them more deeply.

Topics

- Base
- Double clamp
- Modular metal rod
- USB distance sensor (Korea Digital)

Material supplied

- 1 Base
- 1 Double clamp
- 1 Modular metal rod
- 1 USB distance sensor (Korea Digital)

8106

Apparatus to verify the electromagnetic induction law and the principle of action-reaction 1342

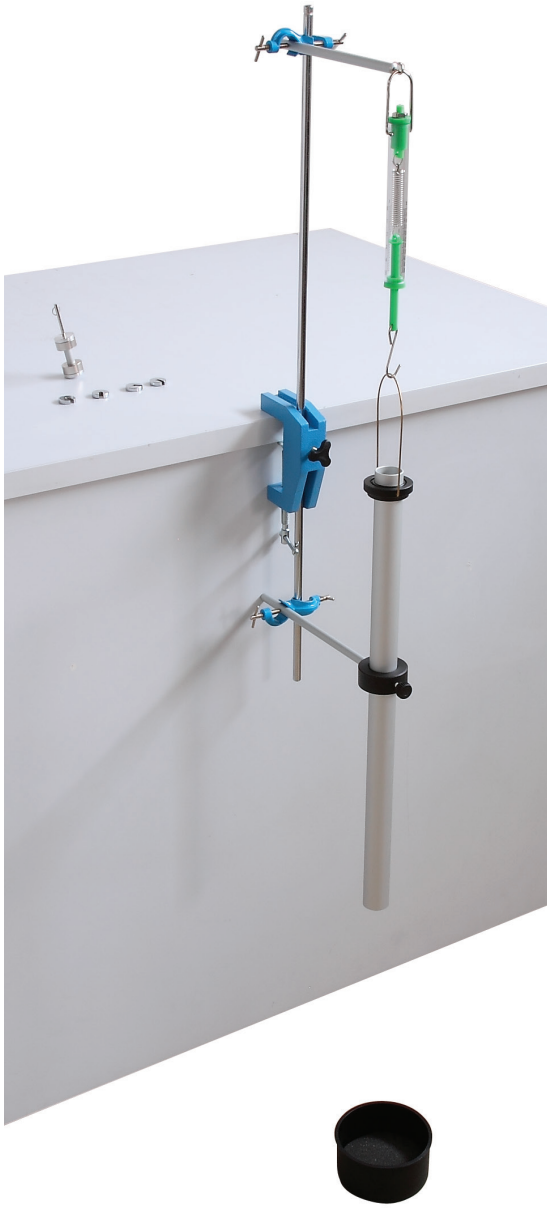
Inside the aluminium tube, a magnet falls with uniform motion.
The explanation is the following: during the fall of the magnet, the aluminium tube is linked to a variable magnetic flux and therefore it has induced currents whose directions, according to Lenz's law, are opposite to what has generated them, i.e. the magnet's motion, in this case.

The consequence is that the latter , in the beginning phase, falls with uniformly accelerated motion because it's moved by a vertical force whose intensity is equal to the difference between its weight P and the electromagnetic force F. This force is proportional and opposed to the speed of the fall, i.e. it is a viscous force: F = - kv. The moment the magnet reaches the speed v0 so that P - kv0 = 0, its motion becomes uniform.

Thanks to the principle of action and reaction, the magnet reacts on the tube with an equal and opposite force and, therefore, during the fall with uniform motion of the magnet, the spring scale measures a force with an intensity equal to the sum of the tube's and the magnet's weights.

Equipment supplied

1 Table clamp
2 Double bossheads
1 Rod 750 x 10 mm
1 Spring scale 1000 g
1 Kit of magnets
4 10 g masses, diameter 4 mm
1 Aluminium tube with ring-shape support
1 Container to collect the magnets
1 Ring-shape PVC support for tube
1 Support for spring scale



1342

Electromagnetic pendulum 8515

Essential item to study electromagnetic interactions. It consists of a linear magnet hanging from a spring and where a spool is located. Starting the magnet's motion, an electromotive force is induced in the spool which is measurable at the resistor's ends. Similarly, making a/c circulate in the spool, the magnet starts its motion.

Topics

- Electromagnetic induction;
- A/c production;
- Electromagnetic resonance.

Equipment supplied

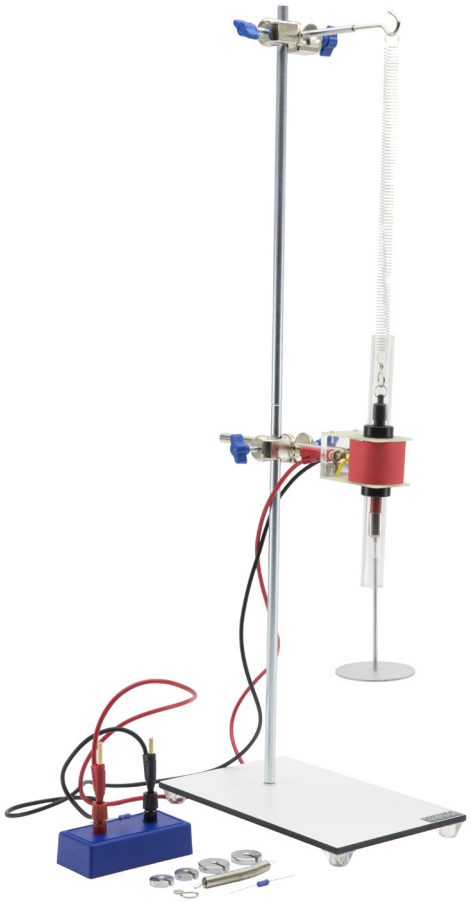
1 1600 turns coil fitted with support and plexiglas tube
1 Linear magnet, diam. 10 mm with support
2 Coil spring
1 Magnetic weights-holder
2 Mass 10 g
2 Mass 20 g
2 Electrical leads 120 cm
1 Rectangular base with rod 10x800 mm
2 Boss-head
1 Bar with hook
1 Base with two bonding posts boss-heads
2 Resistors

Equipment required, not supplied

1 Function generator code 5718

Equipment for online use - not supplied

1 Interface code 9001
2 Voltage sensor code 9029
2 Current sensor code 9027
1 Magnetic field sensor code 9039
or
2 USB Voltage sensor code 9074
2 USB Current sensor code 9073
1 USB Magnetic field sensor code 9067



Suitable to be used with sensors

8515

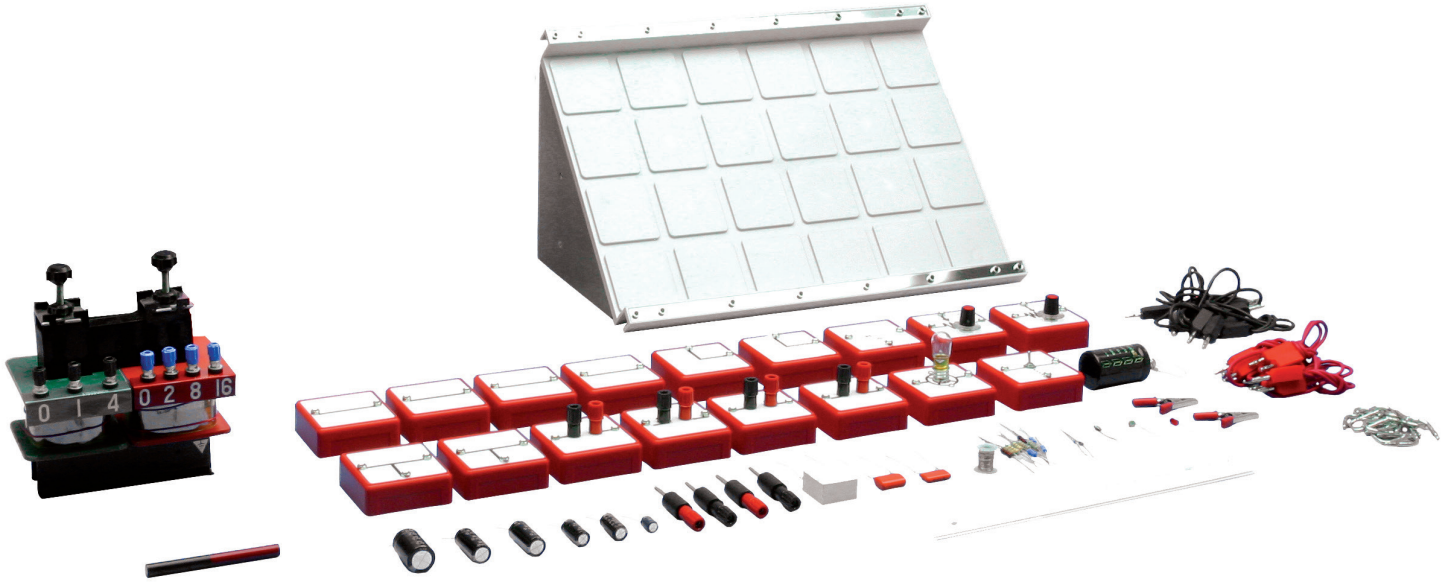
Electromagnetic Fall 5424

A free-falling magnet going through coils produces an induced voltage that lets the LEDs turn on. The production of light energy is obtained at the expense of the kinetic energy of the magnet, which slows down when passing through the coils. If you make a dynamic comparison with an identical magnet, falling down simultaneously along a tube without coils, it can be seen that the latter always comes down first.

5424

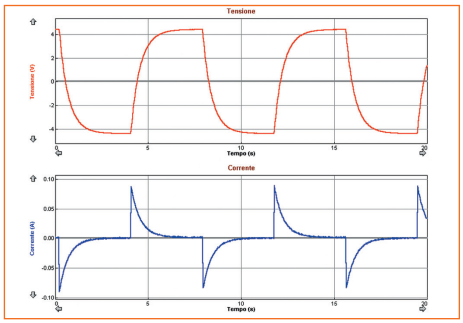
Electromagnetism kit 8514

Laboratory experiments on electrical circuits are difficult due to the use of cables to connect the different parts. It becomes difficult to vary the typology of a circuit without risking incorrect or damaging connections. In addition we risk losing sight of the structure of the circuit. This kit is based on modules which can be quickly assembled on a table. In this way, the type of circuit is immediately recognizable and replacing a part or changing the circuit become simple and quick.



Topics

- Ohm' Laws
- Adjustment in series/parallel
- Charging and discharging of the condenser
- Autoinduction
- The reactive components in a/c
- Magnetic field in a solenoid
- Electromagnetic induction
- Tranformer
- Oscillator circuits
- Resonance
- Rectifier circuit



Charge and discharge of a capacitor

To perform the experiment "the magnetic field in a solenoid" is recommended the product code 5178 "Extensible solenoid".

Equipment supplied

1 Assembling table	2 "T" conductors	1 Kantal wire	1 Modular transformer
14 U bolts	4 Linear conductors	2 Crocodile clips	1 Linear ruler
1 Set of 10 resistors	2 "L" conductors	1 Potentiometer, 22 Ω	1 Set of spring hook for magnet
1 Set of 4 non linear dipoles	1 Switch	1 Bulb holder	1 pdf teaching guide
1 Set of 10 Capacitors	4 Universal connectors	1 Bulb	4 Extensions to crocodile clips
10 Electrical leads	4 Insulators	1 Bar magnet	

Equipment required - not supplied

1 Generator of low frequency signals	code 5718
1 Power unit 0-5A	code 5248

Equipment for online use - not supplied

1 Interface code 9001
1 Magnetic field sensor code 9039
2 Voltage sensor code 9029
2 Current sensor code 9027
or
1 USB magnetic field sensor code 9067
2 USB voltage sensor code 9074
2 USB current sensor code 9073

Suitable to be used with sensors

Plasma sphere 5367

Glass sphere Ø 20 cm, containing a rarefacted gas mixture. The central electrode has an alternating voltage of 10.000 volt; for this reason it creates electric discharges which spread toward the outside. If you move your finger close to the surface, the discharges concentrate in proximity to your finger because of the conductivity of the human body. So the sphere can be used to distiguish conducting objects from insulating objects. It can be used to prove the existence and the nature of electromagnetic waves, too. In fact, a neon tube moving close to the sphere lights up because of the energy carried by the electromagnetic waves. If you interpose a paper sheet, the phenomenon goes on ,because the waves pass through it. But if you interpose a sheet of conducting metal, such as aluminium, the waves are screened and the phenomenon stops.

5367

Cathode ray tube for magnetic deflection 5222

In this tube a white, fluorescent screen, appropriately inclined, allows you to visualise the deflection of a beam of electrons produced by a magnet. We suggest the use of the "U" shaped magnet code 5173 and operation is only guaranteed with the Ruhmkorff's coil code 5208. Two connecting leads (5013) and two alligator clips 5062N, 5062R are required. (not supplied).

5222

Cathode ray tube with whirl 5223

This tube enables you to show the mechanical effects of cathode rays. In fact a small, fluorescent whirl , which can rotate with little friction, starts spinning the moment the cathode ray beam hits it. Operation is only guaranteed with the Ruhmkorff's coil code 5208. Two connecting leads (5013) and two alligator clips 5062N, 5062R are required. (not supplied).

5223

Apparatus for the measurement of the e/m ratio 5304

The main part cosists of a hot cathode Thomson's tube, whose filament must be fed with a voltage of 6,3V ac and whose anode must be fed with a voltage of 1500-5000 V dc. The beam of electrons produced is deflected by an electric field produced by a generator of medium voltage and by magnetic field created by two Helmholtz reels. The measure of the electron specific charge can be determined with a percent mistake of 5% .

Topics

- Nature of the cathode rays
- Electric and magnetic deflection
- Evaluation of the ratio e/m with a grom percentage less than 5%

Separate purchase of generators is required to power the appliance code 5229 , 5324 and 5292. As an alternative to the alternator 5229 it is possible to purchase the 4991 power supply.

5304

Malta cross tube 5224

With this tube it is possible to prove that cathode rays spread in a straight line. A Malta cross- like metal screen can be placed to intercept the cathode ray beam, producing a shadow zone on the screen which satisfies the laws of rectilinear propagation. Operation is only guaranteed with the Ruhmkorff's coil code 5208. Dimension: 45x17x60 cm.

5224

Led light wavelength measurement kit 5392

The light emitted by a LED, is not monochromatic; it covers a small frequency band. If you want to measure Planck's constant with a LED , it is necessary to know this band medium frequency, which is easy to measure with this kit that exploits the diffraction grating.

Equipment supplied

1 Linear ruler
1 LED projector with power unit
1 Lens +10 with lens holder
1 Filter holder
1 Diffraction grating 500l/mm
1 Base for LED
3 Bases
1 White screen
1 Case

5392

Photoelectric effect 5435

Thanks to this apparatus you are allowed to study the photoelectric effect, retracing the fundamental steps that have underlined the unsuitableness of the classic mechanics and have introduced all these new concepts thanks to which the quantum mechanics was born.
The photoelectric effect or photoemission is the production of electrons or other free carriers when light is shone onto a material. Varying the voltage across the phototube, you will be able to check the relation between the energy of the emitted electrons and the wavelength of the incident radiation. Thanks to Einstein notion regarding photoelectric effect, you will also be able to estimate the value of the Planck constant. This instrument is a good starting point to study quantum mechanics. It is basically composed of two parts: a phototube and a control unit (in which is built-in a voltmeter and a nanoammeter). Three LEDs, with average wavelength known, are supplied.
The light intensity could be varied from 0 to 100%.

Technical data
Power supply: 24V DC
Voltmeter 4 digits, sensibility: <2mV
Ammeter 4 digits, sensibility < 5nA
Button to cut off current
LED light adjustment 0-100%
Anodic tension adjustment

Topics

- How to use it
- Historical notes on the nature of light
- Electromagnetic waves
- Intensity of electromagnetic waves
- Photoelectric effect
- Photoelectric cell
- Work function
- Threshold frequency
- Characteristic graphic of a photocell
- Stopping potential
- Kinetic energy of electrons doesn't depend on radiation intensity
- The number of emitted electrons depends on radiation intensity
- Summary
- Einstein quantum theory
- How Einstein quantum theory explains events
- How to value threshold frequency
- How to measure Planck constant

Equipment supplied

3 LEDs (green, red and blue)
1 Base with phototube
1 Unit control
1 Power supply 24 V DC

5435

Planck's constant measurement kit 5410

The measurement of Plack's constant can be obtained also exploiting the quantum properties of the LED diodes. If a LED diode is directly polarized, it starts emitting light the moment the potential energy produced by the electrons, is enough to make them pass from the conduction band to the valence band (Energy gap). As consequence of this energy gap , every electron emits one photon of energy

$$hf = eVs$$

If you know the potential Vs in correspondence of which the LED starts emitting a weak light , it is possible to go back to the value of h.
3 LED are supplied, red green and blue, in order to verify that the higher the energy gap is, the more intense the emitted light frequency becomes.

5410

Kit to study the solid state 5413

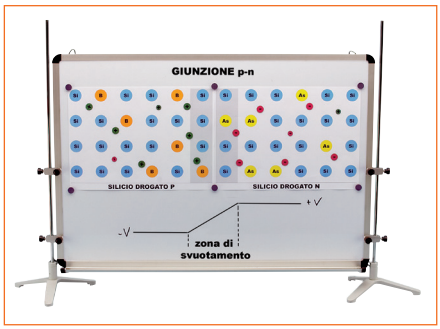
In 1948 when the american physicists h. Brattain, w. And j.Bardeen shockley discovered the transistor effect, the electronic technique has implemented an extraordinary evolution. This kit has been designed to make it easier for students to grasp concepts which are not very intuitive. It consists of a series of explanation charts to be applied on a magnetic board. The interactive feature of the kit allows the teacher to simulate some processes of interaction between photons and matter, showing the passages from a situation to the following one. For performing these experiences, you must have a magnetic whiteboard and a low voltage regulated power supply.
We recommend code 5360.

Topics

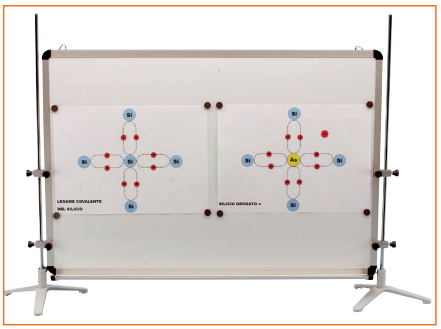
- Atomic energy levels
- The metals crystal lattice
- Energy bands
- Allowed bands and forbidden bands
- Insulators, conductors and semiconductors
- The Ohmic conductor
- The PTC thermistor
- The NTC thermistor
- The photoresistor
- Semiconductors doping
- The junction diode
- The Led
- How to measure the Planck's constant
- The reversibility of the Led
- The photovoltaic cell
- The solar panels

Equipment supplied

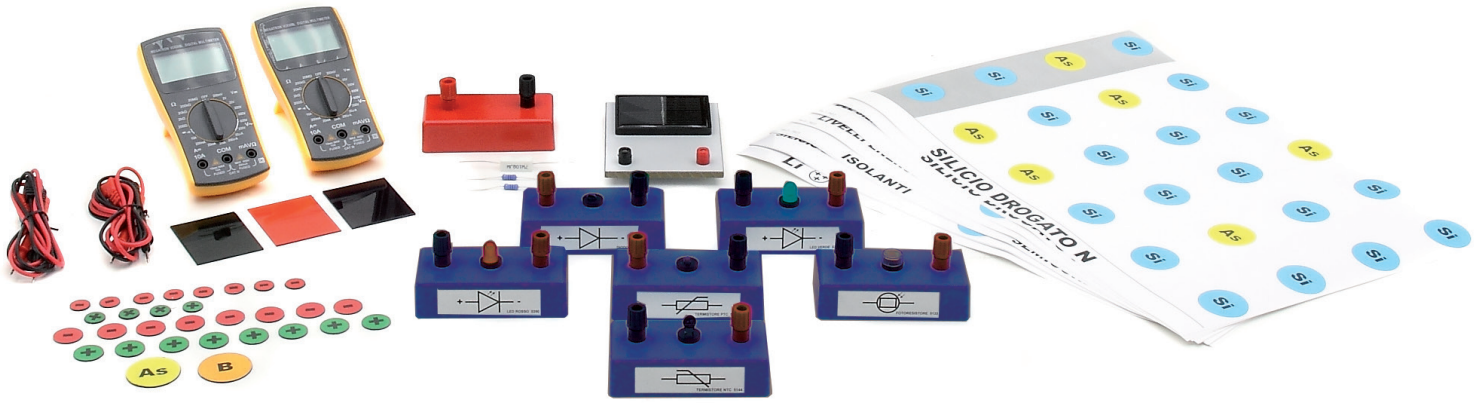
1 Red filter
1 Green filter
1 Purple/blue filter
1 Resistor holder base
1 Photoresistor on base
1 Thermoresistor NCT
1 Silicon Diode on base
2 Portable digital multimeters
1 Photovoltaic panel
1 PTC thermistor
1 Red led on base
1 Green led on base
1 Resistor 10 Ω 7W
1 Resistor 1 KΩ 2W
1 Resistor 100 Ω 2W
1 Set of 11 Tables
1 Small case for tables
1 Set of magnetic tokens
1 Box



Silicon N-doped



Silicon P-doped



5413

Index

Teaching guide in digital format

Minimum invoiced order: € 130,00 + VAT

The transfer of energy

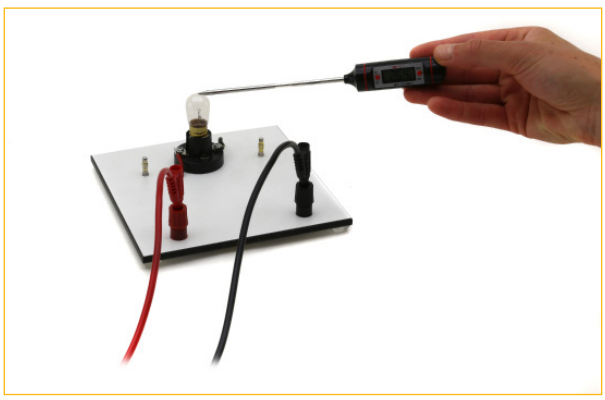
NEW

8140

Everyone knows that energy in the Universe is conserved, but have we ever wondered how this is possible? The answer is: through the transformations of energy.
In fact, energy exists in different forms and the conversion from one form to another allows its conservation.
With this kit it is possible to experience the main forms of energy and the different transformations that involve them: from the transformations of mechanical energy with and without the transport of matter, through the transfers of thermal energy through work and through the phenomena of irradiation, conduction and convection.

Topics

- Conservation of mechanical energy
- Mechanical energy transfer
- Mechanical energy transfer with material displacement
- Mechanical energy transfer without moving matter
- Mechanical waves
- Internal energy
- Molecular thermal agitation
- How to transfer thermal energy with work
- Other ways to transfer thermal energy
- Thermal conduction - heat
- Convection
- Thermal radiation
- Electromagnetic waves
- The principle of thermal radiation
- Irradiation and temperature
- The irradiation and the state of the surfaces
- The thermal equilibrium by radiation
- Solar radiation
- Solar energy incident on earth
- The greenhouse effect
- Air pollution
- Global warming



8140

MECHANICAL ↔ ELECTRICAL

Hydraulic turbine 5314

This model of hydraulic turbine permits to demonstrate the conversion of potential hydraulic power in electrical power, without using water sources.
It is fitted with an immersion pump which takes the water from the small basin and throws it against the turbine blades generating a continuous cycle. A voltmeter measures the voltage at the clamps of the dynamo and the electrical power produced can switch on a LED or make a small electric motor fitted with blade rotate.
The pump needs a continuous 12 V voltage. The use of power supply cod. 4991 (not supplied with the instrument) is suggested.

5314

Air generator 5316

Thanks to this generator it is possible to make work the wind turbine even in the

5316

Wind turbine model 5315

Used to demonstrate the conversion of wind kinetic energy into electrical power. Exposing the turbine to the wind, the movement power is transmitted to a small generator that transfoms it in to electric power.
Size: 25 x 25 x 30 cm.

5315

Small electrical motor 5276

Supplied in an assembly kit. Working with 3-6 V dc voltage. Suitable to develop practical capacities of students and make them understand how an electrical motor works.

5276

AC/DC motor generator, demonstration model 5803

It is an excellent demonstration model for studing electric current eneration. The generator produces AC/DC current when the hand wheel is turned. The presence of AC/DC voltage is visualized by lighting of bulbs. Cables included.

5803

THERMAL ↔ MECHANICAL

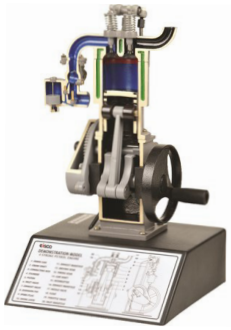
Two-stroke engine 2071

Operating section of a two-stroke engine with carburettor. Turn the crank handle, the spark of the candle coincides with the switch on of a light bulb powered by a 4,5 volt battery.

2071

Four-stroke engine 2101

This model shows the internal structure and the principle of operation of a diesel four-stroke engine water cooled.
Acting on the crank handle, the moving engine parts are visible. A light bulb simulates the spark of the spark plug (requires as a power supply 2 AA batteries not included).



2101

Diesel engine 2102

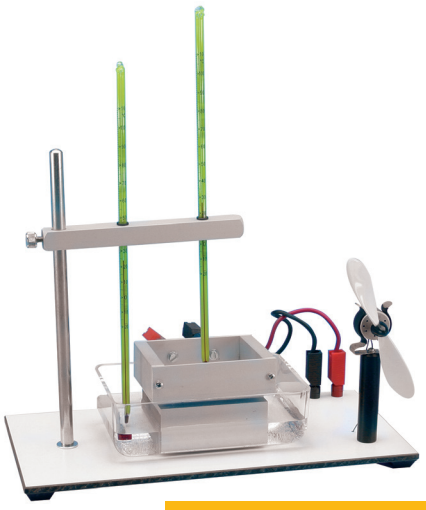
This model shows the internal structure and the principle of operation of a diesel four-stroke engine water cooled.
Acting on the crank handle, the moving engine parts are visible. A light bulb simulates the spark of the spark plug (requires as a power supply 2 AA batteries not included).

2102

ELECTRICAL ↔ THERMAL

Thermoelectric generator 5350

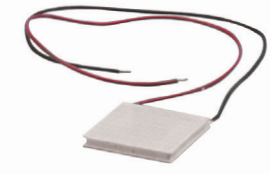
The sensitive part of this item consists of a Peltier cell. It is in contact on one side with a small aluminium wing to be immersed in hot water, on the other side with a small basin to be filled with ice and cold water. Due to the Seebeck effect, the difference in temperature produces a difference in potential that is noticeable at the terminals, this difference can make a small electric motor work: applying a difference in potential to the terminals (max 12V), due to Peltier effect, a great difference in temperature is set between the two faces of the ceramic bloc



5350

Peltier's cell 5374

It consists of 144 doped silicon bars, serial connected and close in a ceramic block.
Maximum voltage: 12V.



5374

RADIANT ↔THERMAL

Solar water heater 2000

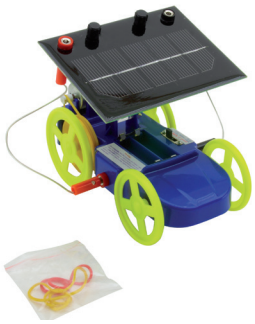
It is a model of the domestic use devices. Thanks to this item you can heat water by means of sun radiant power.
An immersion pump, working at 12 Vcc, make the water circulate in the heating coil of the solar panel.
After a few minutes it is possible to notice an increase in temperature.
It is supplied with a transformer.
The proposed experiment can be carried out using the temperature sensor (not supplied) Cod. 12903-00

2000

RADIANT ↔ ELECTRICAL ↔ MECHANICAL

Model of solar vehicle 5319

This model gets electric power from the solar panel.
When it is exposed to the sun it starts to move autonomously.



5319

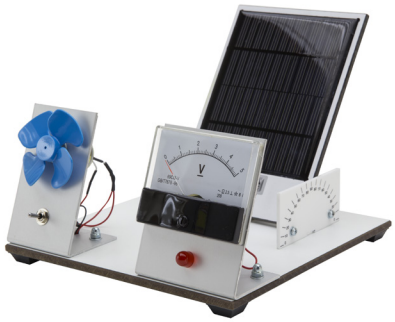
Solar energy motor 5317

Exposing the item to the sun, the panels convert solar energy into electrical power which can be used to make the disk rotating.
Size: 100x120 mm.

5317

Photovoltaic panel 5318

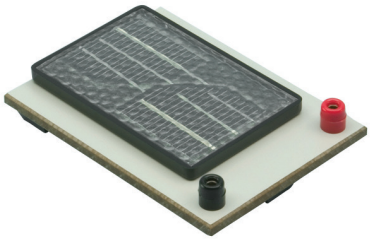
Exposing the panel to the sun you will get the transformation of solar power into electrical power thanks to which the motor starts to rotate, or a light bulb switches on. The panel is tilted and supplied with a protractor so you can easily evaluate its performance according to the angle of the solar rays incidence.



5318

Photovoltaic panel with base 5311

Suitable for rendering measurements.
Panel size: 10 x 6,5 cm.
V_{DC}max = 1,3 V.



5311

Fuel cell with separable devices 5412

This item permits measurements concerning conversion of light power into electrical energy.
The light energy produced by a 75 W lamp(similar to solar energy) is converted into electrical power by a photovoltaic panel.
This electrical energy is used to separate, thanks to a PEM electrolytic cell, (Proton Exchange Membrane) water molecules in the constituent components (with an increase in chemical potential energy contained in hydrogen and oxygen gases).
The two gases are mixed again through a PEM fuel cell, producing water and electric energy again, which is used to operate a fan (mechanical energy) by a small electric motor. The two PEM cells are identical and are both used as electro-chemical converters, once in a direction and then in the opposite.
The measurement of electrical quantities can be performed by means of two multimeters. it is possible to detect as vary the electrical quantities during the operation, making use of voltage and current sensors.

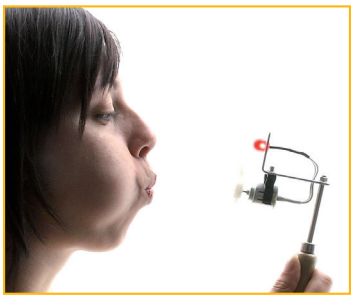
Equipment supplied

- 1 Base
- 1 Projector
- 1 220 V - 75 W lamps
- 1 Solar panel
- 1 PEM electrolytic cell with tanks
- 1 PEM fuel cell
- 1 Small motor with fan
- 2 Analogical portable multimeter
- 4 Electrical leads
- 1 Syringue
- 2 Taps
- 4 Adaptors
- 1 Distil water bottle
- 2 Tubes
- 2 Plugs

5412

Wind device 5423

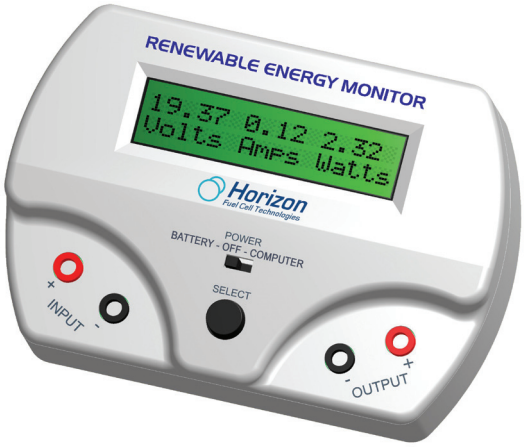
Blowing on the blades, a LED turns on to show that wind power has transformed into electric energy.



5423

Renewable Energy Monitor HZ07

Monitoring device with LCD display, designed to detect via PC the performances of all fuel cells and demonstration kits. Possibility to evaluate real-time voltage, current, power, resistance and even kit rotation speed with miniature wind turbines. The tool also works with battery power, can be used with or without a PC and away from electric energy sources.



HZ07

Hydro-Wind Kit HZ08

Capture wind power!
With this kit you can use the energy produced by a wind generator to power a fuel and hydrogen cell.

HZ08

Wind Energy Science Kit HZ10

Miniature wind turbine designed to assess how different quantities, sizes and blade angles influence the amount of energy produced. This kit contains 4 different models of blades, a special 3-phase AC alternator and a small device equipped with a LED voltmeter and a module for the reproduction of musical sounds.

HZ10

Index

Teaching guide in digital format

Minimum invoiced order: € 130,00 + VAT

OPTIKA AB-Shield

Optika AB-Shield is a particular paint applicable to several surfaces, which guarantees the elimination and prevention of bacterial growth in sensitive areas of the instrument.
This treatment guarantees a strong antibacterial effect thanks to the use of micro-silver, highly effective in destroying 99.9% of surface bacteria.
The antibacterial effect remains for the entire duration of the painting and eliminates bad smells caused by bacteria. Efficacy against resistant bacteria such as MRSA, E-Coli, EHEC etc. is proven.
Optika AB-Shield is available as an option for your new microscope, thus making its use safer, especially when it needs to be shared among several people.
The effectiveness has been successfully tested, following the standard international ISO 22196 "Measurement of antibacterial activity on plastic and other non-porous surfaces", against Staphylococcus aureus DSM 346 / ATCC 6538P and Escherichia coli DSM 1576 / ATCC 8739.
The tests conducted have obtained excellent results, verifying both the bacteriostatic properties (growth inhibitors) than bactericidal (killing of bacteria).

These kits have been designed for outdoor use.
With them it is possible to collect samples of waters, grounds and insects and then to analyze them with a biological microscope or a stereo microscope.
Both kits are supplied with all instruments necessary to work on the field, and the supplied microscopes have a revolutionary illumination system.
Both instruments are able to keep working for the whole day with the rechargeable batteries (not provided) they are endowed with, thanks to the use of low-consumption LED light sources.

On-field stereomicroscopy kit — FLM-1

This kit is suitable for the research of insects and small animals living in lawns , in the ground, etc.
It contains the equipment for animal dissection.

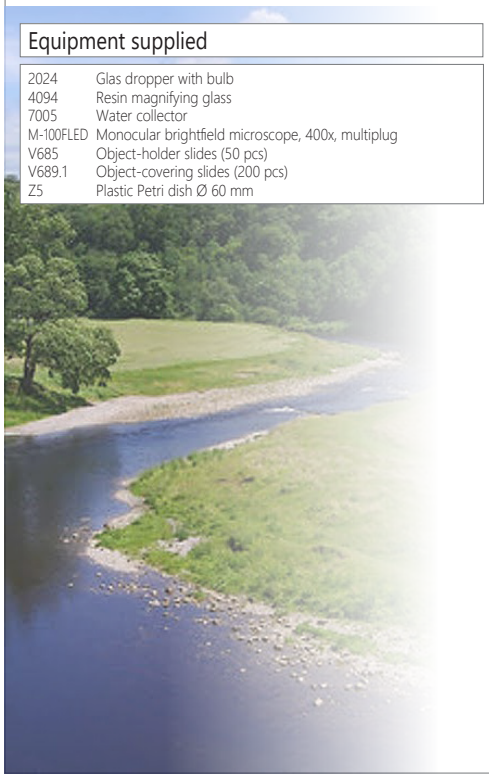
Equipment supplied

4026	Centimetric insects magnifier 4x
4984	Magnifier Ø25 mm 10x with nipper
7006	Insect collector
7007	Landing net 10 cm
8135	Dissection board
15050	Dissection set
SFX-31	Binocular stereomicroscope, multi-plug
Z5	Plastic Petri dish Ø60 mm

FLM-1

On-field microscopy kit — FLM-2

This kit is suitable for the research of micro-organisms living in the water of rivers, creeks and ponds.



Equipment supplied

2024	Glas dropper with bulb
4094	Resin magnifying glass
7005	Water collector
M-100FLED	Monocular brightfield microscope, 400x, multiplug
V685	Object-holder slides (50 pcs)
V689.1	Object-covering slides (200 pcs)
Z5	Plastic Petri dish Ø 60 mm

FLM-2

B-60 SERIES

A wide range of cordless, modern microscopes ideal for students and mainly primary schools with achromatic lenses, FN 18, finite optical system, coaxial focusing, StagErase™ eraseable mechanical stage and 1 W LED illumination with rechargeable batteries. Slim and easy to carry, all the models are equipped with arm/wrist rest support to reduce the fatigue during use and long lasting LED illumination to provide over 20 years of use.

StagErase™ eraseable stage to remove scratches

Here's something you've never seen before! This new, revolutionary stage is coated with a special painting to reduce accidental scratches to the minimum and facilitate their removal.

Cordless use, totally independent from the mains connection

All models work with or without the batteries (not provided) in place and are provided with three NiMH rechargeable batteries for outdoor use (4-hour autonomy, at medium intensity).

Low voltage, external power supply for enhanced safety and convenient servicing

OPTIKA's safety first approach drives to the use of a multi-plug, external power supply in order to prevent any risk of electric shock and heatflow inside the unit.

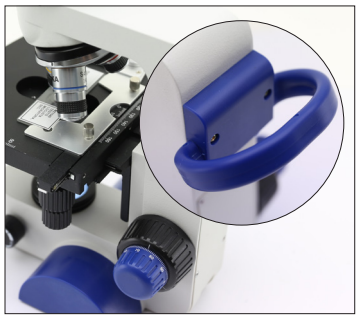
Longlife LED illumination (providing over 20 years of use)

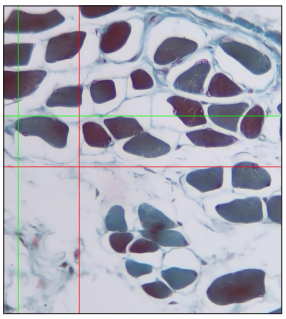
Money & energy saving thanks to LED long lifetime (65.000 hours, 22 years in case of 8 hours/day) which is more than 20 times compared to a standard halogen bulb.

NEW - New B-61V and B-62V bundles

Equipped with a large 7 "LCD monitor, they allow a comfortable real-time view of the preparations with the ability to share the experience with teachers and students.
The system allows the capture of images and videos, and is equipped with an SD card (included) to easily save your work. The resolution of the Full-HD sensor is 2Mp with frame rate at 30fps @ 1920x1080, intuitive menu with camera function controls and the ability to perform simple measurements. By removing the screen and replacing the head (always supplied), the instrument will become a conventional microscope for a direct visual experience.

Available models:
B-61V e B-62V





Monocular microscope B-61

Cordless, modern monocular microscope ideal for students and mainly primary schools with achromatic lenses (400x), FN 18, finite optical system, coaxial focusing, StagErase™ eraseable fixed stage and 1 W LED illumination with rechargeable batteries. Slim and easy to carry, it is equipped with arm /wrist rest support to reduce the fatigue during use and long lasting LED illumination to provide over 20 years of use.

B-61

Monocular microscope B-65

Cordless, modern monocular microscope ideal for students and mainly primary schools with achromatic lenses (1000x), FN 18, finite optical system, coaxial focusing, StagErase™ eraseable mechanical stage and 1 W LED illumination with rechargeable batteries. Slim and easy to carry, it is equipped with arm /wrist rest support to reduce the fatigue during use and long lasting LED illumination to provide over 20 years of use.

B-65

Binocular microscope B-69

Cordless, modern binocular microscope ideal for students and mainly primary schools with achromatic lenses (1000x), FN 18, finite optical system, coaxial focusing, StagErase™ eraseable mechanical stage and 1 W LED illumination with rechargeable batteries. Slim and easy to carry, it is equipped with arm /wrist rest support to reduce the fatigue during use and long lasting LED illumination to provide over 20 years of use.

B-69

B-60 Series - Comparison chart

Model	Head	Eyepieces	Nosepiece	Objectives	Stage	Focusing	Condenser	Illumination
B-61	Monocular, 360° rotating, 45° inclined	Wide Field 10x/18mm	Quadruple, reversed	Achromatic 4x, 10x, 40x	Fixed, 120x110 mm	Coaxial coarse and fine focusing	N.A. 0.65 with iris diaphragm	1 W LED, brightness control
B-62	Monocular, 360° rotating, 45° inclined	Wide Field 10x/18mm	Quadruple, reversed	Achromatic 4x, 10x, 40x	Mechanical, 125x125 mm with 62x24 mm X-Y moving range	Coaxial coarse and fine focusing	N.A. 1.25 Abbe type with iris diaphragm	1 W LED, brightness control
B-63	Monocular, 360° rotating, 45° inclined	Wide Field 10x/18mm	Quadruple, reversed	Achromatic 4x, 10x, 40x, 60x	Mechanical, 125x125 mm with 62x24 mm X-Y moving range	Coaxial coarse and fine focusing	N.A. 1.25 Abbe type with iris diaphragm	1 W LED, brightness control
B-65	Monocular, 360° rotating, 45° inclined	Wide Field 10x/18mm	Quadruple, reversed	Achromatic 4x, 10x, 40x, 100x (oil)	Mechanical, 125x125 mm with 62x24 mm X-Y moving range	Coaxial coarse and fine focusing	N.A. 1.25 Abbe type with iris diaphragm	1 W LED, brightness control
B-66	Binocular, 360° rotating, 30° inclined	Wide Field 10x/18mm	Quadruple, reversed	Achromatic 4x, 10x, 40x	Mechanical, 125x125 mm with 62x24 mm X-Y moving range	Coaxial coarse and fine focusing	N.A. 1.25 Abbe type with iris diaphragm	1 W LED, brightness control
B-67	Binocular, 360° rotating, 30° inclined	Wide Field 10x/18mm	Quadruple, reversed	Achromatic 4x, 10x, 40x, 60x	Mechanical, 125x125 mm with 62x24 mm X-Y moving range	Coaxial coarse and fine focusing	N.A. 1.25 Abbe type with iris diaphragm	1 W LED, brightness control
B-69	Binocular, 360° rotating, 30° inclined	Wide Field 10x/18mm	Quadruple, reversed	Achromatic 4x, 10x, 40x, 100x (oil)	Mechanical, 125x125 mm with 62x24 mm X-Y moving range	Coaxial coarse and fine focusing	N.A. 1.25 Abbe type with iris diaphragm	1 W LED, brightness control

B-60 Series - Accessories

M-001 Huygens 5x eyepiece
M-002.2 WF10x/18 eyepiece
M-003.2 WF15x/12 eyepiece
M-004.2 WF10x/18 micrometric eyepiece
M-008.2 WF10x/18 eyepiece, with pointer
M-162 WF20x/10 eyepiece
M-131 Achromatic objective 4x/0.10
M-132 Achromatic objective 10x/0.25
M-133 Achromatic objective 20x/0.40
M-134 Achromatic objective 40x/0.65
M-135 Achromatic objective 60x/0.85
M-136 Achromatic objective 100x/1.25 (oil)
M-040 Attachable mechanical stage (only for B-61)
M-155.2 Polarising set (filters only)
M-114 0.5x C-Mount projection lens
M-115 0.35x C-Mount projection lens
M-118 0.75x C-Mount projection lens
M-970 Plane-concave mirror, with base (only for B-61)
M-005 Micrometric slide, 26x76mm, with 2 scales (1mm/100 & 10mm/100)
DC-001 Plastic dust cover, small, 340(l)x400(h) mm
M-069 Solar charger
15008 Immersion oil, 10ml
15009 Immersion oil, 100ml
15104 Cleaning kit
AB-010 Antibacterial surface treatment, only for newly purchased microscope

ECOVISION SERIES

Monocular biological microscopes designed especially for students attending primary school.
Obtain clear images at three (40x, 100x and 400x) powers with this basic series offering sturdy and compact structure but very easy to be carried. Choose the most suitable microscope according to the required application.

Easy To Carry Solutions
This series is characterized by extreme compactness and portability as models can be moved easily in the classroom or even outdoors. The body of the microscope is slim and, according to the model, provided with a useful handle: the teaching activity will be facilitated and more enjoyablei.

Extremely Easy And Fast Vision
You find here the basic controls of an optical microscope and all you need to start learning to use a scientific instrument. Pre-aligned illumination and condenser simplify the operation and make necessary just the focusing of the specimen by using the dedicated knobs.

LED - Optimized Illumination
Money & energy saving thanks to LED long lifetime (65.000 hours, 22 years in case of 8 hours/day) which is more than 20 times compared to a standard halogen bulb.

Easy and intuitive use for student

Long-life LED illumination

ECOVISION Series - Technical features

Observation mode: brightfield
Head: monocular and binocular, 30° and 45° inclined, 360° rotating.
Eyepiece: WF 10x/18.
Nosepiece: Triple and quadruple revolving nosepiece, rotation on ball bearings.
Objectives: Achromatic (4x, 10x, 40x) with an anti-fungus treatment.
Specimen stage:
B-20R: round, 360° rotating, 90 mm diameter, with sample clips.
B-20CR: double layer, 105x95 mm, moving range 50x15 mm.
M-100FX / M-100FLed: fixed, 120x110 mm, with sample clips.
Focusing:
B-20R / M-100FX / M-100FLed: Separate coarse and fine focusing mechanism with limit stop to prevent the contact between objective and specimen.
B-20CR: Coaxial coarse and fine focusing mechanism with limit stop to prevent the contact between objective and specimen.
Condenser:
B-20R: diffusing filter with rotating diaphragm wheel.
B-20CR / M-100FX / M-100FLed models: N.A. 0.65, fixed, iris diaphragm.
Illumination:
B-20R: 0.3 W LED, manual brightness control, rechargeable batteries.
B-20CR: 0.5 W LED, manual brightness control, rechargeable batteries.
M-100FX: 1 W LED.
M-100FLed: 0.5 W LED, manual brightness control, rechargeable batteries.

Monocular microscope B-20R

Equipped with efficient LED illumination with rechargeable batteries (not provided) and comfortable handle, being ideal even for the youngest students.

Monocular microscope B-20CR

Complete of mechanical stage, condenser, coaxial focus knobs and LED illumination with rechargeable batteries.

Monocular microscope M-100FX

Equipped with LED illumination, 45° inclined and 360° rotating head. Optional 60x and 100x objectives available.

Monocular microscope M-100FLed

Equipped with efficient LED illumination and internal rechargeable batteries which provides up to 8 hours of outdoor use. Optional 60x and 100x objectives available.

ECOVISION Series - Comparison chart

Model	Head	Eyepieces	Nosepiece	Objectives	Stage	Focusing	Condenser	Illumination
B-20R	Monocular, 45° inclined, 360° rotating	WF 10x/18	Triple reversed	Achromatic 4x, 10x, 40x	X-Y moving, 360° rotating, 90 mm diameter, with sample clips	Separate coarse and fine	Diffusing filter with rotating diaphragm wheel	0.3 W LED, manual brightness control, rechargeable batteries
B-20CR	Monocular, 45° inclined, 360° rotating°	WF 10x/18	Triple reversed	Achromatic 4x, 10x, 40x	Double layer, 105x95 mm, moving range 50x15 mm	Coaxial coarse and fine	N.A. 0.65, fixed, iris diaphragm	0.5 W LED, manual brightness control, rechargeable batteries
M-100FX	Monocular, 45° inclined, 360° rotating°	WF 10x/18	Triple	Achromatic 4x, 10x, 40x	Fixed, 120x110 mm, with sample clips	Separate coarse and fine	N.A. 0.65, fixed, iris diaphragm	1 W LED
M-100FLed	Monocular, 45° inclined, 360° rotating°	WF 10x/18	Triple	Achromatic 4x, 10x, 40x	Fixed, 120x110 mm, with sample clips	Separate coarse and fine	N.A. 0.65, fixed, iris diaphragm	0.5 W LED, with brightness control, rechargeable batteries

ECOVISION Series - Accessories

Accessori per B-20R / B-20CR

M-002.2 WF10x/18 eyepiece
M-003.2 WF15x/12 eyepiece
M-004.2 WF10x/18 micrometric eyepiece
M-008.2 WF10x/18 eyepiece, with pointer
M-162 WF20x/10 eyepiece
M-114 0.5x C-Mount projection lens
M-115 0.35x C-Mount projection lens
M-118 0.75x C-Mount projection lens
M-005 Micrometric slide, 26x76mm, with 2 scales (1mm/100 & 10mm/100)
M-069 Solar charger
DC-001 Plastic dust cover, small, 340(l)x400(h) mm
15104 Cleaning kit

Accessori per M-100FX / M-100FLed

M-001 Huygens 5x eyepiece
M-002.2 WF10x/18 eyepiece
M-003.2 WF15x/12 eyepiece
M-004.2 WF10x/18 micrometric eyepiece
M-008.2 WF10x/18 eyepiece, with pointer
M-162 WF20x/10 eyepiece
M-131 Achromatic objective 4x/0.10
M-132 Achromatic objective 10x/0.25
M-133 Achromatic objective 20x/0.40
M-134 Achromatic objective 40x/0.65
M-135 Achromatic objective 60x/0.85
M-136 Achromatic objective 100x/1.25 (oil)
M-114 0.5x C-Mount projection lens
M-115 0.35x C-Mount projection lens
M-118 0.75x C-Mount projection lens
M-040 Attachable mechanical stage
M-099 Polarising set (filters and rotating stage)
M-005 Micrometric slide, 26x76mm, with 2 scales (1mm/100 & 10mm/100)
M-069 Solar charger
DC-001 Plastic dust cover, small, 340(l)x400(h) mm
15008 Immersion oil, 10ml
15009 Immersion oil, 100ml
15104 Cleaning kit
AB-010 Antibacterial surface treatment, only for newly purchased microscope

MICROSCOPES B-150 SERIES

The B-150 series has been designed to fulfill all requirements of educational laboratories. Obtain clear images at three (40x, 100x and 400x) or four (40x, 100x, 400x and 600x or 1000x) magnifications with 18mm field number. All in a compact and easy to carry size. The entire series is equipped with 1W LED illumination for bright and uniform light. If a cordless microscope is needed, the R Models are is your choice as they come with a rechargeable battery.

Same Objective For Oil And Water Use - Unparalleled Time & Money Savings
This new and revolutionary obyective is something never seen before! Used with oil, it ensures the best achievable performance in terms of image resolution; with water, you get good quality and unparalleled comfort, eliminating all the tedious cleaning tasks typical of oil.

The Most Comprehensive Series Dedicated to Students
B-150 comes in a variety of models to meet your needs. Standard brightfield, models with internal rechargeable batteries (R Models), with automatic light control (ALC Models), a version ready for polarization analysis (P Models), and models with built-in camera (D Models) for image acquisition.

LED With Rechargeable Battery - Optimized Illumination
Money & energy saving thanks to LED long lifetime (65.000 hours, 22 years in case of 8 hours/day) which is more than 20 times compared to a standard halogen bulb.

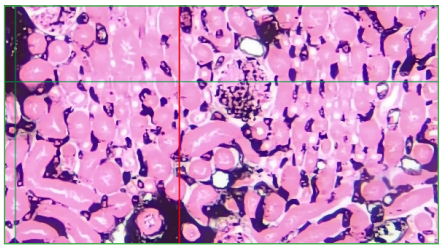
Rechargeable models are equipped with N-PLAN objectives and have internal lithium rechargeable battery for up to 15 hours (at medium intensity) of outdoor use. All other models can be equipped with the optional external solar battery pack for field use.

NEW - New bundles B-151V / B-153V / B-151R-PLV / B-152R-PLV / 159R-PLV
Equipped with a large 7 "LCD monitor, they allow a comfortable real-time view of the preparations with the ability to share the experience with teachers and students.
The system allows the capture of images and videos, and is equipped with an SD card (included) to easily save your work. The resolution of the Full-HD sensor is 2Mp with frame rate at 30fps @ 1920x1080, intuitive menu with camera function controls and the ability to perform simple measurements. By removing the screen and replacing the head (always supplied), the instrument will become a conventional microscope for a direct visual experience.

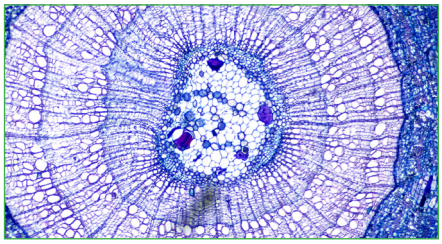
B-150 Series – Technical features

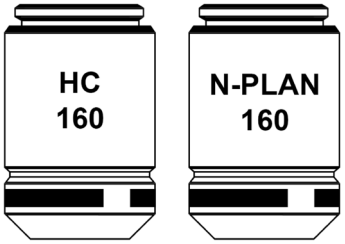
Observation mode: Brightfield, polarization.
Heads: monocular and binocular, 30° inclined. 360° rotating heads on all the models, except for ALC ones.
Interpupillary distance: adjustable between 48 and 75 mm.
Dioptric adjustment: on the left eyepiece.
Eyepieces: WF10x/18 mm.
Nosepiece: quadruple revolving nosepiece, rotation on ball bearings.
Objectives: HC - High Contrast (different magnifications available) with an anti-fungus treatment.
Specimen stage:
B-151 models: Fixed stage, 130x120 mm.
B-153 / B-155 / B-157 / B-159 and B-150D models: Mechanical stage, 126x116mm, 70x30 mm
X-Y movement range. Vernier scale on the two axes, accuracy: 0.1mm.
B-150P models: Rotatable round stage, 120 mm diameter.
Focusing: Coaxial coarse and fine focusing mechanism with limit stop to prevent the contact between objective and specimen. Adjustable tension of coarse focusing knob.
Condenser:
B-151 models: N.A. 0.65, pre-centered, fixed with iris diaphragm.
B-153 / B-155 / B-157 / B-159 models:
N.A. 1.2, pre-centered, adjustable height with iris diaphragm.
B-150P models: N.A. 1.2, pre-centered, fixed with iris diaphragm.
B-150D models: N.A. 1.2, pre-centered, adjustable height with iris diaphragm.
Illumination: X-LED[1] with white 1 W LED and light intensity control.
Color temperature: 6,300 K.

Available models:
B-151V
B-153V
B-151R-PLV
B-152R-PLV
B-159R-PLV


Measurement lines in V models

Long-life LED illumination


Easy and intuitive use for beginners



HC

N-PLAN

OPTIKA HC: OPTIKA HC - objectives ensure a versatile and reasonably priced entry-level lenses for brightfield and simple polarization applications. They are specifically designed to achieve optimal contrast and thus maximize yield on an instrument intended for education on F.N. 18. Learn on how the 100x/1.25 (oil) operates by using water instead of oil at page 18.
OPTIKA N-PLAN: In addition to the advantages of the HC objectives, the total flatness of the field and an even greater contrast are achieved with the N-PLAN series. On all rechargeable models.

Monocular microscope B-151

Up to 400x total magnification with a precise and accurate positioning of the slide thanks to same clips.

B-151

Binocular microscope B-157R-PL

Equipped with rechargeable battery for very long outdoor operation of up to 15 hours. It allows precise and accurate positioning of the slide thanks to smooth movement of the mechanical stage and 600x as maximum magnification.

B-157R-PL

Binocular microscope B-150D-BRPL

Equipped with built-in camera with 3.1 MP resolution, double-layer mechanical stage and efficient X-LED[1] illumination.

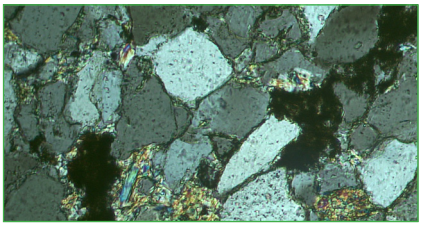
B-150D-BRPL

ALC - Automatic Light Control, Only Available At OPTIKA

Incomparable Comfort With The Exclusive Automatic Light Control (**ALC**)
The intensity of the light is automatically adjusted by the microscope it self in order to maintain the same level as the one the user has previously chosen. No matter if the aperture of the diaphragm changes, if another objective is used, and if the opacity of the sample is different...the microscope will set the light for you according to your preferences. On **B-150ALC** series.

Microscopes B-150P series

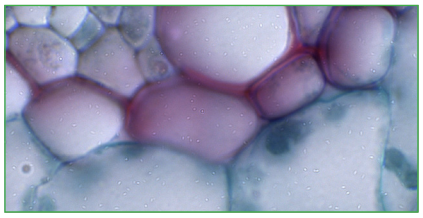
B-150P models are suitable for common observations with polarized light in the educational field, being microscopes designed for simple polarization analysis, with swing-out polarizer, slide-out analyzer and rotating stage. Entry-level microscopes for polarization analysis of birefringent samples, such as rock sections, minerals, fibers, transparent plastics, biological samples (e.g. bone sections).



Polarized light observation of Quartzite with B-150P and 10x objective

Microscopes B-150D series

B-150D models provide the best solution fo
r interactive trainings, with the integration of a digital camera and everything necessary in a ready to use solution. If a cordless microscope is needed, the R Series works with rechargeable battery (not provided). This microscope allows to easily capture pictures and videos of all kinds of sample mounted on standard glass slides.



Brightfield observation of dicotyledonous leaves with B-150D-BRPL and 100x objective

Accessories for B-150 Series

- **M-001** Huygens 5x eyepiece
- **M-002.1** WF10x/18 eyepiece, high eyepoint
- **M-003** WF16x/12 eyepiece
- **M-004** WF10x/18 micrometric eyepiece, high eyepoint
- **M-008** WF10x/18 eyepiece, high eyepoint, with pointer
- **M-162** WF20x/10 eyepiece
- **M-137** HC (high contrast) objective 4x/0.10
- **M-138** HC (high contrast) objective 10x/0.25
- **M-139** HC (high contrast) objective 20x/0.40
- **M-141** HC (high contrast) objective 40x/0.65
- **M-142** HC (high contrast) objective 60x/0.85
- **M-143** HC (high contrast) objective 100x/1.25 (oil)
- **M-164** N-PLAN objective 4x/0.10 (only for R-PL, MRPL, BRPL)
- **M-165** N-PLAN objective 10x/0.25 (only for R-PL, MRPL, BRPL)
- **M-166** N-PLAN objective 20x/0.40 (only for R-PL, MRPL, BRPL)
- **M-167** N-PLAN objective 40x/0.65 (only for R-PL, MRPL, BRPL)
- **M-168** N-PLAN objective 60x/0.85 (only for R-PL, MRPL, BRPL)
- **M-169** N-PLAN objective 100x/1.25 (oil) (only for R-PL, MRPL, BRPL)
- **M-040** Attachable mechanical stage (only for B-151, B-151ALC and B-151R-PL)
- **M-974** Blue filter, 32mm diameter
- **M-976** Green filter, 32mm diameter
- **M-978** Yellow filter, 32mm diameter
- **M-988** Frosted glass filter, 32mm diameter
- **M-155** Polarising set (filters only)
- **M-114** 0.5x C-Mount projection lens
- **M-115** 0.35x C-Mount projection lens
- **M-118** 0.75x C-Mount projection lens
- **M-972** Plane-concave mirror, with base
- **M-005** Micrometric slide, 26x76mm, with 2 scales (1mm/100 & 10mm/100)
- **M-069** Solar charger
- **DC-002** Plastic dust cover, medium, 490(l)x490(h) mm
- **15104** Cleaning kit
- **15008** Immersion oil, 10ml
- **15009** Immersion oil, 100ml
- **AB-010** Antibacterial surface treatment, only for newly purchased microscope

B-150 - Standard Models, with HC Objectives

Model	Head	Eyepieces	Nosepiece	Objectives	Stage	Focusing	Condenser	Illumination
B-151	Monocular, 30° inclined, 360° rotating	WF 10x/18	Quadruple	HC (high contrast) 4x, 10x, 40x	Fixed, 130x120 mm, with sample clips	Coaxial coarse and fine, limit stop	N.A. 0.65, iris diaphragm, fixed	1 W X-LED[1], manual brightness control
B-153	Monocular, 30° inclined, 360° rotating	WF 10x/18	Quadruple	HC (high contrast) 4x, 10x, 40x, 60x	Double layer, 125x116 mm, moving range 70x30 mm	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable	1 W X-LED[1], manual brightness control
B-155	Monocular, 30° inclined, 360° rotating	WF 10x/18	Quadruple	HC (high contrast) 4x, 10x, 40x, 100x	Double layer, 125x116 mm, moving range 70x30 mm	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable	1 W X-LED[1], manual brightness control
B-157	Binocular, 30° inclined, 360° rotating	WF 10x/18	Quadruple	HC (high contrast) 4x, 10x, 40x, 60x	Double layer, 125x116 mm, moving range 70x30 mm	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable	1 W X-LED[1], manual brightness control
B-159	Binocular, 30° inclined, 360° rotating	WF 10x/18	Quadruple	HC (high contrast) 4x, 10x, 40x, 100x	Double layer, 125x116 mm, moving range 70x30 mm	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable	1 W X-LED[1], manual brightness control

B-150 - ALC Models, with Automatic Light Control and HC Objectives

Model	Head	Eyepieces	Nosepiece	Objectives	Stage	Focusing	Condenser	Illumination
B-151ALC	Monocular 30° inclined	WF 10x/18	Quadruple	HC (high contrast) 4x, 10x, 40x	Fixed, 130x120 mm, with sample clips	Coaxial coarse and fine, limit stop	N.A. 0.65 fixed, with diaphragm	1 W X-LED[1], manual and automatic brightness control
B-153ALC	Monocular 30° inclined	WF 10x/18	Quadruple	HC (high contrast) 4x, 10x, 40x, 60x	Double layer, 125x116 mm, moving range 70x30 mm	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable	1 W X-LED[1], manual and automatic brightness control
B-155ALC	Monocular 30° inclined	WF 10x/18	Quadruple	HC (high contrast) 4x, 10x, 40x, 100x	Double layer, 125x116 mm, moving range 70x30 mm	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable	1 W X-LED[1], manual and automatic brightness control
B-157ALC	Binocular 30° inclined	WF 10x/18	Quadruple	HC (high contrast) 4x, 10x, 40x, 60x	Double layer, 125x116 mm, moving range 70x30 mm	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable	1 W X-LED[1], manual and automatic brightness control
B-159ALC	Binocular 30° inclined	WF 10x/18	Quadruple	HC (high contrast) 4x, 10x, 40x, 100x	Double layer, 125x116 mm, moving range 70x30 mm	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable	1 W X-LED[1], manual and automatic brightness control

B-150 - Cordless Models, with N-PLAN Objectives and Li-Ion Rechargeable Batteries

Model	Head	Eyepieces	Nosepiece	Objectives	Stage	Focusing	Condenser	Illumination
B-151R-PL	Monocular, 30° inclined, 360° rotating	WF 10x/18	Quadruple	N-PLAN 4x, 10x, 40x	Fixed, 130x120 mm, with sample clips	Coaxial coarse and fine, limit stop	N.A. 0.65 fixed, with diaphragm	1 W X-LED[1], manual brightness control, Li-Ion rechargeable battery
B-152R-PL	Monocular, 30° inclined, 360° rotating	WF 10x/18	Quadruple	N-PLAN 4x, 10x, 40x	Double layer, 125x116 mm, moving range 70x30 mm	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable	1 W X-LED[1], manual brightness control, Li-Ion rechargeable battery
B-153R-PL	Monocular, 30° inclined, 360° rotating	WF 10x/18	Quadruple	N-PLAN 4x, 10x, 40x, 60x	Double layer, 125x116 mm, moving range 70x30 mm	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable	1 W X-LED[1], manual brightness control, Li-Ion rechargeable battery
B-155R-PL	Monocular, 30° inclined, 360° rotating	WF 10x/18	Quadruple	N-PLAN 4x, 10x, 40x, 100x	Double layer, 125x116 mm, moving range 70x30 mm	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable	1 W X-LED[1], manual brightness control, Li-Ion rechargeable battery
B-157R-PL	Binocular, 30° inclined, 360° rotating	WF 10x/18	Quadruple	N-PLAN 4x, 10x, 40x, 60x	Double layer, 125x116 mm, moving range 70x30 mm	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable	1 W X-LED[1], manual brightness control, Li-Ion rechargeable battery
B-159R-PL	Binocular, 30° inclined, 360° rotating	WF 10x/18	Quadruple	N-PLAN 4x, 10x, 40x, 100x	Double layer, 125x116 mm, moving range 70x30 mm	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable	1 W X-LED[1], manual brightness control, Li-Ion rechargeable battery

B-150 - Polarized Light Cordless Models, with N-PLAN Objectives and Li-Ion Rechargeable Batteries

Model	Head	Eyepieces	Nosepiece	Objectives	Stage	Focusing	Condenser	Illumination
B-150P-MRPL	Monocular, 30° inclined, 360° rotating	WF 10x/18	Quadruple	N-PLAN 4x, 10x, 40x	Round, 360° rotating, 120 mm diameter, with sample clips	Coaxial coarse and fine, limit stop	N.A. 1.25, iris diaphragm, fixed	1 W X-LED[1], manual brightness control, Li-Ion rechargeable battery
B-150P-BRPL	Binocular, 30° inclined, 360° rotating	WF 10x/18	Quadruple	N-PLAN 4x, 10x, 40x	Round, 360° rotating, 120 mm diameter, with sample clips	Coaxial coarse and fine, limit stop	N.A. 1.25, iris diaphragm, fixed	1 W X-LED[1], manual brightness control, Li-Ion rechargeable battery

B-150 - Digital Cordless Models, with N-PLAN Objectives and Li-Ion Rechargeable Batteries

Model	Head	Eyepieces	Nosepiece	Objectives	Stage	Focusing	Condenser	Illumination
B-150D-MRPL	Monocular, 30° inclined, 360° rotating	WF 10x/18	Quadruple	N-PLAN 4x, 10x, 40x	Double layer, 125x116 mm, moving range 70x30 mm	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable	1 W X-LED[1], manual brightness control, Li-Ion rechargeable battery
B-150D-BRPL	Binocular, 30° inclined, 360° rotating	WF 10x/18	Quadruple	N-PLAN 4x, 10x, 40x, 100x	Double layer, 125x116 mm, moving range 70x30 mm	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable	1 W X-LED[1], manual brightness control, Li-Ion rechargeable battery

MICROSCOPES B-190 SERIES

B-190 is the result of a perfect fusion between years of experience in microscopy and a refined design study.
It represents our product philosophy at its best: quality, reliability and innovation, all in one.
B-190 Series, the answer of OPTIKA Microscopes to the challenge of the future in the educational field.

Same Objective For Oil And Water Use - Unparalleled Time & Money Savings
This new and revolutionary obyective is something never seen before! Used with oil, it ensures the best achievable performance in terms of image resolution; with water, you get good quality and unparalleled comfort, eliminating all the tedious cleaning tasks typical of oil.

Original, Compact And Robust
The original design of B-190 series is based on robustness, yet keeping the extreme portability of the instrument, with a dedicated handle on the back. The built-in LED illuminator and the patented version with Windows tablet improve the reliability of one of the best-sellers of OPTIKA in the educational field.

Optimum And Unparalleled Comfort In Use
The B-190TBPL offers you a unique, incomparable solution. It includes a built-in camera of 3.1 MP and a Windows tablet with large touch screen, for a responsive and smooth control. Simultaneous camera and power connection ensure long-term operation, with dependable results in one click. It provides a reliable and comfortable solution for open discussion: 360° rotating and tilting tablet, easily detachable, that can be used as a laptop.

X-LED² Exclusive Lighting Source
A special design of the lens in front of the LED gives a very high light intensity, while ensuring optimal
uniformity of illumination on the whole field number. Relevant money & energy saving thanks to the
incredibly low energy consumptions allow you to cut the electricity bills by 90%!

Planar **N-PLAN** objectives, guarantee bright and clear images with excellent flatness and compensation of chromatic aberration.
Goals with antifungal treatment.

B-190 Series - Technical features

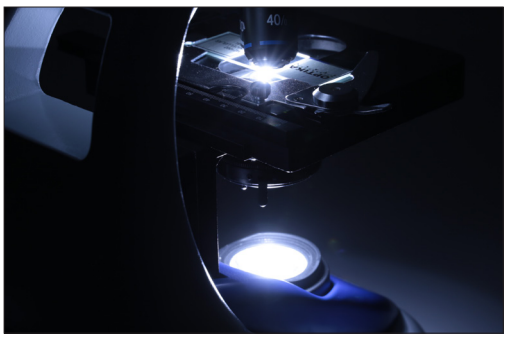
Observation mode: brightfield.
Heads:
- **B-191PL models:** monocular, 360° rotating and 30° inclined.
- **B-192PL models:** binocular, 360° rotating and 30° inclined.
- **B-193PL:** trinocular, 360° rotating and 30° inclined.
- **B-190TBPL:** Digital model binocular with camera 3.1 MP and 10.1" tablet, 360° rotating and 30° inclined.

Interpupillary distance:
- **B-190TBPL/B-192PL models:** adjustable between 48 and 75 mm.
- **B-193PL models:** adjustable between 55 and 75 mm.

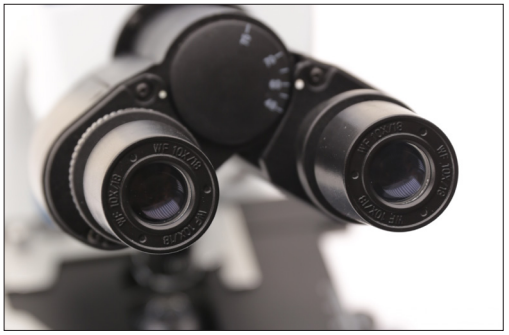
Dioptric adjustment: On the left eyepiece.
Eyepieces: WF 10x/18 mm.
Nosepiece: quadruple revolving nosepiece, rotation on ball bearings.
Objectives: Planar **N-PLAN** (different magnifications available) with an anti-fungus treatment.
Specimen stage:
Double layer mechanical sliding stage, 125x115 mm, 70x30 mm X-Y movement range. Vernier scale on the two axes, accuracy: 0.1mm.

Focusing: Coaxial coarse and fine focusing mechanism with limit stop to prevent the contact between objective and specimen.
Adjustable tension of coarse focusing knob.

Condenser: N.A. 1.25, pre-centered, adjustable height with iris diaphragm.
Illumination: X-LED² with white 3 W LED and light intensity control.
Color temperature: 6,300 K.



X-LED² – Available only in OPTIKA



Binocular microscope B-192PL

Binocular head with up to 1000x total magnification, mechanical stage and exclusive X-LED² for unmatchable performance, powerful and uniform illumination.

B-192PL

Trinocular microscope B-193PL

Trinocular head with up to 1000x total magnification, mechanical stage and exclusive X-LED² for unmatchable performance for powerful and uniform illumination. All the OPTIKA cameras can be easily mounted and used straight away.

B-193PL

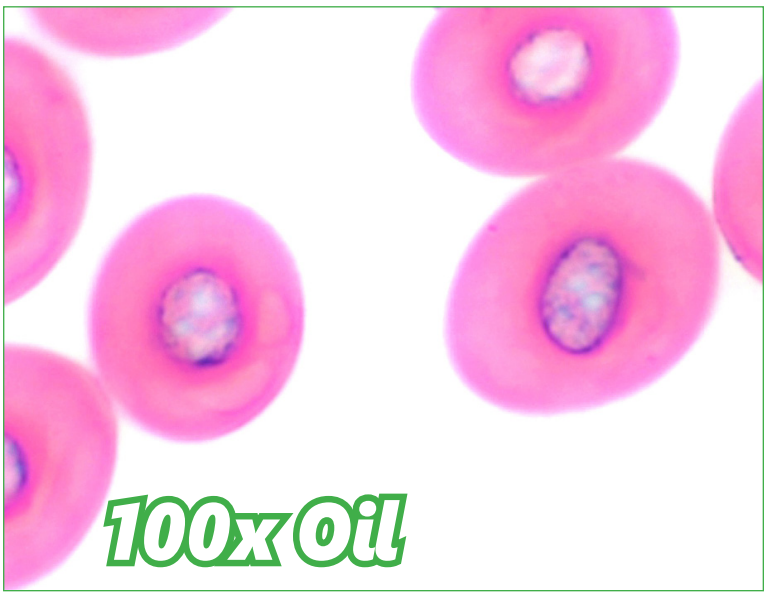
Trinocular microscope B-190TBPL

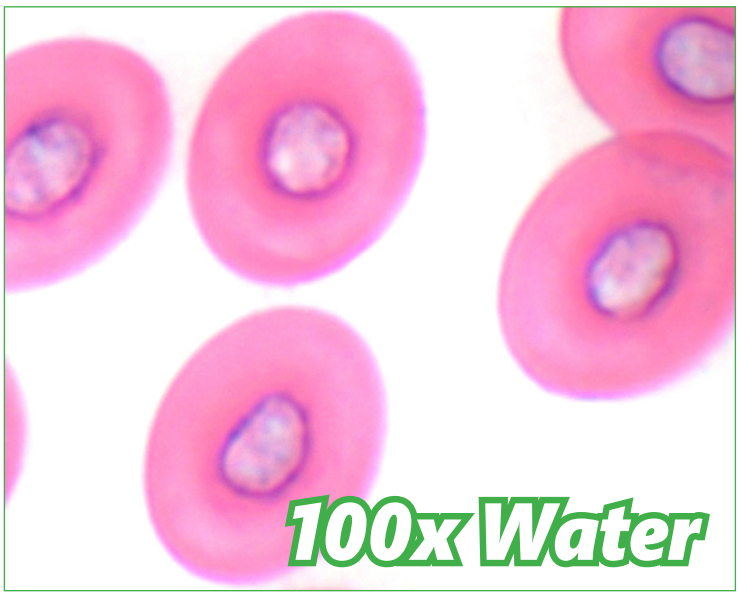
3 MP Built-in camera and 10.1" Windows tablet PC up to 1000x total magnification, mechanical stage and exclusive X-LED² for unmatchable performance for powerful and uniform illumination.

B-190TBPL

B-190 Series - Comparison chart

Model	Head	Eyepieces	Nosepiece	Objectives	Stage	Focusing	Condenser	Illumination
B-191PL	Monocular, 360° rotating, 30° inclined.	Wide Field 10x/18mm	Quadruple, reversed	N-PLAN 4x, 10x, 40x, 100x	Double layer, 125x115 mm with 70x30mm X-Y moving range	Coaxial coarse and fine focusing	N.A. 1.25 Abbe type with adjustable height and iris diaphragm	3 W X-LED² system with adjustable intensity
B-191sPL	Monocular, 360° rotating, 30° inclined.	Wide Field 10x/18mm	Quadruple, reversed	N-PLAN 4x, 10x, 40x, 60x	Double layer, 125x115 mm with 70x30mm X-Y moving range	Coaxial coarse and fine focusing	N.A. 1.25 Abbe type with adjustable height and iris diaphragm	3 W X-LED² system with adjustable intensity
B-192PL	Binocular, 360° rotating, 30° inclined.	Wide Field 10x/18mm	Quadruple, reversed	N-PLAN 4x, 10x, 40x, 100x	Double layer, 125x115 mm with 70x30mm X-Y moving range	Coaxial coarse and fine focusing	N.A. 1.25 Abbe type with adjustable height and iris diaphragm	3 W X-LED² system with adjustable intensity
B-192sPL	Binocular, 360° rotating, 30° inclined.	Wide Field 10x/18mm	Quadruple, reversed	N-PLAN 4x, 10x, 40x, 60x	Double layer, 125x115 mm with 70x30mm X-Y moving range	Coaxial coarse and fine focusing	N.A. 1.25 Abbe type with adjustable height and iris diaphragm	3 W X-LED² system with adjustable intensity
B-193PL	Trinocular, 360° rotating, 30° inclined.	Wide Field 10x/18mm	Quadruple, reversed	N-PLAN 4x, 10x, 40x, 100x	Double layer, 125x115 mm with 70x30mm X-Y moving range	Coaxial coarse and fine focusing	N.A. 1.25 Abbe type with adjustable height and iris diaphragm	3 W X-LED² system with adjustable intensity
B-190TBPL	Binocular, digital 360° rotating, 30° inclined.	Wide Field 10x/18mm	Quadruple, reversed	N-PLAN 4x, 10x, 40x, 100x	Double layer, 125x115 mm with 70x30mm X-Y moving range	Coaxial coarse and fine focusing	N.A. 1.25 Abbe type with adjustable height and iris diaphragm	3 W X-LED² system with adjustable intensity

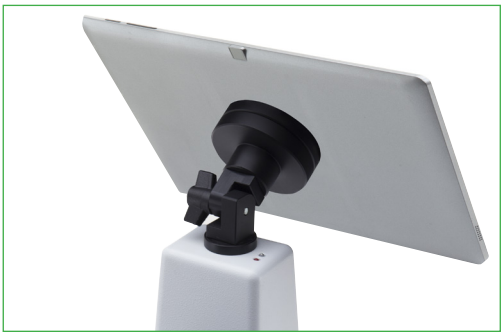




B-190TBPL

The latest OPTIKA digital microscopes with Windows tablet PC open new microscopy horizons, combining high-end optics with innovative digital technology for microscopic imaging. B-190TBPL includes a 3.1 MP camera with a 10.1" Windows tablet.
View, capture, analyze and share your images with simplicity and reliability.

Intuitive and powerful, simple and user-friendly, ideal for students and experienced users.



360° rotating and tilting to facilitate group work.

Easily detachable, can be used as a laptop!
Equipped with Windows OS & Intel processor.
Battery life up to 10 hours.
Keyboard cod. TB-KBD2 sold separately.

Accessories for B-190 Series

M-001	Huygens 5x eyepiece
M-002.1	WF10x/18 eyepiece, high eyepoint
M-003	WF16x/12 eyepiece
M-004	WF10x/18 micrometric eyepiece, high eyepoint
M-008	WF10x/18 eyepiece, high eyepoint, with pointer
M-162	WF20x/10 eyepiece
M-164	N-PLAN objective 4x/0.10
M-165	N-PLAN objective 10x/0.25
M-166	N-PLAN objective 20x/0.40
M-167	N-PLAN objective 40x/0.65
M-168	N-PLAN objective 60x/0.85
M-169	N-PLAN objective 100x/1.25 (oil)
M-174	Polarising set (filters only)
M-974	Blue filter, 32 mm diameter
M-976	Green filter, 32 mm diameter
M-978	Yellow filter, 32 mm diameter
M-988	Frosted glass filter, 32 mm diameter
M-173	Photo adapter for APS-C and full frame reflex cameras (trino head)(only for B-193)
M-114	0.5x C-Mount projection lens
M-115	0.35x C-Mount projection lens
M-118	0.75x C-Mount projection lens
M-971	Plane-concave mirror, with base
DC-002	Plastic dust cover, medium, 490(l)x490(h) mm (except for B-190TB)
DC-003	TNT dust cover, medium, 600(l)x550(h) mm (only for B-190TB)
M-069	Solar charger
15008	Immersion oil, 10ml
15009	Immersion oil, 100ml
M-005	Micrometric slide, 26x76mm, with 2 scales (1mm/100 & 10mm/100)
15104	Cleaning kit
VP-190	IQ/OQ/PQ manual for B-190 series
VP-TB	IQ/OQ/PQ manual for TB series
TB-KBD2	Keyboard for tablet
AB-020	Antibacterial surface treatment, only for newly purchased microscope

MICROSCOPES B-290 SERIES

This series incorporates all the experience gathered by OPTIKA Microscopes in the field of light microscopy, adapted specifically for routine laboratory brightfield applications.
These microscopes are suitable for routine microscopy and have an ergonomic design for comfortable long-term use.
All main controls are located close to each other, which enable operation with minimal movements.

X-LED³ Exclusive lighting source
Special technology able to double the light intensity for incomparable performance, ensuring constant pure-white 6000 K colour temperature.
This new technology allows you to save money, as the energy required for operation is very low.

Rackless Mechanical Stage
Rounded edge rackless stage has been designed with a belt-driven mechanism that allows a smooth movement without any protruding part. This design gives you a more compact solution and lowers any risk of injury after accidentally hitting the rack with your hands.
Clear image achievable with 100X magnification **(now also in water)**

Same Objective For Oil And Water Use - Unparalleled Time & Money Savings
This new and revolutionary obyective is something never seen before! Used with oil, it ensures the best achievable performance in terms of image resolution; with water, you get good quality and unparalleled comfort, eliminating all the tedious cleaning tasks typical of oil.

Laboratory Grade Optics, N-PLAN & IOS N-PLAN System
OPTIKA N-PLAN objectives ensure bright, clear images with excellent flatness and compensation for chromatic aberration. IOS Infinity-corrected optical system prevents image deterioration even if other optical components are added, such as polarizers, beamsplitters and so on.

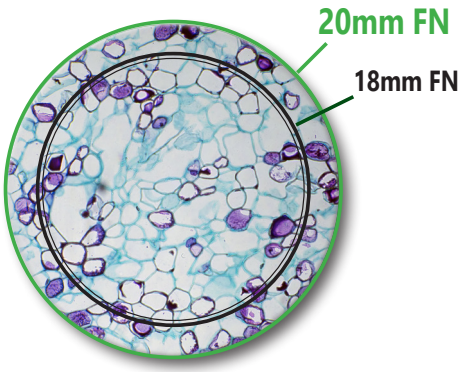
20 mm Field Number
The F.O.V. (field of view) is based on a comfortable diameter of 20 mm. This means that a wide area of the sample can be inspected and allows a natural and easy view, particularly needed in a laboratory environment.

B-290 Series - Technical features

Observation mode: brightfield, polarized light.
Heads:
- **B-292 models:** binocular, 360° rotating and 30° inclined.
- **B-293 models:** trinocular, 360° rotating and 30° inclined.
- **B-290TB:** Digital model, binocular with camera 3.1 MP and 10.1" tablet, 360° rotating and 30° inclined.

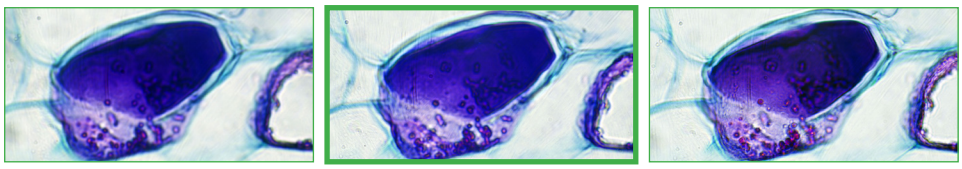
Interpupillary distance:
- **B-290TB/B-292 models:** adjustable between 48 and 75 mm.
- **B-293 models:** adjustable between 55 and 75 mm

Dioptric adjustement: on the left eyepiece tube.
Eyepieces: WF 10x/18 mm.
Nosepiece: quadruple revolving nosepiece, rotation on ball bearings.
Objectives:
N-PLAN or IOS N-PLAN optical system (on PLi models) with an anti-fungus treatment.
Different magnifications available.
Specimen stage:
Double layer rackless mechanical sliding stage, 150x139 mm, 75x33 mm
X-Y movement range. Vernier scale on the two axes, accuracy: 0.1 mm.
Focusing:
coaxial coarse and fine focusing mechanism with limit stop to prevent the contact between objective and specimen.
Adjustable tension of coarse focusing knob.
Condenser: N.A 1.25, centerable, adjustable height.
Illumination: X-LED³ type with white 3.6 W LED and light intensity control. Color temperature: 6,300 K.



Field view di 20 mm

B-290 Series - Zoom comparison



100x Dry *100x Water* *100x Oil*

Trinocular microscope B-293

Binocular microscope B-292

Binocular head with N-PLAN objectives, rackless stage and exclusive X-LED³ for unmatchable performance, powerful and uniform illumination.

B-292

Trinocular microscope B-293PLi

Trinocular head with IOS N-PLAN (infinity corrected) objectives, rackless stage and exclusive X-LED³ for incredibly bright illumination.

B-293PLi

Binocular digital microscope B-290TB

3MP Built-in camera and 10.1" Windows tablet PC with N-PLAN objectives, rackless stage and exclusive X-LED³ for unmatchable performance in illumination. Ideal for discussion group with 360° rotating tablet.

B-290TB

B-290 Series - Comparison chart

Model	Head	Eyepieces	Nosepiece	Objectives	Stage	Focusing	Condenser	Illumination
B-292	Binocular, 30° inclined, 360° rotating.	WF 10x/20	Quadruple, reversed	N-PLAN 4x, 10x, 40x, 100x (oil/water)	Double layer, 150x139 mm, moving range 75x33 mm, X-axis rackless	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable and centrable	3.6 W X-LED³, brightness control. Fixed Koehler
B-292PLi	Binocular, 30° inclined, 360° rotating.	WF 10x/20	Quadruple, reversed	IOS N-PLAN 4x, 10x, 40x, 100x (oil/water)	Double layer, 150x139 mm, moving range 75x33 mm, X-axis rackless	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable and centrable	3.6 W X-LED³, brightness control. Fixed Koehler
B-293	Trinocular, 30° inclined, 360° rotating.	WF 10x/20	Quadruple, reversed	N-PLAN 4x, 10x, 40x, 100x (oil/water)	Double layer, 150x139 mm, moving range 75x33 mm, X-axis rackless	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable and centrable	3.6 W X-LED³, brightness control. Fixed Koehler
B-293PLi	Trinocular, 30° inclined, 360° rotating.	WF 10x/20	Quadruple, reversed	IOS N-PLAN 4x, 10x, 40x, 100x (oil/water)	Double layer, 150x139 mm, moving range 75x33 mm, X-axis rackless	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable and centrable	3.6 W X-LED³, brightness control. Fixed Koehler
B-290TB	Binocular, 30° inclined, 360° rotating,with tablet.	WF 10x/20	Quadruple, reversed	N-PLAN 4x, 10x, 40x, 100x (oil/water)	Double layer, 150x139 mm, moving range 75x33 mm, X-axis rackless	Coaxial coarse and fine, limit stop	Abbe N.A. 1.25, iris diaphragm, focusable and centrable	3.6 W X-LED³, brightness control. Fixed Koehler

Accessories for B-290 Series

M-001 Huygens 5x eyepiece
M-008.1 WF10x/20 eyepiece, high eyepoint, with pointer, rubber cup
M-160 EW10x/20 eyepiece, high eyepoint, with rubber cup
M-161 EW15x/16 eyepiece, with rubber cup
M-162 WF20x/10 eyepiece
M-163 EW10x/20 eyepiece, high eyepoint, with micrometric scale (10mm/100um) & rubber cup
M-144 IOS N-PLAN objective 4x/0.10
M-145 IOS N-PLAN objective 10x/0.25
M-146 IOS N-PLAN objective 20x/0.40
M-147 IOS N-PLAN objective 40x/0.65
M-148 IOS N-PLAN objective 100x/1.25 (oil)
M-149 IOS N-PLAN objective 60x/0.80
M-164 N-PLAN objective 4x/0.10
M-165 N-PLAN objective 10x/0.25
M-166 N-PLAN objective 20x/0.40
M-167 N-PLAN objective 40x/0.65
M-168 N-PLAN objective 60x/0.85
M-169 N-PLAN objective 100x/1.25 (oil)
M-634.1 IOS W-PLAN objective 50x/0.95 (oil)
M-1120.N IOS W-PLAN PH objective 10x/0.25
M-1121.N IOS W-PLAN PH objective 20x/0.40
M-1122.N IOS W-PLAN PH objective 40x/0.65
M-175 Rotating stage for polarising set (for 150x139mm rackless stage)
M-174 Polarising set (filters only)
M-184 Darkfield stop for condenser
M-975 Blue filter, 45mm diameter
M-971 Plane-concave mirror, with base
M-977 Green filter, 45mm diameter
M-979 Yellow filter, 45mm diameter
M-989 Frosted glass filter, 45mm diameter
M-1124.1 Brightfield condenser (with phase slider slot) (except for B-292, B-293 and B-290TB)
M-1124.NO Phase contrast condenser with insert slide 10x/20x-40x (except for B-292, B-293 and B-290TB)
M-114 0.5x C-Mount projection lens
M-115 0.35x C-Mount projection lens
M-118 0.75x C-Mount projection lens
M-173 Photo adapter for APS-C and full frame reflex cameras (trino head)
15104 Cleaning kit
15008 Immersion oil, 10ml
15009 Immersion oil, 100ml
DC-002 Plastic dust cover, medium, 490(l)x490(h) mm (except for B-290TB)
DC-003 TNT dust cover, medium, 600(l)x550(h) mm (only for B-290TB)
M-005 Micrometric slide, 26x76mm, with 2 scales (1mm/100 & 10mm/100)
M-069 Solar charger
M-1380 Centering telescope, 23mm diameter (except for B-292, B-293 and B-290TB)
VP-290 IQ/OQ/PQ manual for B-290 series
VP-TB IQ/OQ/PQ manual for TB series
M-666.290 Applicable heating stage (for 150x139mm rackless stage), multiplug
TB-KBD2 Keyboard for tablet
AB-020 Antibacterial surface treatment, only for newly purchased microscope

MICROSCOPES SFX/STEREO SERIES

This series includes a wide selection of stereomicroscopes designed to satisfy every need in both teaching and amateur fields.
The whole range is assembled according to the best technical standards.
The optical system, due to its transparency, quality and depth, is at the top of its category.
The series consists of different models, each designed to meet different needs.

SFX/STEREO Serie - Technical features

Observation mode: brightfield
Heads: Binocular heads
45° inclined.
SFX-51: 360° rotating heads.
Interpupillary distance:
adjustable (for binocular heads).
Dioptric adjustment: ST-50Led on the left eyepiece.
All SFX models: on both eyepieces.
MS-1: without dioptric adjustment.
Eyepieces: All other models: WF 10x/20 mm.
Objective: Achromatic different magnifications available with an anti-fungus treatment.
Stand:
SFX-31: Pillar stand with focus.
SFX-33, SFX-51: Fixed stand with focus and handle.
SFX-91 and SFX-91D: Precision fixed stand with focus and handle.
ST-50Led: Overhanging stand with focus.
Illumination:
SFX-31:
incident: 1W LED, transmitted: 1W LED, dial brightness control, rechargeable batteries.
SFX-33, SFX-51, SFX-91 e SFX-91D:
Incident: 1W LED, transmitted: 1W LED, dial brightness control, rechargeable batteries.
ST-50Led:
Incident: 1W LED on flexible arm.

LED with rechargeable batteries - Optimized Illumination
Money & energy saving thanks to LED long lifetime (50.000 hours, 20 years in case of 8 hours/day) which is more than 20 times compared to a standard halogen bulb. **All the SFX Series** has internal rechargeable (not provided) batteries for up to 8
hours (at medium intensity) of outdoor use.

Serie SFX/STEREO - Accessori opzionali

ACCESSORIES FOR SFX SERIES & ST-50Led

ST-001	WF5x/22 eyepieces (pair), 30.5mm diameter (except for ST-50Led)
ST-002	WF10x/20 eyepieces (pair)
ST-003	WF15x/15 eyepieces (pair)
ST-004	WF20x/13 eyepieces (pair)
ST-005	WF10x/20 micrometric eyepiece
ST-001.1	WF5x/22 eyepieces (pair), 30mm diameter (only for ST-50Led)
ST-025	1x objective (only for ST-50Led)
ST-026	3.5x objective (only for ST-50Led)
ST-015	Glass object-plate, 60mm diameter (except ST-50Led)
ST-011	White/black object-plate, 60mm diameter (except for ST-50Led)
M-114	0.5x C-Mount projection lens
M-115	0.35x C-Mount projection lens
M-118	0.75x C-Mount projection lens
M-113.1	Ring adapter, 30mm (for monocular and binocular microscopes) (except ST-50Led)
M-113.2	Ring adapter, 30.5mm (for monocular and binocular microscopes) (only for ST-50Led)
DC-001	Plastic dust cover, small, 340(l)x400(h) mm (except for ST-50Led)
DC-002	Plastic dust cover, medium, 490(l)x490(h) mm (only for ST-50Led)
M-005	Micrometric slide, 26x76mm, with 2 scales (1mm/100 & 10mm/100)
15104	Cleaning kit
AB-010	Antibacterial surface treatment, only for newly purchased microscope

Binocular microscope SFX-31

Binocular stereo microscope equipped with revolving revolver (2x-4x), column stand and incredibly powerful and uniform illumination (transmitted and incident) with rechargeable batteries.

SFX-31

Binocular microscope SFX-33

Binocular stereo microscope equipped with revolver revolver (2x-4x) fixed stand with handle and incredibly powerful and uniform illumination (transmitted and incident), which can be set via the exclusive touch control. Powered by rechargeable batteries.

SFX-33

Binocular microscope SFX-51

Binocular stereo microscope equipped with revolving revolver (2x-4x), 360 ° rotating head, fixed stand with handle and incredibly powerful and uniform illumination (transmitted and incident), which can be set via the exclusive touch control. Powered by rechargeable batteries.

SFX-51

Binocular microscope SFX-91D

Digital binocular stereo microscope equipped with revolver revolver with 3 magnifications (1x-2x-4x), fixed precision stand with handle and incredibly powerful and uniform illumination (transmitted and incident), which can be set via the exclusive touch control. Powered by rechargeable batteries.

SFX-91D

Binocular microscope ST-50Led

Binocular stereo microscope ideal for large samples. It allows a great working distance, is a fixed objective (2x), field 20 eyepieces, cantilever base and 1W LED with orientable incident light.

ST-50Led

SFX/STEREO Series - Comparison chart

Model	Head	Eyepieces	Objective	Working Distance	Stand	Illumination
SFX-31	Binocular, 45° inclined, fixed	WF 10x/20	2x – 4x selectable	57 mm	Pillar with focus	Incident: 1 W LED Transmitted: 1 W LED Touch brightness control, rechargeable batteries
SFX-33	Binocular, 45° inclined, fixed	WF 10x/20	2x – 4x selectable	57 mm	Fixed with focus and handle	Incident: 1 W LED Transmitted: 1 W LED Touch brightness control, rechargeable batteries
SFX-51	Binocular, 45° inclined, 360° rotating	WF 10x/20	2x – 4x selectable	76 mm	Fixed with focus and handle	Incident: 1 W LED Transmitted: 1 W LED Touch brightness control, rechargeable batteries
SFX-91	Binocular, 45° inclined, fixed	WF 10x/20	1x – 2x – 4x selectable	60 mm	Precision fixed with focus and handle	Incident: 1 W LED Transmitted: 1 W LED Touch brightness control, rechargeable batteries
SFX-91D	Binocular, 45° inclined, 3 MP integrated camera	WF 10x/20	1x – 2x – 4x selectable	60 mm	Precision fixed with focus and handle	Incident: 1 W LED Transmitted: 1 W LED Touch brightness control, rechargeable batteries
ST-50Led	Binocular, 45° inclined, fixed	WF 10x/20	2x fixed	119 mm	Overhanging with focus	Incident: 1 W LED on flexible arm

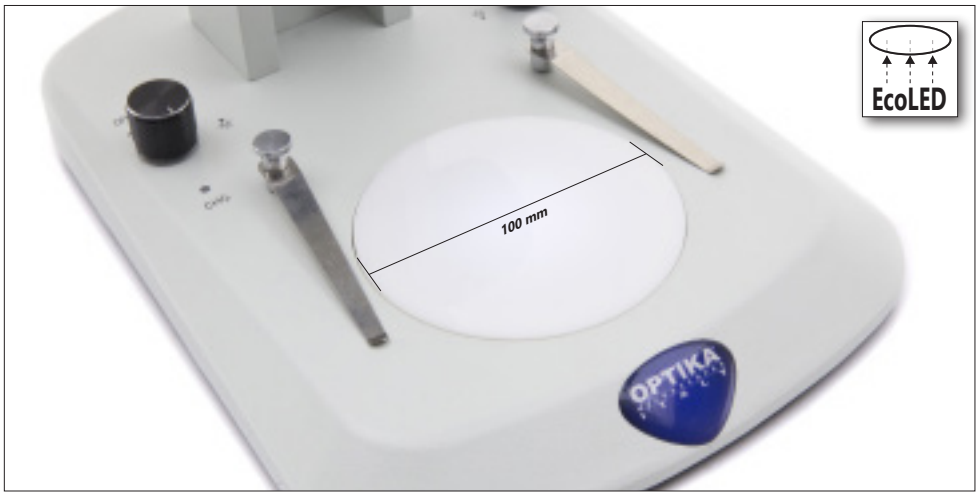
MICROSCOPES SLX SERIES

Cordless and modern stereo & stereozoom microscopes ideal for a variety of applications, including dissection, biology, entomology, anatomy, chemistry and material science among the others.
Provided with dual magnification (SLX-1) or 6.43:1 zoom ratio (SLX-2 e SLX-3), FN 21 high eyepoint with eyepieces for glasses wearers, fixed stand with focus and handle with high precision and focusing mechanism.

High eyepoint eyepieces for glasses wearers
These eyepieces are designed in such a way that the exit pupil is further away from the eye lens than standard eyepieces, being are well suited for eyeglasses wearers.
The longest autonomy on the market ensured by EcoLED™
OPTIKA has re-designed illumination in microscopy, once again: a special coating process on optics combined with a new, higher ratio between low consumptions and ultra-efficiency has addressed us to top brightness levels.
6.43:1 zoom ratio - zoom magnification from 7x to 45x
Purposely designed for professional routine inspections, the total magnification can be even extended to 135x with 20x eyepieces and 1.5x additional lens, obtaining an excellent results in this class.
Ultra-flat base with Ø 100 mm disc for diffused transmitted light
A new level of ergonomy and comfort is achieved during operations, with the ultra-flat base of only 3 cm height to ensure smooth specimen movement and the Ø 100 mm for top class diffusion of the transmitted light.
Longlife LED illumination (providing over 20 years of use)
Money & energy saving thanks to LED long lifetime (65.000 hours, 22 years in case of 8 hours/day) which is more than 20 times compared to a standard halogen bulb.
Cordless use, totally independent from mains/batteries connection
All models work with or without the batteries in place and are provided with three NiMH rechargeable batteries for the longest autonomy in outdoor use (12-hour autonomy, at medium intensity)
External power supply for enhanced safety and convenient servicing
OPTIKA's safety first approach drives to the use of a low voltage, multi-plug, external power supply in order to prevent any risk of electric shock and heatflow inside the unit.

SLX Series - Technical features

Observation mode: brightfield
Heads: Binocular and trinocular, 45° inclined; 360° rotating.
Dioptric adjustment:
SLX-1: Left eyepiece.
SLX-2 e SLX-3: Both eyepieces.
Eyepieces: WF10x/21 mm, high eyepoint, secured by screw and with rubber cups.
Objectives:
SLX-1: dual magnification (2x-4x) with turnable objective.
SLX-2 and SLX-3: Parfocal achromatic zoom 0.7x...4.5x (6.43:1 ratio) with anti-fungus treatment.
Working distance 100 mm.
Stand: High-grade, precision fixed with handle and focus.
Focusing: Rack and pinion focusing mechanism adjustable through the knobs located on both sides of the instrument.
Illumination: EcoLED™ swiveling incident and transmitted, with brightness control, rechargeable batteries.
Color temperature: 6.300 K. Multi-plug 100-240Vac/5Vdc external power supply.



Binocular stereomicroscope SLX-1

Binocular microscope with rechargeable batteries, FN 21 high eyepoint with eyepieces for glasses wearers, with turnable objective (2x-4x), and the latest technology of EcoLED™ illumination.

SLX-1

Binocular stereomicroscope SLX-2

Binocular microscope with rechargeable batteries, FN 21 high eyepoint with eyepieces for glasses wearers, with parfocal achromatic zoom 0.7x...4.5x (6.43:1 ratio) and the latest technology of EcoLED™ illumination.

SLX-2

Trinocular stereomicroscope SLX-3

Trinocular microscope with output for connection to an external camera equipped with rechargeable batteries, FN 21 high eyepoint with eyepieces for glasses wearers,y with parfocal achromatic zoom 0.7x...4.5x (6.43:1 ratio) to work with additional lenses and the latest technology of EcoLED™ illumination.

SLX-3

SLX Series - Comparison chart

Model	Head	Eyepieces	Objective	Working Distance	Stand	Illumination
SLX-1	Binocular 45° inclined 360° rotating	WF 10x/21	2x – 4x selectable	100 mm	High-grade, precision fixed with handle and focus	EcoLED™ swiveling incident and transmitted with brightness control, rechargeable batteries
SLX-2	Binocular 45° inclined 360° rotating	WF 10x/21	0.7x...4.5x zoom	100 mm	High-grade, precision fixed with handle and focus	EcoLED™ swiveling incident and transmitted with brightness control, rechargeable batteries
SLX-3	Trinocular (50/50) 45° inclined 360° rotating	WF 10x/21	0.7x...4.5x zoom	100 mm	High-grade, precision fixed with handle and focus	EcoLED™ swiveling incident and transmitted with brightness control, rechargeable batteries

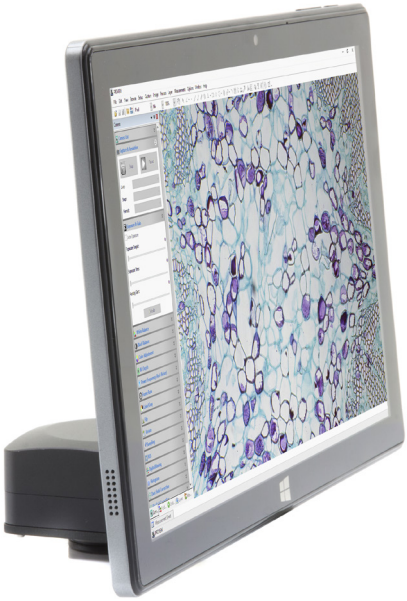
Serie SLX - Accessori opzionali

ST-036 Eyecups (pair), curved
ST-081 EW10x/21 eyepieces (pair), high eyepoint, with rubber cup
ST-082 WF15x/15 eyepieces (pair), high eyepoint
ST-083 WF20x/10 eyepieces (pair), high eyepoint
ST-084 WF10x/21 micrometric eyepiece, high eyepoint, with rubber cup
ST-085.1 Additional lens 0.5x (w.d. 165mm) with SZ-EXT (only for SLX-2 & SLX-3)
ST-091 Additional lens 0.75x (w.d. 105mm) (only for SLX-2 & SLX-3)
ST-086.1 Additional lens 1.5x (w.d. 45mm) with compensating disc (only for SLX-2 & SLX-3)
ST-100.1 Hand moving stage, 100mm diameter
ST-110.1 Moving stage, coaxial knobs, 100mm diameter
ST-111.1 Moving stage, micrometric screws, 100mm diameter
ST-040.1 Darkfield condenser, 100mm diameter
ST-088.1 Polarising set (filters and rotating stage), 100mm diameter
M-173 Photo adapter for APS-C and full frame reflex cameras (trino head) (only for SLX-3)
M-699 Universal adapter (only for SLX-3)
M-620 0.35x focusable C-Mount adapter (only for SLX-3)
M-620.1 0.5x focusable C-Mount adapter (only for SLX-3)
M-620.2 0.65x focusable C-Mount adapter (only for SLX-3)
M-620.3 1x focusable C-Mount adapter (only for SLX-3)
M-113.1 Ring adapter, 30mm (for monocular and binocular microscopes)
M-114 0.5x C-Mount projection lens
M-115 0.35x C-Mount projection lens
M-118 0.75x C-Mount projection lens
DC-002 Plastic dust cover, medium, 490(l)x490(h) mm
15104 Cleaning kit
M-005 Micrometric slide, 26x76mm, with 2 scales (1mm/100 & 10mm/100)
ST-092 Protective glass for stereohead
VP-SLX IQ/OQ/PQ manual for SLX series
ST-041 Sample clip
ST-042 White/black object-plate, 100mm diameter
ST-043 Glass object-plate, 100mm diameter
ST-666.1 Applicable heating stage (stereomicroscopes, 100mm diameter), multiplug
AB-020 Antibacterial surface treatment, only for newly purchased microscope

Tablet with integrated camera - TB Series

TB-3W / TB-5W

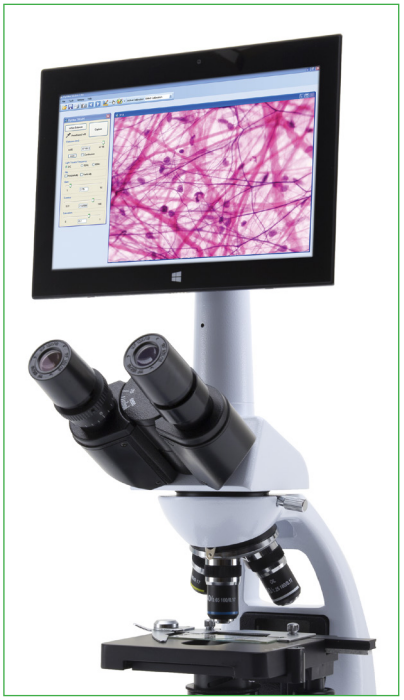
Exclusive tablet PC, powerful and versatile for a great user experience.
Always one step forward to ensure the latest technology!
For trinocular microscopes only. A 2-in-1 solution that you can use like a PC, being Windows-based.
Powerful Intel processor ensuring top performance and speed. High-resolution, vivid color graphic display.
Large touch screen of 10.1" with fast, responsive and smooth control.
Attached camera available in 3.1 MP (TB-3W) or 5.1 MP (TB-5W) resolution.
Holding solution for open discussion, 360° rotating. Includes the user-friendly and intuitive Optika Vision Lite software.



*Keyboard code **TB-KD1** sold separately*

CAMERA Technical specifications

Specifications CAMERA	TB-3W	TB-5W
Digital camera resolution	3.1 MP (2048 x 1536)	5.1 MP (2592 x 1944)
Signal output	USB 2.0	USB 2.0
Sensor Size	1/2"	1/2.5"
Sensor technology	CMOS	CMOS
Sensor type	Aptina CMOS	Aptina CMOS
Image format	4/3	4/3
Pixel size	3.2 x 3.2 µm	2.2 x 2.2 µm
Frame rate full resolution	12 fps (2048 x 1536)	7 fps (2592 x 1944)
Frame rate other resolutions	32 fps (1024 x 768); 45 fps (680 x 510)	27 fps (1280x 960); 90fps (640x 480)
Sensitivity	1 V/lux-second	0.53 V/lux-second
Signal / noise ratio	43 dB	40.5 dB
Dynamic range	61 dB	66.5 dB
ADC conversion	8 Bit	8 Bit
Color Depth	1 Bit ; 4 Bit; 8 Bit; 24 Bit	1 Bit; 4 Bit; 8 Bit; 24 Bit
Exposure Time	0.244 msec - 2 sec	0.294 msec - 2 sec
Binning	1x1; 2x2; 3x3	1x1; 2x2; 4x4
IR filter	380-650 nm (IR-cut filter)	380-650 nm (IR-cut filter)
Camera power	PC USB	PC USB
C-mount	YES	YES



Accessories included: C-mount projection lens, calibration slide, 1.8 m USB cable, 0.5 m USB cable and touch pen.

TB-3W / TB-5W

USB 2.0 C-mount and Eyepiece Microscope Cameras

C-B Series

Cameras have become indispensable nowadays and OPTIKA is offering a line of remarkable solutions for digital imaging.
OPTIKA B Series represents a cost-effective solution equipped with the latest technology sensors with more vivid colors and great contrast for stunning images. This series features Aptina CMOS sensor with excellent color reproduction, significantly high frame rates and several resolutions available to match any customer need.
Thanks to the convenience and simplicity, being extremely intuitive to install and operate, the OPTIKA B Series is recommended for educational and routinary microscopes, also as eyepiece cameras (no need for additional adapters/rings in case of monocular and binocular microscopes).
All the main operating systems like Windows, IOS, Linux are supported.

USB User-frienldy cameras for general purposes.
Superb results and vivid details from standard to high resolution.

Conveniently installable either on trinocular head or on monocular/binocular microscopes.

USB CAMERAS - B Series - Specifications

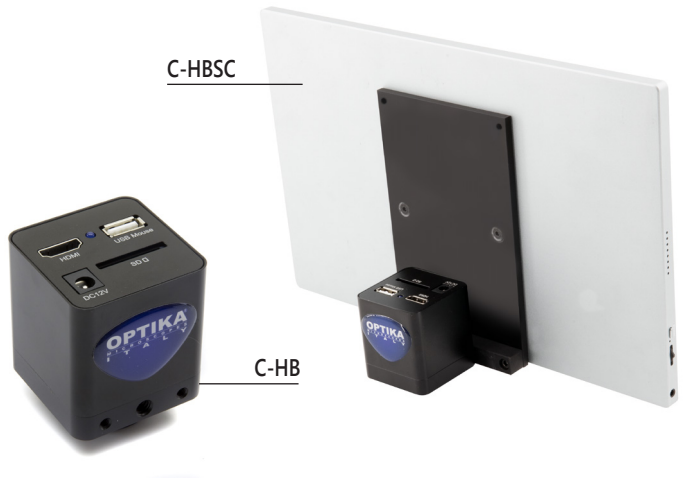
Specifications CAMERA	C-B1	C-B3A	C-B5	C-B10+
Digital camera resolution	1.3 MP (1280 x 1024)	3.1 MP (2048 x 1536)	5.1 MP (2592 x 1944)	10 MP (3584 x 2748)
Signal output	USB 2.0	USB 2.0	USB 2.0	USB 3.0
Sensor Size	1/3"	1/2"	1/2.5"	1/2.3"
Sensor technology	CMOS	CMOS	CMOS	CMOS
Sensor type	Aptina CMOS	Aptina CMOS	Aptina CMOS	Aptina CMOS
Image format	5/4	4/3	4/3	4/3
Pixel size	3.6 x 3.6 µm	3.2 x 3.2 µm	2.2 x 2.2 µm	1.67 x 1.67 µm
Frame rate full resolution	15 fps (1280 x 1024)	12 fps (2048 x 1536)	7 fps (2592 x 1944)	7.2 fps (3584 x 2748)
Frame rate other resolutions	50 fps (320 x 256)	32 fps (1024 x 768); 45 fps (680 x 510)	27 fps (1280x 960); 90fps (640x 480)	24.5 fps (1792 x 1374)
Sensitivity	1 V/lux-second	1 V/lux-second	0.53 V/lux-second	0.31 V/lux-second
Signal / noise ratio	44 dB	43 dB	40.5 dB	34 dB
Dynamic range	71 dB	61 dB	66.5 dB	65.2 dB
ADC conversion	8 Bit	8 Bit	8 Bit	8 Bit - 12 Bit
Color Depth	1 Bit; 4 Bit; 8 Bit; 24 Bit	1 Bit ; 4 Bit; 8 Bit; 24 Bit	1 Bit; 4 Bit; 8 Bit; 24 Bit	1 Bit; 4 Bit; 8 Bit; 24 Bit
Exposure Time	0.14 msec - 2 sec	0.244 msec - 2 sec	0.294 msec - 2 sec	0.4 ms - 2 sec
Binning	1x1; 2x2; 4x4	1x1; 2x2; 3x3	1x1; 2x2; 4x4	1x1; 2x2; 4x4
IR filter	380-650 nm (IR-cut filter)	380-650 nm (IR-cut filter)	380-650 nm (IR-cut filter)	380-650 nm (IR-cut filter)
Camera power	PC USB	PC USB	PC USB	PC USB
C-mount	YES	YES	YES	YES

Accessories included: 0.37x (for 23 mm eyepiece tube), 30 mm & 30.5 mm diameter, calibration slide, 1.8 m USB cable

HDMI Cameras - H Series

C-HB/C-HBSC

The C-HB and C-HBSC models are composed of 1080p high definition cameras, which allow you to capture high quality images through a simple connection to a TV, monitor or projector via the HDMI output, representing a reliable and economical solution equipped with latest technology sensors with more vivid colors and excellent contrast for extraordinary images.
These models feature a first-class Sony CMOS sensor with excellent color reproduction and remarkably high frame rates. Thanks to their practicality and simplicity, being extremely intuitive to install and use, these models are perfect for various applications in the educational and professional fields.
The cameras can be controlled simply via a mouse and can record live video or capture images on a removable SD card.
The C-HBSC model includes an 11.5 " full HD monitor with a small footprint, which allows for screen adjustment to ensure correct posture and eliminate fatigue during observation.
This series of cameras allows you to easily measure samples or parts of them via software.
It also supports spreadsheet archiving.



C-HB / C-HBSC

HDMI / Wi-Fi Cameras

C-WH5/C-WH5SC

Intelligent and intuitive dual output camera (HDMI and Wi-Fi) with good resolution (up to 5MP), high quality SONY CMOS sensor and HDMI / Wi-Fi connection, recommended for routine operations and whenever needed measurements.
The acquisition of images and videos takes place directly on the SD card in HDMI mode and does not require software. It is possible to connect the camera to the PC (Windows) and use it via software (downloadable free of charge) that allows you to perform different types of measurements.
Adaptable to the ocular or trinocular tube of any brand of microscope through a special adapter (to be purchased separately).
Also available as an all-in-one (model C-WH5SC), space-saving package that includes a small footprint 11.5 " full HD monitor that allows for screen adjustment to ensure correct posture and eliminate fatigue during lecture. 'observation.
Wireless mouse, SD card and integrated software included.

C-WH5/C-WH5SC

CAMERA Technical specifications

	C-HB / C-HBSC	C-WH5 / C-WH5SC
Video resolution (Wi-Fi output)	-	2 MP
Video resolution (HDMI output)	HD 1080p	2 MP 1920 x 1080 (1080p)
Digital camera resolution	2 MP (1280 x 720)	5 MP (PC), 2 MP (HDMI)
Signal output	HDMI	HDMI, Wi-Fi
Sensor Size	1/2.8"	1/1.8"
Sensor technology	CMOS	CMOS
Sensor type	SONY STARVIS	SONY
Image format	16/9	16/9
Pixel size	2.9 x 2.9 µm	2.4 x 2.4 µm
Frame rate (HDMI)	60@1920X1080	60 fps (1920 x 1080 HDMI); 25 fps (1920 x 1080 Wi-Fi)
Sensitivity	1300 mV at 1/30sec	1120 mV at 1/30 s
Dark Signal	0.15mV at 1/30sec	0.15 mV at 1/30 s
Exposure Time	0.01 msec - 1 sec	0.03 ms - 918 ms
Binning	1x1	1x1
IR filter	380-650 nm (filter IR-cut)	380-650 nm (filter IR-cut)
Camera power	DC 12V/1A	DC 12V/1A
C-mount	Yes	Yes
White balance	Auto/Manual	Auto/Manual
Gain control	Yes	Yes
Exposure control	Auto/Manual	Auto/Manual

Monitor technical specifications

	C-HBSC / C-WH5SC
Display size	11.5"
Display resolution	1920x1080
Contrast ratio	1000:1
Brightness (lumen)	350
Monitor power supply	DC 12V/1.5 A
Input	HDMI
Dimensions (mm)	281x180x14
Weight (kg)	0,4

Included accessories: C-HB / C-HBSC: HDMI cable, SD card, wireless mouse, multi-plug adapter, calibration slide.
C-WH5 / C-WH5SC: HDMI cable, SD card, wireless mouse, 2 multi-plug adapters, calibration slide.

WIFI Cameras - WF Series

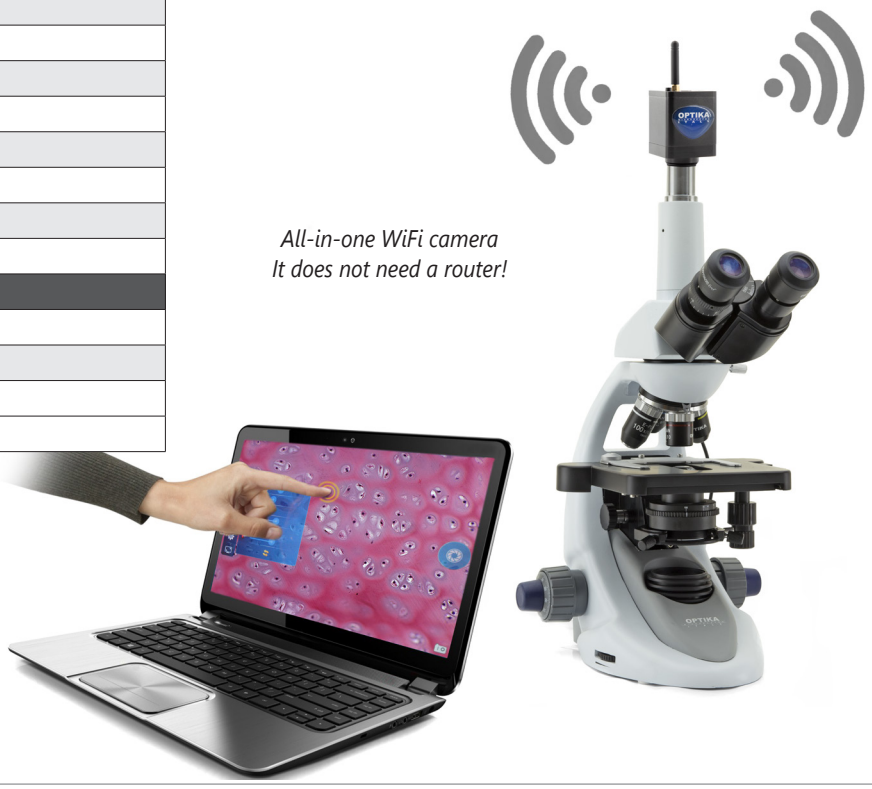
C-WF2

Intuitive **Wi-Fi camera**, affordable and easy to use, with CMOS sensor and direct Wi-Fi connection, recommended for basic and general school applications.
Suitable for use in an interactive digital classroom, it maximizes the efficiency of learning processes.
Direct Wi-Fi, no router required.
Ready for use on any microscope with direct connection to the ocular or trinocular tube, thanks to the included C-Mount lens.
Downloadable software included (Windows, Mac OS or Linux), always available to allow for the latest updates.

Technical specifications

CAMERA Specification	C-WF2
PC Camera resolution (MP)	4 MP
WiFi resolution (MP)	4 MP
Camera resolution (n° of pixels: W x H)	2688x1512
WiFi signal output	Yes
Color / Monochrome	Color
Sensor Technology	CMOS
Sensor Size	1/1.8"
Sensor Technology	CMOS
Sensor Type	SONY EXMOR
Rolling shutter	Yes
Image Format	16/9
Pixel Size (mm)	2.9x2.9
Frame rate full resolution (fps)	30@2688*1512
WiFi speed	802.11n 150Mbps
WiFi Signal	From the camera
WiFi Signal ready	About 10 seconds after turning on
Max Users connected to a single camera	3
Sensibility	1V/lux-sec
Signal/Noise Ratio (DB)	43
Dynamic Range (DB)	61
ADC Conversion	8 Bit - 12Bit
Color Deep	8 Bit
Exposure Time	Auto
Binning	1x1
IR Filter	Yes
Range IR Filter (nm)	380-650 (IR CUT)
Camera power supply	5 Vdc 500mA
C-Mount	Yes
Dimension (mm)	50 x 50 x 112
Weight (Kg)	0.19
Accessories included	
Optical adapter (for 23mm eyepiece tube)	0.5x
Diameter of adapter ring (mm)	30 e 30.5
Calibration slide	Si
USB cable	1.8m

C-WF2



All-in-one WiFi camera
It does not need a router!

Eyepiece camera with CCD sensor

VC-05

Simple eyepiece camera with CCD sensor, 420 TV Lines (PAL)

	VC-05
Digital camera resolution	NO
Analog camera resolution	PAL 582 x 420
Signal output	PAL
Audio Signal	NO
Sensor Size	1\3"
Sensor technology	CCD
Image format	4\3
Full Image size	-
Frame rate full resolution	50 frames\sec (analog mode)
Max Exposure time	-
ON board Memory	NO
External Memory Card	NO
External camera power	12V DC power supply
White Balance	Auto
Gain Control	Auto
Back light control	Auto
Exposure control	Auto
C-Mount connection	NO
CS-Mount connection	NO
Arm length	-
Obiettivo 8 mm	NO

VC-05

OPTIKAM C-E2

C-E2

User-friendly eyepiece camera to be combined with any microscope.

• Direct connection into the eyepiece tube instead of one of the eyepieces (23mm, 30mm & 30.5mm diameter)
• No additional adapters required
• Very useful for educational purposes
• Removable miniUSB cable
• Includes the user-friendly and intuitive OPTIKA Pro View & OPTIKA Lite View.

	OPTIKAM C-E2
Digital camera resolution	2 MP
Analog camera resolution	NO
Signal output	USB 2.0
Audio Signal	NO
Sensor Size	1\3.2"
Sensor technology	CMOS
Image format	4\3
Full Image size	1600 x 1200
Frame rate full resolution	5 frames\sec (1600×1200) / 7,5 frames\sec (1280×1024) / 22 frames\sec (640×480)
Max Exposure time	Auto
ON board Memory	NO
External Memory Card	NO
External camera power	PC USB
White Balance	Auto
Gain Control	Auto
Back light control	Auto
Exposure control	Auto
C-Mount connection	NO
CS-Mount connection	NO
Arm length	-
8mm objective	NO

MICROSCOPE SLIDES

Pack of 50 object-holder slides. V685
Dimensions: 25.4 x 76.2 mm; thickness: 1-1.2 mm. Ground edges.

Object-holding slide with 1 hollow. V757

Object-holding slide with 2 hollows. V758

Object-holding slide with 3 hollows. V759

Object-holding slide distributor. K540
The slides come out one at a time when the knobs are turned. Capacity: 50 slides.

Pack of 200 object-covering slides 18x18 mm. V689.1

Pack of 1000 object-covering slides 18x18 mm. V689


K540


V685


V757


V689.1


K353

EQUIPMENT FOR THE PREPARATION OF SLIDES

Straight points tweezers. 120 mm, stainless steel. F340

Curved points tweezers. 120 mm, stainless steel. F344

Round points tweezers. 120 mm, stainless steel. F329

Flat points tweezers. 105 mm, stainless steel. F327

Potbellied blade steel scalpel, detachable blade F361

Disposable scalpel, plastic handle F364

Scissors for microscopy. F950

Double flexible spatula . 120x6 mm, stainless steel. F760

Needle with handle. 130 mm. F322

Lance needle with handle. 130 mm. F323

Drum microtome with hand razor. SM2713


SM2713


15050

Set of microscopy accessories 15050
The set is composed of: ruler, thin point scissors, laboratory scissors, straight point tweezers, round point tweezers, interchangeable blade scalpel, 1 blade for scalpel and two needles with handle.

Microscopy toolbox 15001
Toolbox containing: scalpel, scissors, spatula, needle with scissors, round point tweezers, curved point tweezers, magnifying glass, 6 bottles of fundamental dyes , 3 glass bottles, 2 droppers, 2 watch glasses, 1 bottle of Canada balsam,1 bottle of xylene, 1 bottle of ethyl alcohol, 50 object-holding slides, 200 object-covering slides.


15001

EQUIPMENT FOR SLIDE-STAINING

Slide-staining box. K354
20 spaces to be immersed into a basin code K353.

Basin for slide-staining. K353
Dimension: 100 x 80 x70(h) mm.

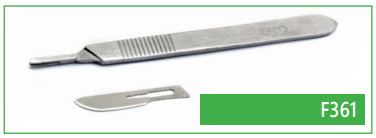
K354


F340


F344


F329


F327


F361


F364


F950


F760


F322


F323

EQUIPMENT FOR CLEANING AND MAINTENANCE OF MICROSCOPES

Cleaning kit 15101
It contains air brush with cap, pack of optical cards, cleanser liquid, antistatic cloth 20x20 cm, wadding, plastic case.

15101

Compressed air spray 15102
Suitable for cleaning objective and eyepieces,it has a small tube to reach the hidden parts, too. Pack of 400 ml.

STAINS AND REAGENTS FOR MICROSCOPY

6 fundamental stains in bottles of 10 ml. 15002
Metylene blue, eosin, gentian violet, nigrosine, neutral red, Lugol solution.

Ethyl alcohol 25 ml. 15006

Canada Balsam 10 ml. 15007

Oil for immersion eyepieces 10 ml. 15008

Two-lens magnifier 4986
It is composed of two lenses whose diameter is 22 mm. First lens magnification: 4x; second lens magnification: 6x; total magnification: 10x.

Magnifier with millimetric scale 4987
8x magnifier with front opening and millimetric ruler for measurement. Measure interval: 0,1 mm. Endowed with focusing adjustment. Dimensions: 42x42x45h mm.

Counting glass with millimetric scale 4090
5x counting glass with double millimetric ruler for measurement. Measurement interval: 1 mm. Dimensions: 40x52x52h mm.

4986 - 4987 - 4090

3x magnifier 4091
Endowed with front opening. Dimensions: 47x59x56h mm.

4091

6x magnifier 4985
Diameter: 66 mm. Height: 55 mm.

4985

2x-4x magnifying glass 4980
Double magnification lens: inside the 2x lens (diam. 70 mm) there is a lunette with 4x magnification (diam. 16 mm).

Giant magnifying glass 4981
Diameter: 145 mm, long-distance functioning. Magnification: 2x.

4980 - 4981

Big model of Two-sides viewer 4988
Simple viewer to observe the life of insects and grubs.
Separable into 3 parts.
Magnification: 6x.
Dimension: 190x130x130h mm.

4988

7x magnifier 4088
The item is suitable for the observation of small insects.

4088

Lens with support pincer 4984
6x magnifying lens with pincer for samples.

4984

100x pocket microscope 4086
Magnification from 60x to 100x; it is supplied with zoom and focus adjustment. Built-in light bulb powered by batteries.

4086

Magnifying lens with handle-stand endowed with built-in light bulb 4982
2x-4x double magnification lens. With double-function handle: stand (open) and light bulb (batteries-powered).

4982

3x giant magnifier 4087
It has rulers with millimetric graduation. Lens diameter: 110 mm. Dimensions: 160x130x180h mm.

4087

8x magnifying glass with built-in light bulb 4092
Lens diameter 25 mm. It is endowed with front opening and battery-powered light bulb.

4092

Centimeter-graduated magnifier for insects 4026
With ventilation holes in order to observe alive insects.
With double 2x - 4x lens.
Chamber dimensions:
Ø 70 mm, height 75 mm.
Dimensions: 160x130x180h mm.

4026

General biology - Basic kit MZ-1000

1. Unicellular animal (Ameba or other)
2. Paramecium, whole body
3. Hydra, whole body
4. Daphnia, whole body
5. Lumbricus (earthworm), cross section
6. House fly, mouth part, whole body
7. Honey bee, mouth part, whole part
8. Honey bee, hind leg
9. Three type of bacteria, smear
10. Simple flat epitelium, whole body
11. Skeletal muscle, longitudinal section and cross section
12. Human blood smear
13. Frog blood smear
14. Lung section
15. Artery and vein, cross section
16. Human skin section through hair follicle
17. Spirogyra conjugation, whole body
18. Volvox, whole body
19. Moss, whole body
20. Mitosis, onion root tip cell, section
21. Monocot and dicot, roots , cross sec.
22. Monocot and dicot shafts , cross sec.
23. Tilia (linden tree), 1 year old stem, cross sec.
24. Tilia (linden tree), 3 years old stem, cross sec.
25. Monocot and dicot leaves, cross sec.

Freshwater plants (cryptogams) MZ-2000

1. Three types of bacteria, smear
2. Rhizopus nigricans (breadmold), whole body
3. Penicillium, whole body
4. Aspergilus, whole body
5. Yeast, whole body
6. Lichen, section
7. Volvox, whole body
8. Spirogyra conjugation, whole body
9. Porphyra (sea lettuce), whole body
10. Marchantia thallus, section
11. Marchantia antheridiophore, longitudinal sec.
12. Marchantia archegoniophore, longitudinal sec.
13. Moss, protonema, whole body
14. Moss, antheridium, cross section
15. Fern prothallus, young sporophyte, whole body

Phanerogams MZ-3000

1. Pine tree, leaf , cross sec.
2. Pine tree, 1 year old stem, cross sec.
3. Pine tree, 10 years old stem, cross sec.
4. Pine tree, spherical male fruit, longitudinal sec.
5. Pine tree, spherical female fruit, longitudinal sec.
6. Pine tree, pollen, whole body
7. Buttercup, root, cross sec.
8. Corn (mais), root, cross sec.
9. Mitosis, onion tips, section
10. Geranium stem, cross sec.
11. Corn (zea mays), stem, cross sec.
12. Corn (zea mays), stem, longitudinal sec
13. Sunflower, young stem, cross sec.
14. Tilia (linden tree), 1 year old stem, cross sec.
15. Tilia (linden tree), 3 years old stem, cross sec.
16. Lily, leaf, cross sec.
17. Fig tree , leaf with foveolate stomata, cross sec.
18. Three types of leaves, cross sec.
19. Lily pollen, whole body
20. Lily anther, cross sec.
21. Lily ovary, cross sec.
22. Meiosis, cross section of lily anther at different phases
23. Capsella, young embryo, section
24. Capsella, medium embryo, section
25. Capsella, old embryo, section

Zoology - Vertebrates and insects MZ-4000

1. Unicellular animal (Ameba or other)
2. Paramecium, whole body
3. Hydra, whole body
4. Hydra, sperm gland, cross section
5. Hydra ovary, cross section
6. Male nematode, cross section (ascaris megalocephala)
7. Female nematode, cross section (ascaris megalocephala)
8. Egg mitosis of a horse's nematode (ascaris mega locephala)
9. Tubellaria, injected intestinal tube, whole body
10. Mussel Gill, cross section
11. Mosquito male, mouth parts, whole body
12. Female mosquito, mouth parts, whole body
13. Butterfly, mouth parts, whole body
14. Honey bee, mouth parts, whole body
15. Testis of migratory locust, section
16. Insect's composed eye, section
17. House fly, whole body
18. Female mosquito, whole body
19. Drosophila (fruit fly), whole body
20. Insect, legs for digging, whole body
21. Insect, legs for walking, whole body
22. Insect, legs for swimming, whole body
23. Insect, legs for jumping, whole body
24. Insect, leg for pollinating, whole body

Zoology - Vertebrates and mammals MZ-5000

1. Frog skin, cross sec.
2. Frog small intestine, cross sec.
3. Frog blood smear
4. Frog testis, section
5. Frog liver, section
6. Frog, heart, sect.
7. Rabbit liver, sec.
8. Rabbit testis, sec.
9. Rabbit vertebral column, cross sec.
10. Rabbit, motor nerve endings, whole body
11. Rabbit ovary, section
12. Compact bone tissue
13. Stomach walls, section
14. Small intestine, cross section (mamal)
15. Large intestine, cross sec. (mammal)
16. Pancreas (mammal)
17. Spleen, sec. (mammal)
18. Gall bladder, sec. (mammal)
19. Lung, sec. (mammal)
20. Artery and vein, cross sec. (mammal)
21. Kidney, longitudinal sec. (mammal)
22. Human sperm, smear
23. Human skin, sec. through sweat gland
24. Eye ball, longitudinal sec.(mammal)
25. Human Chromosome in blood, male and female

Set of 5 slide kits MZ-5556

This article contains the following collections of slides:

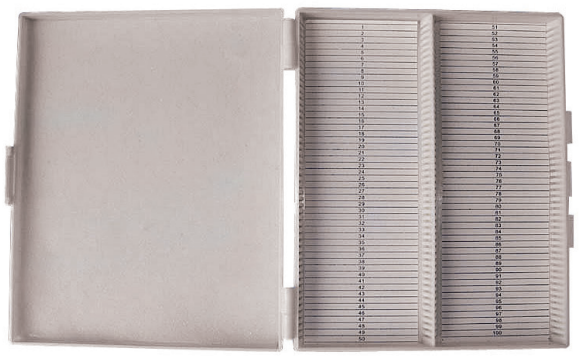
MZ-1000 - General biology - Basic kit
MZ-2000 - Freshwater plants (cryptogams)
MZ-3000 - Phanerogams
MZ-4000 - Zoology - Vertebrates and insects
MZ-5000 - Zoology - Vertebrates and mammals

PREPARED SLIDES - SINGLE SLIDE

Artery and vein, cross sec. (mammal)	MZ-2057
Ascaris female, c.s.	MZ-1021
Ascaris male, c.s.	MZ-1020
Unicellular animal (euglena, W.M.)	MZ-1002
Lily anther, cross sec.	MZ-3167
Honey bee, mouth parts, whole body	MZ-1031
Honey bee, hind leg	MZ-1037
Aspergillus, W.M.	MZ-3004
Mussel gill, cross sec.	MZ-4028
Eyeball, longitudinal sect. (mammal)	MZ-2077
Capsella, young embryo, section	MZ-3177
Capsella, medium embryo, sect.	MZ-3178
Capsella, old embryo, sect.	MZ-3179
Gall bladder, sec. (mammal)	MZ-2052
Rabbit, motor nerve endings, whole body	MZ-2031
Rabbit, vertebral column, cross sec.	MZ-2027
Rabbit liver sec.	MZ-4047
Rabbit ovary sec.	MZ-2062
Rabbit testicle, sec.	MZ-4051
Human chromosomes in blood, male and female	MZ-4063
Daphnia W.M.	MZ-1009
Drosophila (fruit fly), whole body	MZ-1067
Epithelium, whole body	MZ-2001
Butterfly, mouth parts, whole body	MZ-1032
Fig tree , leaf with foveolate stomata, cross sec.	MZ-3137
Monocot and dicot, leaves, cross sec.	MZ-4003
Geranium stem, C.S.	MZ-3109
Monocot and dicot, stem , cross sec.	MZ-4002
Hydra sperm gland, cross sec.	MZ-1007
Lily, leaf, cross sec.	MZ-3144
Sunflower, young stem, cross sec.	MZ-3086
Large intestine, cross sec. (mammal)	MZ-2046
Corn (mais), stem, longitudinal sect.	MZ-3100
Corn (mais), stem, cross sect.	MZ-3099
Corn(zea mays) root, C.S.	MZ-3071
Hydra, whole body	MZ-1003
Insect, leg for pollinating, whole body	MZ-1073
Insect, legs for walking, whole body	MZ-1070
Insect, legs for swimming, whole body	MZ-1071
Insect, legs for jumping, whole body	MZ-1072
Insect, legs for digging, whole body	MZ-1069
Lichen, sect.	MZ-3008
Yeast, whole body	MZ-3007
Lumbricus (earthworm), cross section	MZ-1025
Marchantia, female genital organ, longitudinal sec.	MZ-3019
Marchantia, male genital organ, longitudinal sec.	MZ-3018
Meiosis, cross section of lily anther at different phases	MZ-4005
Spleen sec. (mammal)	MZ-2050
Mitosis, onion tips, sec.	MZ-3067
Mitosis, horse mite's egg	MZ-1023
Monocot and dicot, roots , cross sec.	MZ-4001
House fly, whole body	MZ-1064
House fly, mouth parts, whole body	MZ-1030
Moss, antheridium, cross sec.	MZ-3023
Moss, whole body	MZ-3021
Moss, protonema, whole body	MZ-3022
Skeletal muscle, longitudinaland cross sections	MZ-2025
Insect's composed eye, sec.	MZ-1042
Hydra ovary, cross sect	MZ-1008
Lily ovary, cross sec.	MZ-3173
Pancreas (mammal)	MZ-2049
Paramecium W.M.	MZ-1001
Stomach wall, sec	MZ-2038
Frog skin C.S.	MZ-1045
Human skin section through hair follicle	MZ-2080
Human skin, sect. through sweat gland	MZ-2079
Penicillium, whole body	MZ-3003
Frog small intestine, cross sect.	MZ-1047
Small intestine, cross sec. (mammal)	MZ-2041
Pine tree leaf C.S.	MZ-3037
Pine tree, spherical female fruit, longitudinal sec.	MZ-3043
Pine tree, spherical male fruit, longitudinal sec.	MZ-3042
Pine tree, 1year old stem, cross sec.	MZ-3038
Pine tree, 10 years old stem, cross sec.	MZ-3039
Pine tree, pollen, whole body	MZ-3044
Lily pollen, whole body	MZ-3165
Lung sec. (mammal)	MZ-2053
Porphyra (sea lettuce), whole body	MZ-3015
Fern prothallus, young sporophyte, whole body	MZ-3032
Frog hearth sect.	MZ-4060
Frog liver section	MZ-4057
Frog testicle, sec.	MZ-4054
Buttercup, root, cross sec.	MZ-3050
Kidney, longitudinal sec. (mammal)	MZ-2058
Rhizopus nigricans (breadmold), whole body	MZ-3002
Human sperm, smear	MZ-2065
Spirogyra conjugation, whole body	MZ-3013
Frog blood smear	MZ-2016
Human blood smear	MZ-2015
Marchantia thallus, sec.	MZ-3016
Compact bone tissue	MZ-2013
Testicle of migratory locust, sec.	MZ-1040
Tilia (linden tree), 1 year old stem, cross sec.	MZ-3091
Tilia (linden tree), 3 year old stem, cross sec.	MZ-3093
Three types of bacteria, smear	MZ-1077
Three types of leaves , cross sec.	MZ-3136
Tubellaria, injected intestinal tube, whole body	MZ-4024
Volvox, whole body	MZ-3011
Female mosquito, whole body	MZ-1065
Female mosquito, mouth parts, whole body	MZ-1029
Male mosquito, mouth parts, whole body	MZ-1028

EMPTY PLASTIC CASES FOR SLIDES

Plastic case for 10 slides	MZ-6010
Plastic case for 15 slides	MZ-6015
Plastic case for 25 slides	MZ-6025
Plastic case for 50 slides	MZ-6050
Plastic case for 100 slides	MZ-6100



Bacteria and yeasts (12 slides) 15900

Tartar - saccharomyces cerevisiae (brewer's yeast) - coccobacillus - yoghurt bacteria - acetobacter - staphyilobacillus - Hansen's bacillus (leprosy) - staphylococcus - streptobacillus (lactic bacillus) - bacilla - candida albicanis - candidiasis.

Weeds (12 slides) 15901

Spirogyra - phytoplankton diatoms - brown seaweed ovary, c. s. - Posidonia leaf, c. s. - peacock feather, c. s. - laminar thallus c. s. - corallina officinalis - halopteris scoparia - nostoc - ulva, c. s. - codiaeum variegatum, cross. section. - rhizome of seaweed.

Mushrooms, lichens, musks (12 slides) 15902

Bread mould - basidiomycet champignon mushroom- gasteromycete of truffle - ascomycetes - polyporaceae (bracket fungi) - fruit mould - Xantophyceae's lichen, t.s. - paramelia lichen, t.s. - Mushroom stem - Lichen apothecium- musk's sporangium - musk leaf

Morphology of cells(12 slides) 15903

Silica cells (diatomeae) - stone cells (dissociated sclereids) - adipose cells (cut of coffee seed) - scale cells (vegetal hairs of ulive leaf) - secretory cells (fennel thallus) - fibrous cells (thrinax fibres) - spheric cells (equisetum spores) - concretioned cells (orange tree bark) - elongated cells (coconut flesh) - polygonal cells (Ceterach Officinarum exfoliated epidermis) - elliptical cells (Lilium pollen) - cylindrical cells (asphodelus, t.s.).

Cell structure (12 slides) 15904

Tannins (carob thallus) - starch (corn seed by-products) - druse (lilium styles) - raphides (thallus, cat nail) - nuclei (mixed plants) - aleuron (seeds, wheat bran) - calcium crystals (onion endothelium) - proteins (seeds) - globoids (castor proteins) - chloroplasts (leaves of fig tree and vine) - potato flour(section of potato) - pelargonin (geranium petal).

Vegetable histology 1 (12 slides) 15905

Tracheids of linden tree - collenchyma - lysigenous holes - sclerenchyma fibres- epidermis with styles - air pores - cork - xylem, t.s.- xylem, l. s. - marrow parenchyma - ringed vessels - chlorophyl parenchyma.

Vegetable histology 2 (12 slides) 15906

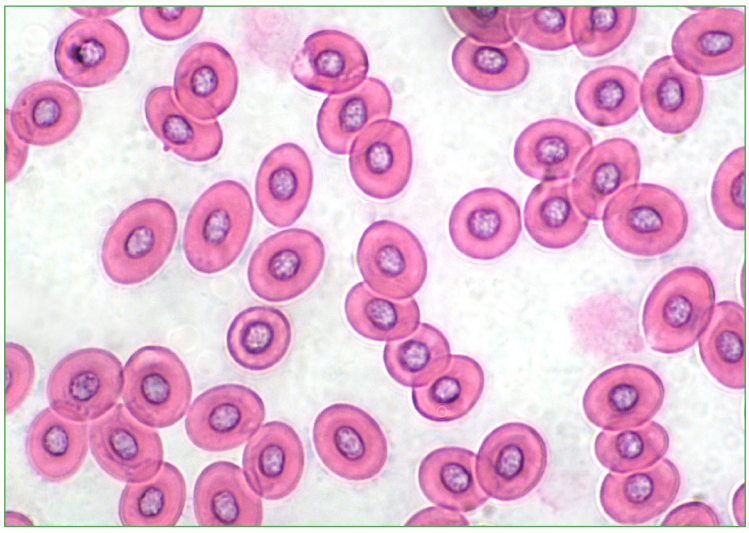
Cypress pollen - Equisetum thallus- Male pine fower - Monocotyledon roots - ulive leaf - Monocotyledon thallus - Female pine leaves - Dicotyledon thallus, secondary structure - petiole - pine fresh thallus - pine leaf - Monocotyledon's leaf.

Vegetable histology 3 (12 slides) 15907

Dicotyledon roots - Dicotyledon thallus, prime secondary structure - stigma - rootstock - eucalyptus leaf - Dicotyledon leaf - Fern leaf - Primary dicotyledon root - ovary - flower - bud - style, t. s.

Pollens and spores (12 slides) 15908

Gladiolus pollen - Polypody spores - Chanterelle spores - Corn pollen - Equisetum spores - pine pollen - passion flower pollen - Llycopodium spores - Coprinus mushroom spores - Mimosa pollen- fern spores - Platanus pollen.

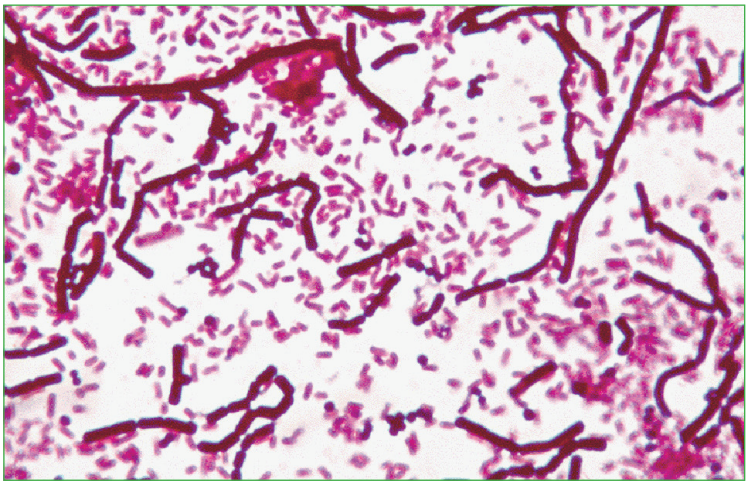


Zoology (12 slides) 15909

Chromatophores - Copepods - bird feather - dog hair - cycloid scale - ctenoid scale - butterfly wing - hydroids- sponge section - nucleated blood - holothuroidea spicules - radula.

Insects (12 slides) 15910

Fly wing -fly leg - bee head - fly head - winged ant wing - bee wing - ant head - mosquito head - butterfly wing - bee sting - diptera larva - insect windpipe (thrachea)



Parasitology (12 slides) 15911

Liver with parasites - Lung with parasites - triquina - tapeworm, t.s. - flea - birds' louse - Mite - zoocecidium - Ascaris, t.s. - fasciola hepatica(liver fluke), t.s.- opalina - coenurus.

Animal histology 1 (12 slides) 15912

Skeletal muscle - Smooth muscle - spongy bone - compact bone - diaphanous cartilage - elastic cartilage - mammal blood - adipose tissue (fat) - prismatic epithelium - sebaceous gland - multilayered epithelium - subjunctive released in the umbilical cord.

Animal histology 2 (12 slides) 15913

Mammal tongue - tooth, t.s. - oesophagus - stomach - reticulum - omasum - abomasum - small intestine - large intestine - pancreas - liver - gall bladder.

Animal histology 3 (12 slides) 15914

Nose cavity - windpipe - mammal lung -kidney - urethra - urinary bladder - testis - epididymis - ovary - uterine tube - uterus - udder.

Animal histilogy 4 (12 slides) 15915

Mammal skin - hair, t.s.. - lynphatic ganglion - heart - artery - vein - marrow - cerebellum(little brain) - brain - adrenal glands- thymus gland -spleen.

Petrography (10 slides) 15916

Granite - gabbro - gneiss - quartzite - sandstone - aragonite - trachyte - bauxite - syenite - basalt - mica schist - marble -fossil limestone - peridot - diabase - diorite

General biology (25 slides) 15917

Skeletal muscle - small intestine - diaphanus cartilage - elastic cartilage - compact bone - mammal tongue - mammal stomach - lung - yoghurt bacteria - starch - iris ovary- raphides - dicotyledon thallus - stone cells - pollen - ascomycota - butterfly wing - fly leg - sponge spicule - hydroides - bird blood - mammal hair - ctenoid scale - bee wing - spider leg.

Structure and morphology of cells (25 slides) 15918

Silica cells - adipose cells - spheric cells - elongated cells - elliptical cells - stone cells - scale cells - fibre cells - concrectioned cells - cylindrical cells - polygonal cells - dotted cells - cork-like cells - druse - starch - nuclei - calcium crystals- globoids- tannins - raphes - proteins - aleurons - chloroplasts - pelargonin - potato flour.

General zoology (25 slides) 15919

Cromatophores - holothuroidea spicules - arachnid's leg - sea crustacean - copepods - winged ant wing - sponge, t. s. - mammal hair - bird blood - cycloid scale - wool fibres - head of mosquito - ctenoid scale - radula - hydroids - bird feather - diptera wing - diptera larva - fly leg - butterfly wing - head of ant - head of fly - bee wing - bee sting - insect windpipe.

General animal histology 1 (25 slides) 15920

Skeletal muscle - smooth muscle - compact bone - spongy bone - diaphanous cartilage - elastic cartilage - mammal tongue - large intestine - small intestine - oesophagus - omasum- reticulum- abomasum -liver - pancreas - gall bladder - bird tongue- frog tongue - nose cavity - windpipe (thrachea) - mammal lung - mammal skin - bird lung - pelle di muranca - hair , t.s.

General animal histology 2 (25 slides) 15921

Mammal kidney - urethra - urinary bladder - uterus - uterine tube - testis - epidydimis - udder - lymphatic ganglium - adrenal glands - spinal cord - brain - small brain - artery - vein - heart - blood - thymus gland - spleen- ovary - bird kidney - fish gonad - lung with parasites - fasciola hepatica(liver fluke), t.s. - oesophagus and windpipe of bird.

Fishes, frogs and other amphibians (10 slides) 15600

Dogfish (scyllum) vertebral column t.s. -Fresh water fish, region of gills t.s. - Fresh water fish, region of tails t.s. - Fish scales, various types w.m. - Tadpole frog, larva t.s. through body - Frog (Rana) blood smear - Frog (Rana) tongue t.s. - Frog (Rana) intestine t.s. - Frog (Rana) lung t.s. - Salamander skin, t.s. with poison glands.

Lizard, snakes and bird (10 slides) 15601

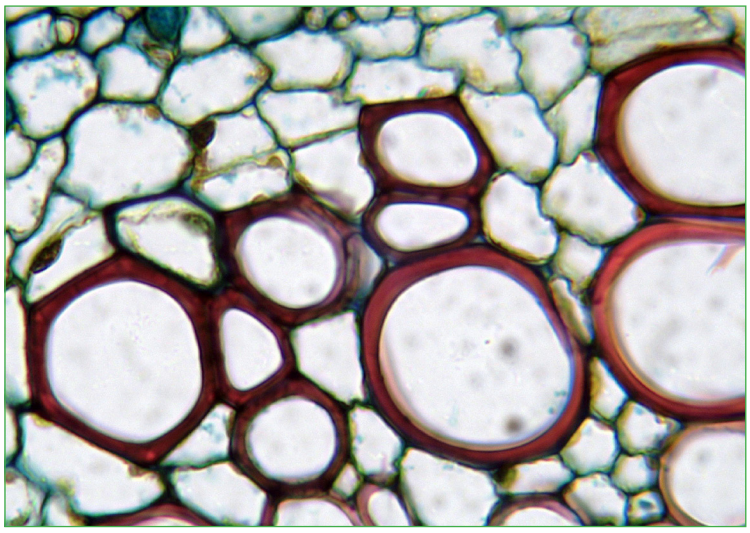
Lizard (Lacerta)wide surface lung t.s. - Lizard (Lacerta) kidney - Adder (Elaphe) muscles of snake t.s. - Adder (Elaphe) stomach with acid glands of snake - Goose (Anser) plume feather w.m. - Duck (Anas) gizzard with thicklining t.s.- Turkey (Meleagris) wing feather w.m. - Chicken (Gallus) cockscomb, secondary sexual characteristic t.s. - Chicken (Gallus) ovary t.s. - Chicken (Gallus) blood smear.

Bacteria, simple organisms (10 slides) 15602

Hay bacilli (Bacillus subtilis) - Milk souring bacteria (Streptococcus lactis) - Putrefaction bacteria (Proteus vulgaris) - Intestinal bacteria (Escherichia coli) - Paratyphoid bacteria (Salmonella paratyphi) - Bacillary dysentery (Shigella dysenteriae) - Pus bacteria (Staphylococcus pyogenes) - Bacteria from human mouth - Bacteria from cheese - Bacteria from leaven.

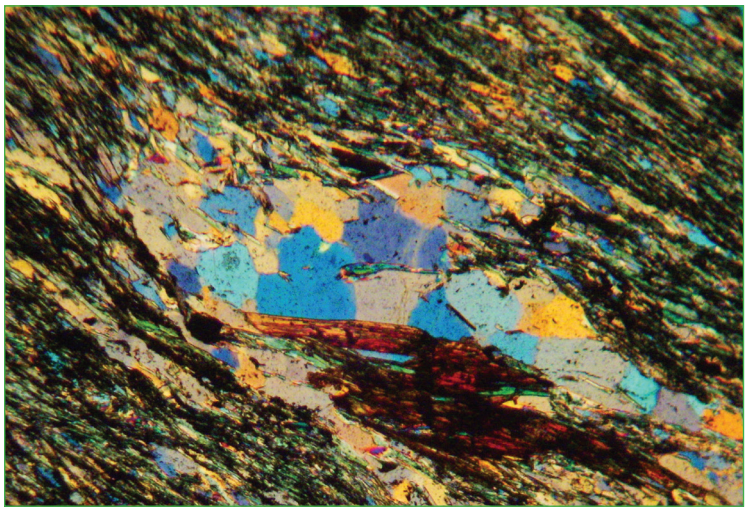
Plant reproduction and propagation (10 slides) 15604

Bacteria rod-shaped bacilli in fission - Seaweed, Focus thallus t.s. - Cornsmut Ustilago spore w.m. - Pine (Pinus), male cone with pollen t.s. - Pine pollen grains with air bag w.m. - Chive, flower with anthers, ovaries t.s. - Lily anthers development of pollen t.s. - Tulip (Tulipa) t.s. ovary with ovules - Iris t.s. seed and embryo - Tomato (Solanum) young fruit t.s.



Structure of a vegetable cell (10 slides) 15605

Cells with crystals from cactus t.s. - Edelberry, Sambucus stem t.s. - Mullein, Verbascum branched leaf hairs - Glandular cells in rosemary leaf t.s. - Sunflower leaf with hairs t.s. - Water lily Nymphaea stem, stellate hairs. - Dead nettle Lamium stem t.s. - Potato cells with starch grains t.s. - Pollen grains, mixed species - Isolated vessels from plant stem.



The world of a drop of water (10 slides) 15607

Diatoms, many different forms - Euglena, green flagellate weed - Paramecium, ciliates from hay-infusion - Daphnia, water flea - Cyclops, a copepod w.m. - Desmids, mixed (Desmidiaceae) - Mixed plankton from fresh water - Hydra t.s. of the body - Planaria t.s. of body of a flatworm - Bacteria from putrid water.

The human tissues 1 (10 slides) 15608

Human blood smear with red and white cells - Human mouth, epithelial cells - Human striate muscle l.s. - Human cerebrum t.s. - Human tonsil with lymph nodules, t.s. - Human lung t.s. - Human skin l.s. - Human stomach t.s. - Human red bone marrow, blood cell in development - Human testis t.s.

The human tissues 2 (10 slides) 15609

Human skin, section t.s. of hairs - Human salivary gland t.s. - Human cerebellum t.s. - Bacteria from human intestine - Human spermatozoa, smear - Human heart muscle, t.s. and l.s. - Human bone t.s. - Human liver tissue t.s. - Human intestinal wall t.s. - Human kidney, t.s. of a cortical zone.

Animal and human parasites (10 slides) 15610

Tapeworm (Taenia) t.s. proglottids - Tapeworm (Taenia) eggs w.m. - Trichinella t.s. muscle with larvae - Trypanosoma in blood smear - Plasmodium, cause of malaria, in blood s.m. - Liver of rabbit, with coccidiosis t.s. - Big liver fluke (Fascicola) t.s. - Schistosoma t.s. of male and female - Hydatide cyst of Echinococcus t.s. - Roundworm of man and pig (Ascaris) t.s.

Life in the ground (10 slides) 15612

Soil bacteria - Hyphae of root fungi t.s. - Fruiting body of mushroom (Psalliota) - Horsetail Equisetum - Moss leaf, surface view w.m. - Needle of pine (Pinus) t.s. - Venation of a deciduous leaf - Decomposing leaf, formation of humus - Mite from forest soil w.m. - Earthworm (Lumbricus) t.s. midbody.

Set for science teaching (10 slides) **15614**

Leg of house fly, Musca domestica - Bird feather w.m. - Wing scales of butterfly - Human blood smear - Intestine of rabbit t.s. - Lung of cat t.s. - Mixed zoological and botanical plankton - Pollen grains of different plants - Foliate leaf with netted venation - Large cells, marrow of edelberry

Set for biology teaching 1 (10 slides) **15615**

Filamentous green alga of freshwater with chloroplasts - Mould from bread with mycelium and spoor - Sunflower root t.s. - Privet, t.s. of leaf (Ligustrum) with palisade and spongy parenchyma - Tulip, t.s. of ovary with ovules - Paramecium ciliates - Earthworm t.s. through midbody - House fly, wing w.m. - Frog, blood smear - Chick, skin of a bird l.s. with feathers.

Set for biology teaching 2 (10 slides) **15616**

Bacteria from sour milk, smear - Moss, leaves t.s. with cloroplasts - Yew, young stems t.s. - Hyacinth seed t.s. - Euglena, green flagellate - Ascaris, intestine worm t.s. through midbody - Honey bee (Apis), antenna with smell organs w.m. - Carp (Cyprinus) t.s. of gills - Liver of rabbit t.s. - Skin of cat l.s. with glands and hairs.

Animal reproduction (10 slides) **15624**

Tapeworm of sheep, mature proglottid with eggs t.s. - Honey bee ovaries of queen t.s. - Fish, testis with spermatozoa t.s. - Sperm smear of bull - Testis of bull, spermatognesis t.s. - Ovary of rabbit, ovogenesis t.s. - Fallopian tube of guinea pig t.s. - Uterus of pig, resting stage t.s. - Uterus of rat with embryo t.s. - Placenta of cat or pig t.s.

Cell reproduction (10 slides) **15626**

Mitotic stages in red bone marrow of a mammal - Mitotic stages in testis of mouse t.s. (meiosis) - Development of sea-urchin egg, cleavage stage - Growing egg in ovary of bird t.s. - Plant mitosis, l.s. of onion root tips - Plant mitosis, angular vision of onion root tips - Growing tissue in asparagus stem apex l.s. - Growing pine leaf tissue in shoot apex t.s. - Plant meiosis, t.s. young Lilium anthers - Mature pollen grains of Lilium w.m.

Human pathological tissues 1 (10 slides) **15627**

Tubercolosis of the lung with bacteria breeding grounds t.s. - Cirrhosis of liver with parenchyma isles and connective tissues t.s. - Leukemia of spleen with leukocytes and young cells t.s. - Sleeping diease, blood smear with protozoa - Inflammation of the lung, breeding grounds arond blood vessels - Malaria, melanemia of spleen t.s. - Scar tissue of skin t.s. - Eberthella typhi (typhoid fever) - Chronic nephritis: inflamed renal tubules t.s. - Pus bacteria smear with cocci.

Human pathological tissues 2 (10 slides) **15628**

Miliary tuberculosis of liver - Anthracosis of lung - Malaria parasites in blood - Infarct of lung t.s. - Cancer of testis t.s. - Amyloid degeneration of liver - Influenzal pneumonia - Struma of thyroid gland - Chronic inflammation of colon - Metastatic carcinoma of liver.

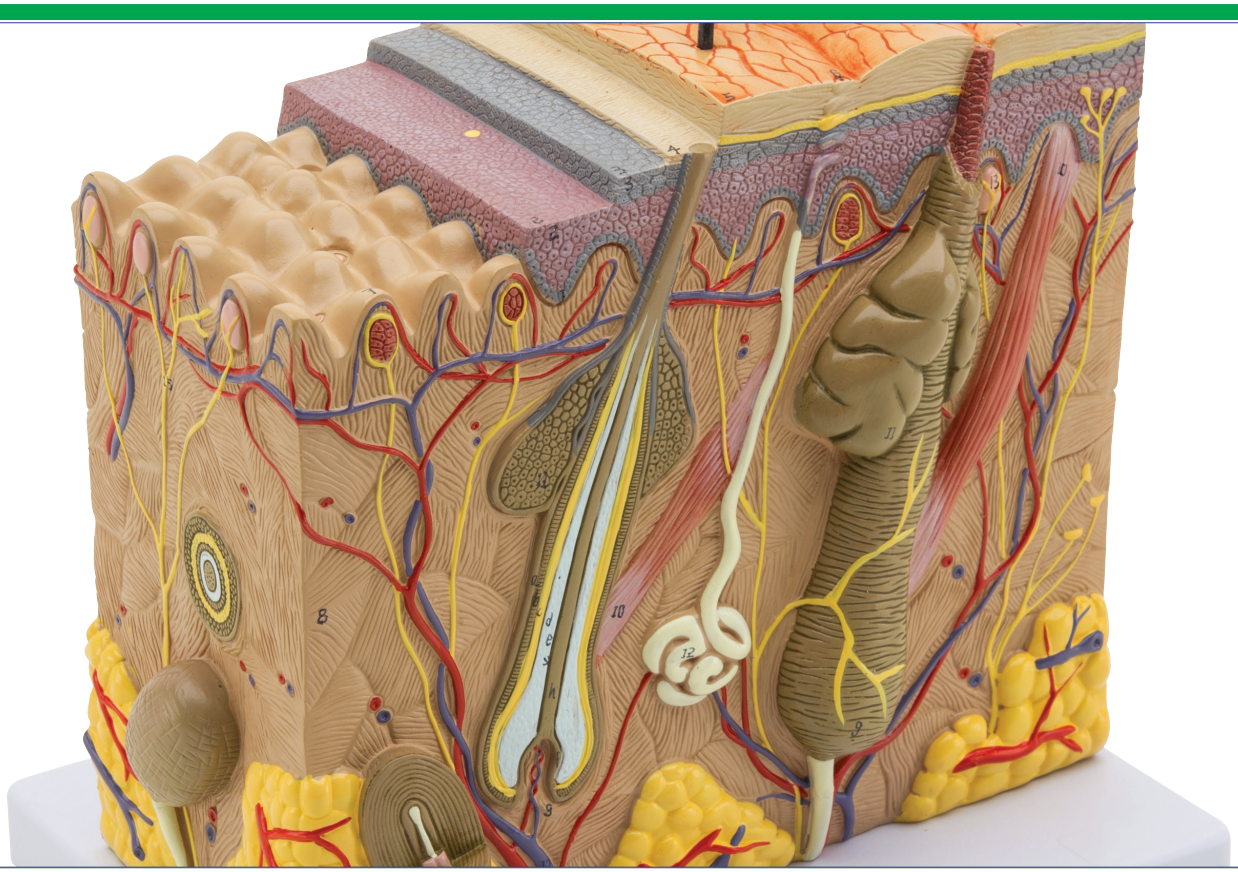
The cell and the animal tissues (25 slides) **15629**

Squamous epithelium of amphibian - Squamous stratified epithelium - Cuboidal Epithelium - Simple columnar epithelium - Pseudostratified columnar epithelium - Ciliated epithelium - Transitional epithelium - Fibrous connective tissue of a mouse's tail - Reticular connective tissue - Fat Connective tissue - Hyaline Cartilage - Elastic Cartilage - Fibrous Cartilage - Human bone tissue - Growing bone and joint cartilage of a fetus' finger - Fish Blood - Bird blood (sparrow) - Human blood - Striated muscle, dissociated with whole fibres, nuclei, fibrils and striations - Smooth involuntary muscle, dissociated - Cardiac muscle, dissociated with ramified cells, striations and intercalated discs - Muscle and tendon, lateral section - Nerve cells, spinal cord section, Golgi's method - Nerve, cross and lateral section, hematoxylin and eosin stain - Intercostal muscles' neuromuscular synapse, auric impregnation.

Index

Teaching guide in digital format

Minimum invoiced order: € 130,00 + VAT



Set for the demonstration of plants' respiration 5661

To demonstrate that, during cellular respiration, the plants absorb oxygen.

5661

Set for the demonstration of germinating seeds breathing 5663

To demonstrate how seeds absorb oxygen during the germination period.

5663

Set for the demonstration of CO2 emission and heat production in germinating seeds 5664

For the study of two other phenomenon of the germination phase of seeds.

5664

Set for the demonstration of plants' traspiration 5665

To demonstrate that, during the cellular respiration, the plants absorb oxygen and for the quantification of the phenomenon in different environmental conditions with different plants.

5665

Set for the demonstration of radical pressure 5666

To demonstrate the existence of the radical pressure's phenomena.

5666

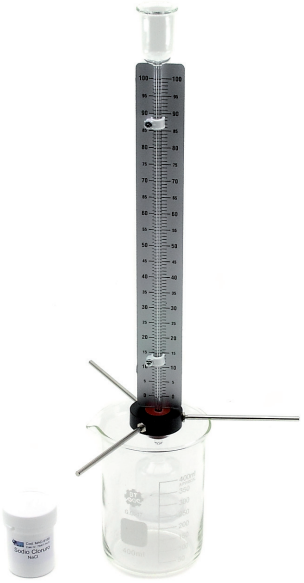
Set for the demonstration of aquatic plants' respiration 5667

To show how during the phenomena of photosynthesis, the plants emit molecular oxygen.

5667

Dutrochet's endosmometer for the demonstration of osmotic pressure 5668

To show how plants absorb water through the osmosis phenomenon.



5668

Set for the demonstration of mineral salts absorption in plants 5669

To demonstrate the difference in the development between plants fed with mineral salts and plants which are not fed.

5669

Kit for experiments on photosynthesis 9040

The kit for experiments on photosynthesis allows the study of earth and water plants, observing their breathing, or seeds' germination, and measuring quantitatively what occurs.

Equipment supplied

1 Cell for photosynthesis
1 Platinum temperature sensor
1 CO_2 sensor

Equipment required, not supplied

1 ScienceCube Pro Interface code 9001
1 Dissolved oxygen sensor code 9030

Suitable to be used with sensors

9040

Plant physiology 5660

This kit includes all the items previously described: 5661, 5663, 5664, 5665, 5666, 5667, 5668, 5669.
Repeated items have been eliminated in order to reduce total cost.

10 Feasible experiments

Topics

- Introduction: atmospheric pressure
- Respiration in germinating seeds .1
- Heat production in germinating seeds
- Respiration in germinating seeds .2
- Absorption of oxigen in plants .1
- Absorption of oxigen in plants .2
- Production of oxigen by water plants
- Dutrochet's endosmometer
- Root pressure
- The rise of water in plants by transpiration
- Absorption of minerals in plants

Equipment supplied

3 Rods 35 cm
1 Bosshead
1 Base
1 Ring holder
1 Bottle of sodium chloride
1 Rod 25 cm
2 Pliers with clamp
1 Test tube 5 x 7 x 30 mm
1 Three necked bottle
1 Pair of tubes with tap
1 Pair of glass tubes with capillary
1 3-sphere expansion tube with stopper
1 Capillary tube with plate and stopper
1 Glass tube 20x200x2 mm
1 Endosmometer
2 Insufflators with flask
1 Thermometer with stopper
1 Bottle of potassium hydroxide
2 Bottles of coloured liquid
1 Bottle of nutrient salts solution
1 Funnel 80 mm
1 Pipet aspirator with three valves
1 Bottle of baryta water
1 Beaker 600 ml
1 Round flask 500 ml
1 Test tube 16 x 150 mm
1 Box

5660

Potometer 7212

Item for measuring the plants' water absorption speed. It consists of a bottle for water, a glass support for plants and a graduated tube for measuring.

7212

Peach blossom MBT004

This model shows the basic structure of the peach blossom: the receptacle, the calyx, the corolla, the stalk and the pistil. The ovary can be opened, showing the two pendulum ovules and the placenta. Diameter: 35 cm.

MBT004

Modular cherry blossom with fruit T21019

This model shows the cherry blossom (decomposable in 3 parts) enlarged 7 times and the fruit enlarged 3 times. The wrapper which contains the seeds can be extracted.
Height: 32,5 cm.

T21019

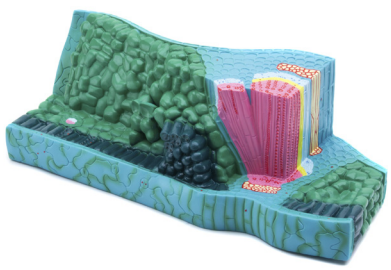
Pollination process MBT022

Model of angiosperm flower which shows the process of its dual pollination.
Size: 33x26x3 cm.

MBT022

Leaf section MBT007

This model shows the vessels and the internal and external structure of a leaf. Cross and longitudinal sections.
Size: 45x16x20 cm.



MBT007

Model of germination HS2850

On this model in relief the germination of monocots and dicots plants is shown. The students can notice the similarities and the differences in seed's development according to both cases.
Size: 42×30 cm.

HS2850

Root MBT006

This model shows the morphology of a root's cross and longitudinal sections, its internal structure included.
Size: 60x20x17 cm.

MBT006

Transparent plastic basin H20

18x11x14 cm
with cover.

H20

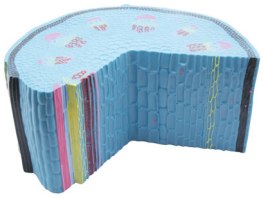
Germination fay TE05

Made of plastic with plexiglas transparent cover with two boles.
Size: 36x24x18h cm.

TE05

Dicotyledon's stem MBT005

This model shows the histological structures of a dicotyledon's stem in the cross and longitudinal section.
Size: 34x26x16 cm.



MBT005

pH meter for soil TE07

To measure soil's acidity degree.
PH scale from 3 to 10.
No batteries required.

TE07

Igrometer for soil TE08

To measure soil's humidity degree.
With built-in light meter to check if plants are correctly exposed to light.

TE08

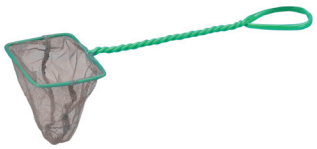
Insects collector 7006

It consists of a transparent plastic container with cover, equipped with two transparent small flexible tubes.

7006

Landing net 7007

Suitable for collection of small fishes and insects. Length: 32 cm.



7007

Dissection table 7008

It consists of a metallic tray covered by a washable layer.
Size: 28x20 cm.

7008

Stetoscope model 3104

This model of stetoscope is very similar to the one used by doctors to auscultate.

3104

Kit for experiments on digestion 7016

Particularly suited to primary school

Topics

- Digestive system
- Proteins digestion
- Fats digestion
- Food rout

Equipment supplied

1 Beaker 100 ml
1 Plastic stirrer
2 Test-tubes with stopper
1 Dropper
1 Bottle of chloride acid

To perform the experiments on fats and proteins digestion it is necessary to buy pepsin and pancreatin in a pharmacy.

7016

Berlese's selector 7217

Item for the extraction of microartropodes from soil's samples. The lamp progressively dries up the soil and there are the animals move to the bottom, they go through the support net and fall in the alcohol solution that fix them.

For the observation of this fauna, the stereomicroscopes mentioned on microscopy series are particularly indicated.

7217

Pulmonary capacity meter 7223

Blowing the lung air into the cylinder through a straw, the piston raises. Thus it is possible to evaluate the volume of the inhaled air.

7223

Kit for experiments on digestion 7023

Suitable for secondary school.

7 Feasible experiments

Topics

- Digestion of starches
- Digestion of fats
- Digestion of proteins
- Enzymes

Equipment supplied

1 Beaker, 250 ml	1 Alcohol burner	1 Bottle of Lugol's solution
1 Beaker, 100 ml	1 Tripod support	1 Bottle of starch
1 Test-tubes holder	1 Ceramic centre gauze	1 Bottle of albumin
1 Pencil dropper	1 Spoon	1 Bottle of chloride acid, 10% solution
1 Plastic stirrer	10 Test-tubes with bung	1 Bottle of biuret
25 Filter paper discs	1 Bottle of dentured alcohol	1 Box

To perform the experiments on fats and proteins digestion it is necessary to buy pepsin and pancreatin in a pharmacy.

7023

Plant and animal life 8613

How does a plant breath ? How does the process of photosynthesis occur? What happens if we try to change some significant parameters while we study a vegetable's activity? Do the eye and the skin breath? The answer to these questions is in the biology books, without the support of an adequate experimentation. Thanks to the on-line items mentioned in this section the teacher can observe " live" the behaviour of biological organisms, and then analyze the experimental data to establish relations between parameters and try to represent them mathematically.

Topics

- Experiences on human respiration
- Human eye's breathing
- Respiration and photosynthesis of plants
- Skin breathing
- Fermentation of yeasts
- The effect of temperature on the cold-blooded organisms
- Cellular respiration

Equipment supplied

1 Bunchner flask, 1000 ml	1 T junction for breath	1 Tweezers
1 Glass flask, 300 ml with stopper	1 Junction with suction cap	1 Tinfoil
1 Glass beaker, 600 ml	1 Glasses suited for sensor	1 Red filter
1 Rubber bung O_2	1 Compressed air	1 Thermometer
1 Rubber bung CO_2	1 Mouthpiece for breath	1 Box

Equipment for online use - not supplied

1 O_2 sensor code 9044	1 Interface code 9001
1 CO_2 sensor code 9089	1 Bluetooth temperature sensor code 12903-00

Even the skin absorbs oxygen from the air.

Suitable to be used with sensors

8613

Kit for experiments on breathing 7017

This kit allows yuo to simulate the functioning of lungs during the two phases of breathing and to reveal the presence of carbon dioxide in the exhaled air.

Equipment supplied

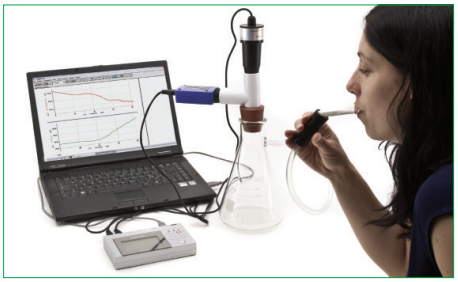
1 Pulmonary model	1 Bottle of water lime
1 Breathed for carbon dioxide	1 Tripod support
1 Vacuum pipette	1 Box

7017

Set of spare filters for the kit on smoking effects 7201

Set of 25 spare filters.

7201



Human breath: inhaling and exhaling.

EXPLORING OUR SENSES 5719

The sense organs are the instruments through which the body can receive and process the stimuli coming from outside. With the material provided in this collection teachers can enrich their lessons through the exhibition of sense organs' models and conducting meaningful experiments, on physical and chemical stimuli. Even the students, divided into six working groups, can perform simple experiments through which:

- they acquire the knowledge that every sensation contributes to the perception of the outside world;
- they learn to distinguish the information coming from each sense;
- they learn the potentialities and limits of their sense organs and the hygienic standards for their correct use;
- they understand the importance of the connection between the sense organs and the brain in perception.

70 feasible experiments

Topics

TOUCH
- The skin
- Skin's sensibility
- Touch's stimuli
- Pressure's stimuli
- Pain's stimuli
- Temperature & heat
- Thermal stimuli
- Hot and cold receptors
- To see through touch
- Fingerprints
- The skin's hygiene

SIGHT
Light sources and illuminated bodies
Light propagation
Light transports energy
The eye: a light receiver
Lenses
The eye as an optical system
Eyes' defects and their correction
Resolving power of the eye and visual acuity
The eye-brain system
The persistence of images on the retina
Temporal synthesis of colors
Spatial synthesis of colors
Binocular vision
Sense of depth
Stereoscopic vision
Field of view
Optical illusions
How to help the sight

OLFACTION
- What's the matter like
- The matter's aggregation stages
- Changes of state
- The nose: the organ of smell
- How smells are detected
- How smells are identified
- How we get used to smells
- The nose's hygiene

TASTE
- The tongue and the taste buds
- How we taste different tastes
- The four main tastes
- Taste and olfaction
- Taste and sight
- Good and bad smells

HEARING
- Oscillating motion
- Graphical representation of the oscillating motion
- When we hear a sound
- Why we hear sounds
- Acoustic waves
- How acoustic waves turn into sounds
- The ear: a receiver of acoustic waves
- The ear-brain system
- The limits of audibility
- The distinctive features of sound
- The sensibility of auditory apparatus
- How to reinforce the auditory sensibility
- Stereo phonics
- Echo, reverberation and boom
- Cure of auditory apparatus

Equipment supplied

1 Linear ruler
6 Droppers
1 Tuning fork with case and small hammer
1 Vibrating plate
1 Stetoscope
1 Ultrasonic whistle
1 Xylophone
1 Electrical Newton disc
6 Stereoscopic glasses
2 Binoculars
6 Magnification lenses
1 Solar energy motor
1 Batteries-holder
2 Connection cables
6 Plastic tubes
1 Kit for the study of eyes and their defects
1 Ink pad
1 Kit of different items
6 Anti-acoustic pannels
1 Kit of different substances
1 Tastes' kit
1 Punctured aluminum plate
1 Small sphere with wire
1 Digital thermometer
1 Model of eye
1 Model of ear
1 Model of skin
1 Model of skin
1 Model of nose
6 Petri dishes
3 Beakers 250 cc
6 Teaspoons
6 Tables on eye's strucure
6 Tables on resolving power of the eye
1 Snellen chart
6 Tables on eye blind spot
6 Tables on images' persistence
6 Tables on spatial synthesis of colours
6 Tables on visual axis convergence
6 Tables on visual axis convergence
6 Tables on chromatic optical illusions
6 Tables with Braille's alphabet
6 Transparencies
6 Stereoscopic figures
1 Box

NOTICE

To perform the experiments on eye and its defects, it is necessary to have a magnetic whiteboard because the pentalaser and the five lenses are magnetized.
the purchase of the whiteboard code 1329 is suggested, it can be hung on a wall or placed on a table.

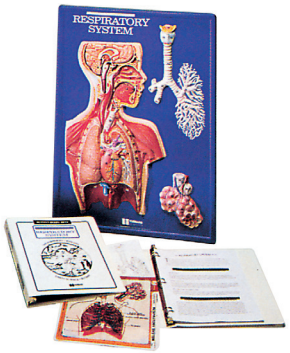
Circulatory apparatus HS2671

Protruding model of circulatory system which gives a sectional view of the internal structure of heart, of kidney, of an artery and of the blood vessels that go through the human body. It is fitted with transparent sheets.

HS2671

Breathing apparatus HS2672

Protruding model of breathing system which gives a sectional view of the skull and of the human torso, of the bronchial tube and of the pulmonary alveolus. It is fitted with three transparent sheets which clearly show the connection between breathing and anatomical adjacent structures.



HS2672

Digestive system HS2673

Protruding model of the digestive system that gives a sectional view of the mouth, of the salivary glands, of the oesophagus, of the stomach, of the pancreas and of the intestine. It is fitted with transparent sheets.

HS2673

Nervous apparatus HS2674

Protruding model of nervous system which gives a sectional view of the brain, of the spinal cord and of the spinal nerves with dendrites and synapses. It is fitted with transparent sheets.

HS2674

Urinary tract HS2675

Protruding model of urinary tract in which the kidney is shown in details, llustrating an enlarged nephron. Other highlighted elements are the bark, the pyramid, the calyx and the papilla. It is fitted with transparent sheets.

HS2675

Plant mitosis model HS2667

10 individual models mounted on a 400mm x 460mm base show the stages of cell division of a plant. Mounted on a strong and sturdy MDF board. All phases are represented and cut laterally to show the interior of the cell. Each cell phase (interphase, first prophase, late prophase, metaphase, first anaphase, middle anaphase, late anaphase, first telophase, late telophase and daughter cells) is labeled with a key located at the base of the rear panel.
Great to use during classroom demonstrations.

HS2667

Plant cell division meiosis model HS2668

This model is a 3D render of the cell division process of meiosis in a plant cell.
The model is made with sturdy fiberglass molded cell patterns on a sturdy MDF board and has clearly labeled stages.
The cells are shown in great detail in vivid colors and provide an internal view of the chromosomal changes that occur during the meiosis process in a plant cell.
The base measures 455mm x 610mm.
Great to use during classroom demonstrations.

HS2668

Human skeleton 170 cm GD0101

Human skeleton made of unbreakable plastic, standard model. Natural modelling of an high quality male skeleton. All the apertures, the openings and the anatomic details are carefully reproduced. The skull can be dismantlable into three parts: cranial vault, cranial base and jaw. Skull, arms and legs are jointed. Model mounted on a movable tripod with small wheels.

GD0101

Human mini-skeleton 85 cm GD0111

Human mini-skeleton made of unbreakable plastic, standard model. Natural modelling of an high quality male skeleton. All the apertures, the openings and the anatomic details are carefully reproduced.

GD0111

Human skull GD0102

Life-size modelling of an high quality human skull. All the anatomic details, apertures and openings are carefully reproduced. Thanks to a specific manufacturing process, the denture is reproduced with great care as regards the position of teeth and the interdental system. The skull is dismantlable in three parts: calotte, cranial base and jaw.

GD0102

Vertebral column GD0141

Flexible, with pelvis, occipital bone, nerve endings, vertebral artery and herniated disc spine - lateral between the third and the fourth lumbar vertebra.

GD0141

Mini-torso with removable head GD0206

Approximately life size. The mini-torso is a small model that corresponds to the bigger anatomic models as regards the implementation and details. It is dismantlable into 12 parts and it is mounted on a plastic stage.

GD0206

High Quality Model of sexless human body, with open back GD0203

Natural-size human body, which can be dismantlable into 20 parts. This model is characterized by the very high quality of the details and the superior colour reproduction. In addition, the type of plastics used contribute further to make this model particularly realistic.
h = 85 cm

GD0203

Muscular system GD0501

One-piece model of the human male muscular system. Model mounted on a rectangular base, height 85cm.

GD0501

Human torso masculine - feminine GD0202

Human torso, life size, dismantlable into 23 parts. All the details, the colours and the openings are made of high quality plastic and are carefully reproduced.
The model includes the masculine and feminine genital organs.
h = 85 cm

GD0202

Brain GD0304

Human brain model, dismantlable into 8 parts. The arteries are carefully reproduced and the model is mounted on a plastic stage.
Natural size.

GD0304

Eye GD0307

Enlarged 6 times, dismantlable into 6 parts: sclera with cornea and muscle listings, vascular tunic with retina and iris, vitreous humor and crystalline lens. Mounted on rectangular plastic stage.

GD0307

Teeth set GD0311

These anatomic models of 3 different human teeth show the morphological differences between the bucktooth, the canine tooth and the premolar tooth. The dissection of the canine and premolar teeth shows their internal structure. Models enlarged approximately 12 times.

GD0311

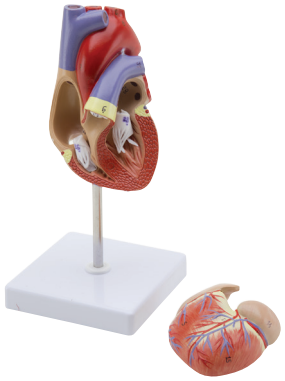
Jaw GD0313

Enlarged model of young man's half jaw, decomposable into 6 parts. The teeth, their roots, the nerve endings, the boold vessels and the gum are stressed. Two teeth are removable and dismantlable.

GD0313

Heart GD0322

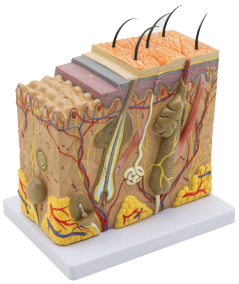
Model of human heart, natural-size, dismantlable into two parts.
Vision of the atriums, of the ventricles and of the cardiac valves.
Mounted on a rectangular plastic stage.



GD0322

Skin section GD0331

Table model, enlarged approximately 70 times. On every half you can see the 3 layers of the scalp and of the skin without hair, with hair roots, sweat glands, etc...



GD0331

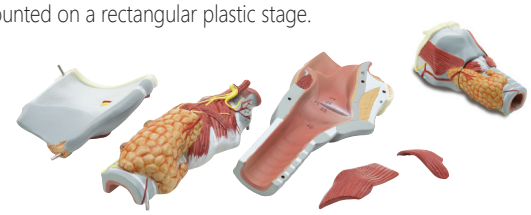
Ear GD0309

Enlarged approximately 3 times, decomposable into 3 parts. The external auditory meatus, the middle and inner ear, the eardrum with the hammer and the removable incus are visible. Mounted on a rectangular plastic stage.

GD0309

Larynx GD0314

Model enlarged approximately 2 times, decomposable into 5 parts dissected lengthwise. Epiglottis, vocal cords, movable arytenoid cartilage, not dismantlable. Mounted on a rectangular plastic stage.



GD0314

Decayed tooth GD0335

Upper molar with three roots, enlarged approximately 15 times, decomposable into to 6 parts: longitudinal section of the crown and two roots, the pulp and three interchangeable components showing the progressive stages of decays formation. Mounted on support.

GD0335

Model for dental hygiene GD0312

Enlarged approximately 3 times, the model shows the denture and the palate of an adult and it is suitable to demonstrate the dental hygiene. It is fitted with a big size toothbrush.

GD0312

Heart GD0321

Human heart model enlarged approximately 3.5 times. 4 openings to allow the study of cardiac dynamics. Superior vena cava, detachable aorta and pulmonary artery. Through the openings it will be possible to inspect the right atrium and right ventricle, left atrium and left ventricle, pulmonary valve and aortic valve. Mounted on a plastic base.

GD0321

Lungs GD0319

This model shows the segments of the right lung and left lung, the bronchial tube and the windpipe. The lungs are shown in blacklight. Mounted on a plastic stage. Natural-size.

GD0319

Pulmonary alveolus GD0320

This model shows the distribution of the terminal bronchioles in the lung and its relation to the pulmonary alveolus. Mounted on a rectangular plastic stage.

GD0320

Stomach GD0326

Model enlarged stomach 1,5 times, decomposable into two parts.
The internal and external walls of the stomach are represented, with a part of the oesophagus and duodenum. Mounted on a rectangular plastic stage.
Size: 19 x 12 x 25 cm.

GD0326

Liver GD0324

Life-size liver model, not removable.
The four hepatic lobes, the gallbladder and the vessels are represented.
Made of plastic, mounted on a circular base.

GD0324

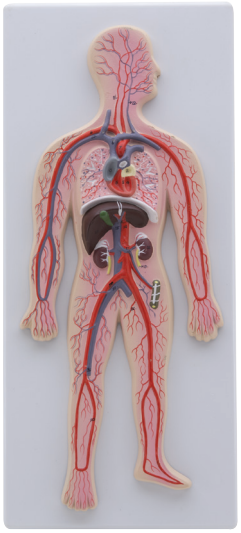
Pancreas, spleen and gallbladder GD0325

Life-size, non-removable model of pancreas, spleen and gallbladder with various common diseases including gallstones and pancreatic cancer.

GD0325

Circulatory system GD0336

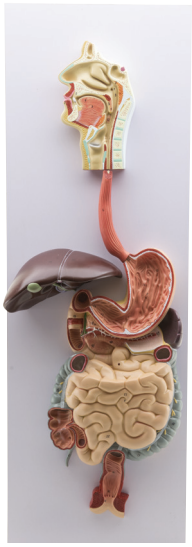
Protruding model, approximately half life-size. Schematic representation of the human body's vascular system.



GD0336

Digestive system GD0334

Natural-size. The model shows the digestive tract from the oral cavity to the rectum. The tract head-oesophagus-stomach-intestine (detachable transverse colon) and the bottom part of the liver with the gall bladder are represented.



GD0334

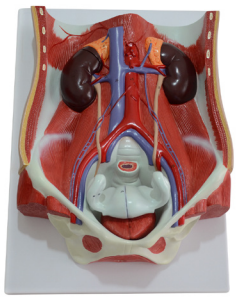
Kidney GD0327

Model of kidney natural-size, decomposable into two parts.
Mounted on a circular plastic stage.

GD0327

Male and female urogenital system GD0330

Size model in PVC with kidney, urethra, bladder, uterus and lower abdomen.
Dimensions 42 x 30 x 11.5 cm.



GD0330

Nose GD0502

Model of nose, made of plastic, supplied with base.

GD0502

Tongue GD0333

Model of tongue, made of plastic, supplied with base.

GD0333

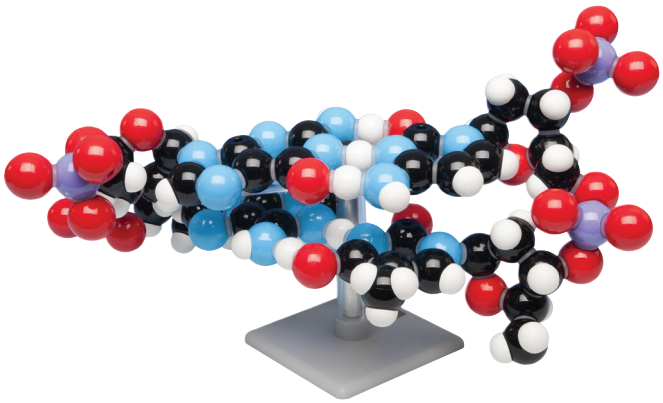
Simulator of vertebral discopathies GD1501

Vertebra model with two examples of disc diseases.

GD1501

Kit for DNA model MKS-122/2

This kit for educational activities includes carbon, nitrogen, oxygen and hydrogen atoms of different colours, with different holes, and the respective connections to create the molecular structures of the nucleotides which compose theDNA helix.
It is fitted with a pedestal which support the different models.
It is supplied with an instruction guide for assembly.
Height: 12 cm.



MKS-122/2

DNA Double Helix Model (cheap model) 7300

Simple but complete DNA model, dismountable.
Ideal for students. Height: 60 cm.

7300

Index

Teaching guide in digital format

Minimum invoiced order: € 130,00 + VAT

Backpack Marine Science Test Kit — HI3899BP

This kit is designed to provide teachers with a comprehensive tool to familiarize students with important chemical tests for sea water analysis. These items are supplied with a comprehensive teacher's guide that includes in-depth information on each parameter, class activities and detailed procedures for field testing.
With this kit it is possible to carry out measurements of the following important parameters:

- Acidity ($CaCO_3$)
- Alkalinity
- Ammonia (NH_3-N)
- Carbon dioxide (CO_2)
- Phosphates
- Nitrite (NO_2-N)
- Nitrates (NO_3-N)
- Dissolved oxygen
- Salinity

HI3899BP

Backpack Lab Soil Quality Test Kit — HI3896BP

This soil quality kit is designed to provide teachers with a comprehensive tool to familiarize students with important chemical tests for soil quality and fertility assessment and to correlate these measures with plant metabolism. The items are supplied with a comprehensive teacher's guide that includes in-depth information on each parameter, class activities and detailed procedures for field testing.
Real examples help students understand the importance of macronutrients and other parameters of daily life.
This kit is therefore an in-depth introduction to the major themes on soil quality, and is presented in an easy-to-use format that makes lessons interesting.

Field analysis	Nutrients
- nitrogen - phosphorus - potassium - pH - conductivity - temperature	- nitrogen - phosphorus - potassium

HI3896BP

Backpack Lab Water Quality Educational Test Kit — HI3817BP

Backpack Lab® is designed to contain all accessories and reagents, in a practical and orderly way. Ideal for transport, this backpack can also make measurements in the field. The backpack includes a teacher's manual with information on each parameter, activities to be done in the classroom, designed to introduce students to each parameter, and detailed procedures for field analysis.

This kit provides teachers with a valuable tool to help students understand how to assess the water quality of streams, rivers and lakes.

It meets the need to assess the quality of water, providing you with the tests to check its basic parameters, namely:
Acidity (as $CaCO_3$)
Alkalinity ($CaCO_3$) Phenolphthalein & Total
Carbon Dioxide
Hardness ($CaCO_3$)
Oxygen, Dissolved
Nitrate (NO_3-N)
Phosphate
pH, Conductivity, TDS and temperature (with pocket electronic instrument)

The kit includes all the accessories and reagents necessary for the execution of 100 analyzes for each parameter (with the exception of iron, for which reagents are supplied for 50 tests).
Replacement reagents are available in separate packages for each analysis parameter.

HI3817BP

Small portable laboratory — 7219

The reagent case is especially designed for schools and caters to the needs of both students and teachers. All reagents are approved to be used in schools and can be disposed of easily just down the drain without any harm to the environment.
The case contains 6 colorimetric and titrimetric tests for at least 50 determinations each to determine the most important water parameters.

Parameter	Range
- Ammonium	- 0,2 - 3 mg / L NH_4+
- Hardness (total)	- 1 drop = 1° d
- Nitrate	- 1 - 90 mg / L NO_3-
- Nitrite	- 0,02 - 0,5 mg / L NO_2-
- pH	- 4,0 - 9,0
- Phosphate	- 0,5 - 15 mg / L PO_4^{3-}

Features:
- Maximum safety due to exact labeling of all reagents.
- Safe results using color and turbidity compensation.
- Especially stable and rugged case as well as chemical resistant foam inlaye.
- High sensitivity down to the values of drinking water standards.
- Safe for the environment and easy disposal of used tests.

There are no disposal issue with these reagents, (both in the concentrated or diluted form) which belong to the zero danger class for water.

7219

Water analysis kit 7021

11 feasible experiments

Topics

- Water cycle; rain and rain gauge
- Drinking water and its distribution;
- Water pollution
- Biodegradable waste
- The detection of ammonia
- The detection of nitrites
- The detection of sulfates
- The detection of surfactants
- Biological indicators
- Water acidity
- Use of the universal indicator
- Use of the pH meter
- Acid rain

Equipment supplied

1 Beaker, 250 ml
1 Pencil dropper
1 Magnifying glass 7x
1 Funnel
1 Plastic stirrer
1 Water collector
1 Graduated cylinder 100 ml
2 Syringes with tube
1 pH indicator, pH 1-14
3 Solution of known pH
1 pH meter for soil
5 Petri dishes
5 Test-tubes with plug
1 Bottle of methylene blue
1 Bottle of sodium hydrate
1 Bottle of Griess reagent
1 Bottle of Nessler reagent
1 Bottle chloride acid, 10% sol.
1 Bottle of chloroform
1 Bottle of barium chloride, 10% sol.
1 Box

7021

Soil analysis kit 7022

13 feasible experiments

Topics

- The soil
- Mineral and organical fraction
- Soil porosity
- Soil permeability
- Soil acidity
- Soil carbonates
- Soil ammonia
- Soil nitrites
- Soil sulphates
- Soil surfactants
- Biodegradability

Equipment supplied

1 Beaker, 250 ml
1 Pencil dropper
1 Funnel
1 Plastic stirrer
1 Graduated cylinder, 100 ml
1 Spoon
3 Solutions of known pH
2 Syringes with tube
1 pH indicator, 1-14
1 pH meter for soil
5 Petri dishes
1 Pack of 30 filter paper discs
5 Test-tubes with bung
5 Jars with cap
1 Bottle of sodium hydrate
1 Bottle of methylene blue
1 Bottle of sodium hydrate
1 Bottle of Griess reagent
1 Bottle of Nessler reagent
1 Bottle chloride acid, 10% sol.
1 Bottle of chloroform
1 Bottle of barium chloride, 10% sol.
1 Box

7022

Laboratory for soil analysis 7204

Thorough analysis is a corner stone to support and maintain healthy, productive and biologically active soil. To effectively and efficiently plan all measures that affect the soil (fertilization, liming, etc.) it is crucial to determine the important soil parameters first. This reagent case for soil analysis is the perfect companion for economical, fast and convenient soil analysis, both in the field or in your laboratory. It contains all reagents, instruments and accessories required for the preparation of soil extracts and the subsequent determination of:

- Ammonium, Nitrite, Nitrate (N)
- Phosphate (P)
- Potassium (K)
- pH

The soil extracts are either prepared with Calcium-Acetate-Lactate (CAL) solution (prior to the determination of P and K) or with CaCl2 solution (prior to the determination of N and pH). Reagents are sufficient for 110 CaCl2 extractions, 7 CAL extractions and 60 – 100 tests.

7204

Deep water sampler 7152

This item can be used to take samples of water, from a pond, from a stream, from a pool or from other basin at a measurable depths.

7152

Secchi's disk 7000

This item permits perform once of a qualitative evaluation of turbidity considering water of ponds, pools etc, according to their depth.

7000

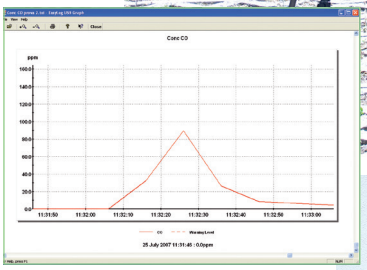
Wall station 7012

The station code 7012 has been designed for a first quantitative study of air quality. It can be installed against the wall or on a tripod and it measures the temperature, the humidity and the concentration of carbon monoxide typical of pollution caused by traffic. It is possible to set an alarm that sounds when the CO level exceeds a specific threshold. The supplied sensors are powered by lithium batteries (replaceable) that permit the unit to operate continuosly up to three months. At the end of the measurement, the data are transferred on a pc and seen on a graph.
Range: temperature: from -35° to +80°C.
Relative humidity: from 0% to 100% RH.
CO: from 0 to 200 ppm CO.
(Values greater than 800 ppm can damage the sensor).

7012

Air pollution station on tripod 7014

As code 7012, but on a tripod.



7014

Oximeter - for measurement of dissolved oxygen 7253

This oximeter is equipped with a polarographic probe with built-in temperature sensor that allows a precise measurement of dissolved oxygen. Applications: aquariums, medical laboratories, agriculture, water conditioning, fish farming, mining, education, quality control.

Display	13 mm LCD, 3 1/2 digits
DO measurement range	0 – 20.0 mg/L
Resolution	0.1 mg/L
Accuracy	± 0.4 mg/L (after calibration within 23±5°C)
Compensation temperature sensor	automatic from 0 to 40°C
Control panel knobs	ZERO and CAL knobs
Battery	006P DC 9V
Operating temperature	0°C – 50°C
Operating humidity	Less than 80% RH
Size	Instrument: 131 x 70 x 25 mm Probe: 190 mm x 28 mm diameter Length of sensor cable: 4 m
Weight	390 g (with probe)
Accessories included	1 Oxygen probe (OXPB-09N) 2 Spare Probe with diaphragm set, OXHD-04 1 Electrolyte for OXEL-03 probe

7253

Pocket TDS Tester — HIP

This pocket-sized instrument guarantees you a great accuracy of the measurements of total dissolved solids (TDS).
Thanks to the internal microprocessor, this model performs calibration and temperature compensation automatically.

Range TDS	0 to 1999 ppm
Resolution TDS	1 ppm
Accuracy TDS	±2% f.s.
Calibration	automatic, at 1382 ppm
Calibration	calibration Solution 1382 ppm - not included
Temperature compensation	Automatic, 0 to 60°C
Battery type / life	2 x 1.5V / circa 200 hours
Auto-off	after 5 minutes of non-use
Environment	0 to 50°C; RH max 95%

HIP

Calibration solution TDS 1382 ppm — HI7032P

Solution at 1382 ppm, in bag (25 x 20 mL).

Pocket EC/TDS and pH Tester, High Range — HI98130

This instrument is designed to obtain accurate measurements of pH, EC / TDS and temperature. It is no longer necessary to use 2 or 3 instruments for these measurements: in fact, this tester displays the pH or EC / TDS readings automatically compensated in temperature and the temperature value of the sample in degrees Celsius or Fahrenheit. To achieve more precise results in any particular application, the EC / TDS conversion factor and the temperature compensation coefficient ß can be set by the user.

Range - pH	0.00 - 14.00 pH
Resolution - pH	0.01 pH
Accuracy - pH	±0.05 pH
Temperature compensation - pH	automatic
Calibration - pH	automatic, 1 or 2 points with two sets of standard solutions (pH 4.01 / 7.01 / 10.01 or pH 4.01 / 6.86 / 9.18)
Range - EC	0.00 - 20.00 mS/cm
Resolution - EC	0.01 mS/cm
Accuracy - EC	±2% f.s.
Calibration - EC	automatic, 1 point - 12.88 mS/cm
Range - TDS	0.00 - 10.00 ppt
Resolution - TDS	0.01 ppt
Accuracy - TDS	±2% f.s.
Calibration - TDS	automatic, 1 point - 6.44 ppt (g/L)
Temperature compensation EC / TDS	automatic with ß adjustable from 0.0 to 2.4% / °C
EC / TDS conversion factor	adjustable from 0.45 to 1.00
Range - temperature	0.0 - 60.0°C / 32.0 - 140.0°F
Resolution - temperature	0.1°C / 0.1°F
Accuracy - temperature	±0.5°C /±1.0°F
pHelectrode	included (replaceable)
Battery type / life	4 x 1.5V / approx. 100 hours of continuous use; auto-off after 8 minutes of non-use
Environment	0 to 50°C; RH max 100%

HI98130

Storage solution for electrodes — HI70300M

Bottle, 230 ml

HI70300M

Pocket pH Tester — PH-2

It is an easy-to-use tool with a large display and a single operation button.

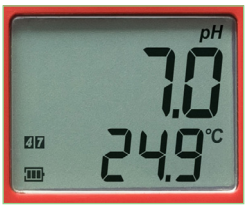
- Replaceable electrode
- Automatic calibration for precise pH measurements
- Ideal for environmental analyzes, on the field and in the laboratory

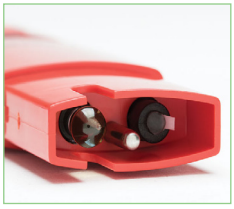
pH range	0.0 to 14.00 pH
pH resolution	0.1 pH
pH accuracy	±0.2 pH
pH calibration	automatic in one or two points
Auto-off	after 8 minuts, 60 minuts, or disabled
Battery type / life	1 x CR2032 1.5V / circa 1000 hours
Environment	0 to 50°C; RH max 95%

PH-2

Pocket waterproof pH Tester — HI98107

The pocket tester is sturdy and reliable and is ideal for laboratory use.
This new tester has a thickness of less than 2 cm and is extremely ergonomic, comfortable to hold in your hand.
The instrument is simple to use because it is equipped with only 2 buttons: one dedicated to switching on and off; the other dedicated to calibration.





pH range	0.0 to 14.00 pH
pH resolution	0.1 pH
pH accuracy	±0.1 pH
pH calibration	automatic in one or two points
Temperature range	0.0 to 50.0°C
Temperature resolution	0.1°C
Temperature accuracy	±0.5°C
Auto-off	after 8 minuts, 60 minuts, or disabled
Battery type / life	CR2032 3V / circa 800 hours
Environment	0 to 50°C; RH max 100%

HI98107

Electrode for PH-2 — HI1271

Replacement electrode for PH-2.

HI1271

Solution for cleaning pH meters electrodes — HI7061M

230 ml bottle to clean the junction of the electrodes.

Calibration solutions for pH meters — HI774P

20 ml buffer solution at pH = 4.01 and 20 ml buffer solution at pH = 7.01 of potassium phthalate acid.
Calibration temperature: 25°C.

PEI Body Gel Filled pH Electrode with Bluetooth — HI12302

Flexibility and simplicity of use, no cables, no tools. Simply download the free app to turn your compatible Apple or Android device (not included) into a full-optional pH meter. HI12302 is equipped with a pH electrode with durable plastic body (PEI), double junction, gel filling, for general use. The high quality electrode is equipped with a built-in temperature sensor that ensures automatic temperature compensation both during measurement and during calibration.
It can be used almost anywhere: in the laboratory, in production or in the classroom.

pH range	0 to 12 pH
pH resolution	0.1, 0.01, 0.001 pH
pH accuracy	±0.005 pH
Reference cell type	double, Ag/AgCl
Max pressure	2 bar
Junction	ceramic, single
Electrolyte	gel
Operating temperature	-5.0 to 70.0°C
Temperature sensor	yes
Tip	spheric, 12 mm diameter
Total length	100 mm / 165 mm
Connection	Bluetooth 4.0, 10 m range
Battery type / life	CR2032 3V lithium ion / approximately 500 hours
Calibration points	up to 5 points
Calibration values	1.68, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45 pH
Temperature compensation	automatic
Compatibility	Android (4.0 Bluetooth® technology and 4.3 Android system or next); iOS (third gen iPad or more recent, iPhone 4S or next models)

iPad and stand are not included.

HI12302

Digital Thermometer CHT

Digital Thermometer with Stainless Steel Penetration Probe.
Suitable for temperature measurements in air, liquids and soil.
Scale in °C and °F.

Range	-50,0 °C to +150,0 °C
Resolution	0,1 °C
Accuracy	±0.3°C
Battery type / Life	1 x CR2032 / ca 2000 hours

CHT

Pocket Thermometer CHT-1

The penetration probe is connected with a 1 meter long cable to the instrument, which is provided with a support to remain in a vertical position.
Suitable for temperature measurements in air, liquids and soil.

Range	-50,0 °C to +150,0 °C
Resolution	0,1°C
Accuracy	±0.3°C
Battery type / Life	3 x 1.5V AAA / ca 2 years

CHT-1

Index

Teaching guide in digital format *Minimum invoiced order: € 130,00 + VAT*

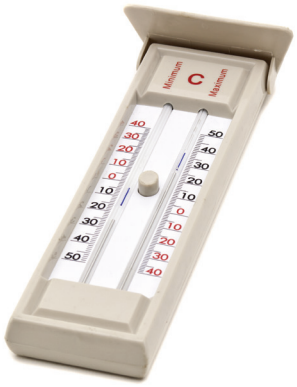
Wall thermometer 2080

Graduation: -30°C +50°C.
Plastic stand, white scale.

2080

Indoor and outdoor max-min thermometer 2038

The item is mounted on plastic base and endowed with a small shelter for outdoor usage.



2038

August's psychrometer 2041

It is mounted on metal base and endowed with two thermometers and respective calculation chart.
Dimensions: 27 x 7 cm.

2041

Psychrometer 2033

It is mounted on plastic base and endowed with two thermometers and respective calculation charts.
Dimensions: 32 x 16 cm.

2033

Wall metal barometer 1054

Instrument diameter: 57 mm.
Base diameter: 90 mm.

1054

Synthetic hair hygrometer 2081

Diameter: 130 mm.

2081

Rain gauge 2098

It is suitable to be driven into the ground and is made of plastic.

2098

Didactic anemometer 2120

It is easy to be used ; it points out both direction and intensity of the wind.

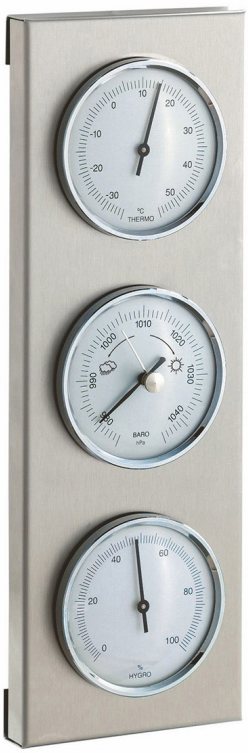
2120

Weather station 2082

Metal structure. Diameter of tools 70mm

Composed of:
1 Thermometer -35 +55°C.
1 Barometer 975 – 1045 mbar.
1 Hygrometer 0 – 100%.

Dimensions: 282×96mm.



2082

Weather shelter station 2084

Forex structure, suitable for outdoor usage. Dimensions: 33x48x58 cm.
Metal parts made of stainless material.
With:
1 Rain gauge
1 Max/min thermometer
1 Barometer
1 Hygrometer
1 Wind's direction indicator with wind rose

2084 on 2061

2084

Stand for meteorological shelter station 2061

Made of fire-glazed metal.
Dimensions: 35 x 50 x 100 cm.

2061

WIFI color weather center with 5in1 profi sensor 8256

Wi-Fi weather station with multifunction sensor, data sharing via app (supports firmware updates).
Measurement of wind speed, air direction and humidity, temperature, amount of precipitation and moon phases.
Time synchronization via the Internet, alarm clock with snooze function, alarm for maximum and minimum values, snow / ice warning, atmospheric pressure display and perceived outside temperature.
Supports up to seven additional wireless sensors (available separately).
Meteorological index of the dew point, wind chill factor and heat index.
Package contents: base station, sensor with mounting accessories, power supply.

Technical data

Indication option
Display type Digital
Season
- Summer
- Winter
- Spring
- Autumn

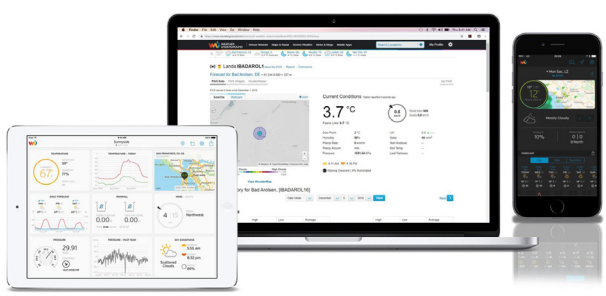
Time and date indication
Languages
- Danish
- German
- English

Internal temperature yes
Probability of precipitation yes
Time trend yes

General technical data
Black colour
Housing material Plastic
Mounting type Support
5 year extended warranty

Dimensions and Weights
Total length 168 mm
Total width 143 mm
Total height 24 mm
Net weight 355 g

Electronics, hardware & software
Main features
Outdoor temperature (° C / ° F)
Battery2 3x AA, 1.5V and 1x CR2032, 3V
868 MHz emission frequency



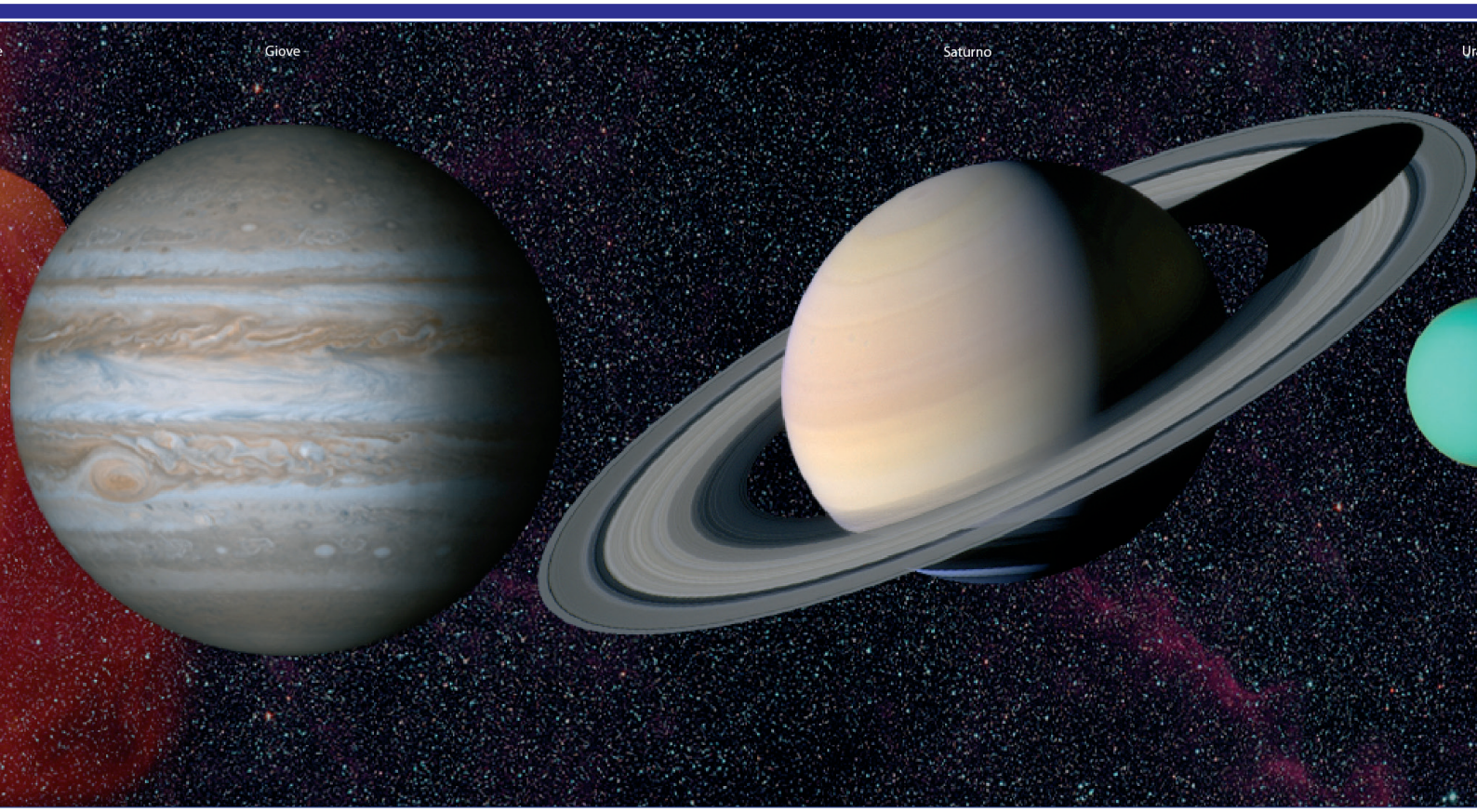
8256

SECTION 08 - ASTRONOMY AND EARTH SCIENCE

Index

Teaching guide in digital format

Minimum invoiced order: € 130,00 + VAT



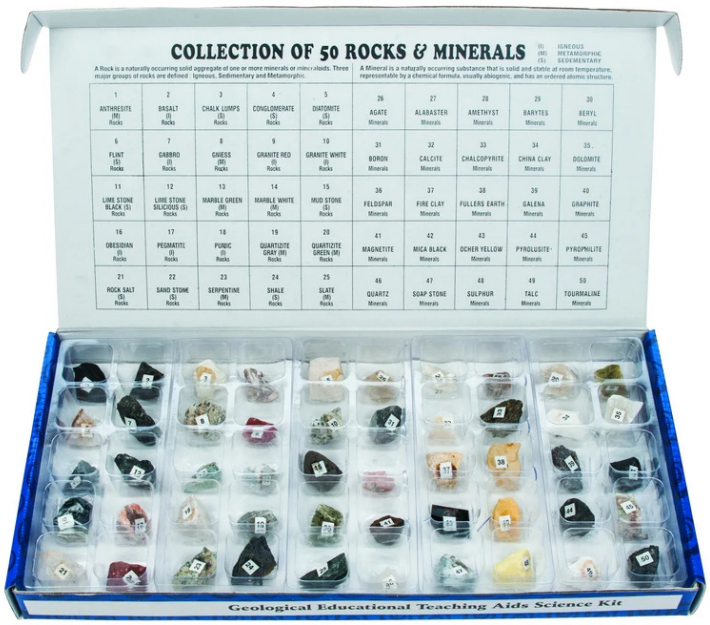
Collection of 20 rocks 7037

Various origin.

7037

Collection of 50 minerals and rocks 7038

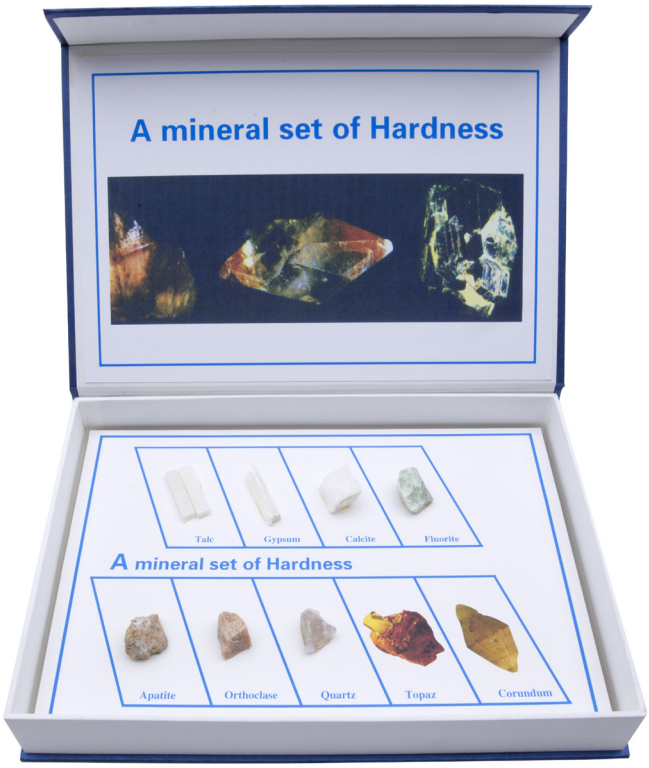
Various origin.



7038

Collection of 10 minerals HS2358

Scale of hardness. Diamond included.



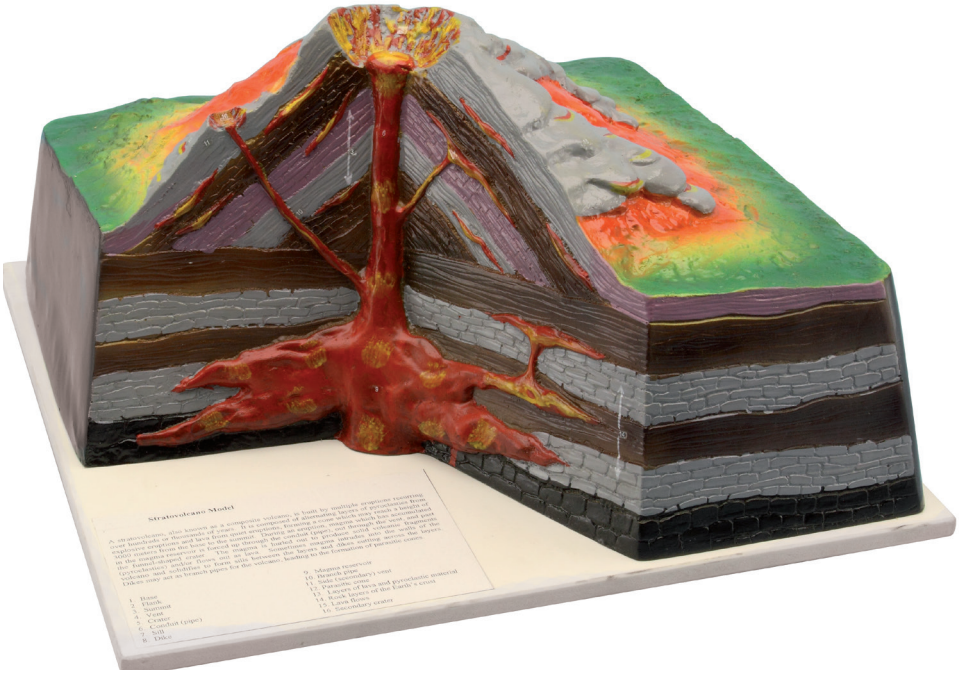
HS2358

Collection of 20 metallic ores HS2251

HS2251

Volcano model 7157

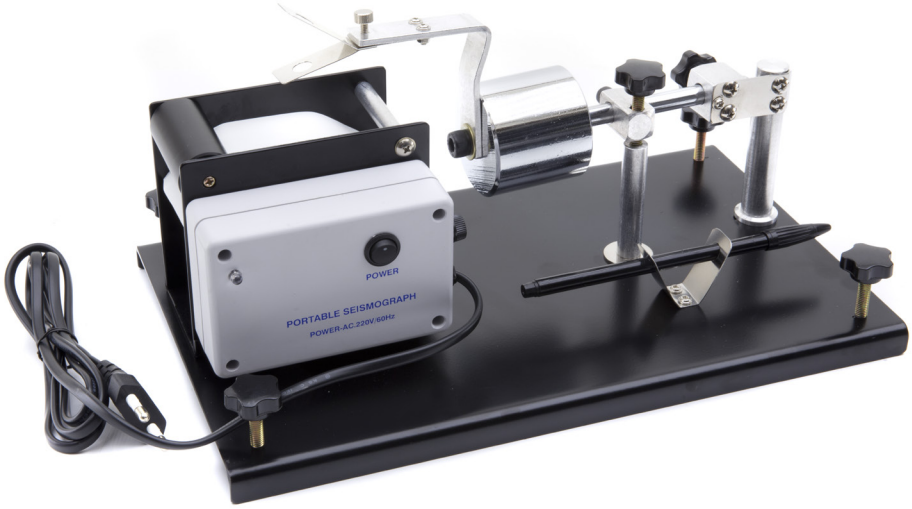
Dimensions: 41 x 41 x 21 h cm.



7157

Sismograph 7046

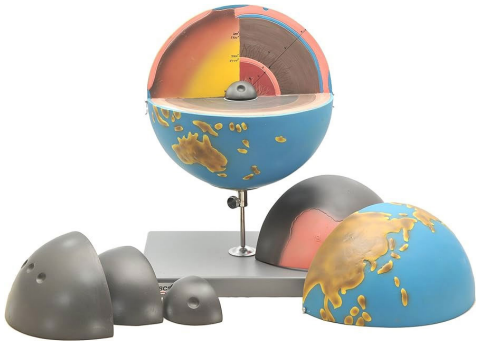
Simple electric model (220V), which reproduces the functioning of a modern seismograph. Comes with pen and a roll of paper.
Rotation speed: 1 rev/min.
Dimensions: 36x18x15h cm.



7046

Physiographic globe HS610

It highlights the cross-section of the Earth's interior, describing the crust, mantle, inner and outer core.



HS610

Ground sieves 7148

Set of four different sieves made of stainless steel. Net links dimension: respectively 1 mm, 2 mm, 3 mm e 4 mm. They can be stacked and are completed by a collecting tray. Diameter: 120 mm, height: 50 mm.

7148

Faults HS555

With this kit it is possible aiming at a wider knowledge of the volcano action, of the faults'creation, of the folds and of many other geological processes.

HS555

Solar system model HS200

Every planet can rotate individually around the Sun; therefore it is possible to place each of them in the real position they reach on a certain date. Experiment guide included.
Sun diameter: 15 cm.

HS200

Celestial star globe HS300

This item is a transparent sphere Ø 30 cm with the most important constellations on it.

HS300

Hand orbiter HS151

It allows you to simulate the phenomena of day and night, seasons, phases of the moon and eclipses.
2 AA batteries (not supplied) required for Sun illumination.
Total length 41 cm.

HS151

Apparatus for the study of the solar radiation 2074

This compact item allows to deepen the solar radiation on the Earth, making complex phenomena accessible through simple experiences; the presence of the protractor also allows a quantitative approach to the phenomena.

With the different accessories provided, it is possible to study:
- the breakdown of solar radiation;
- solar radiation and its variation with latitude;
- solar radiation and seasons;
- the apparent motion of the Sun.

2074

Light diffusion Kit 4336

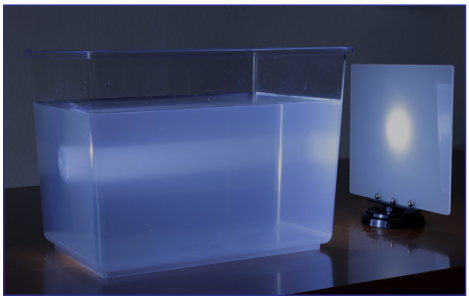
Why is the sky blue at midday while it turns red at sunset? When the light passes through particles with comparable size of the light's wavelength, light diffusion (elastic scattering) takes place. The molecules in the air have a size comparable to the wavelength of blue component of the light. Consequently, the molecules scatter blue light from the sun much more efficiently than the other components. For this reason, our eyes see the blue sky. On the contrary, at sunset, light passes through a larger layer of the atmosphere and it goes through many solid particles (dust) that scatter the red component of the sun rays.
With this kit, you can observe on a screen the phenomenon of progressive diffusion. With the polarizing filter it is also possible to study the polarization of the diffused light. The optic projector must be bought separately.

Equipment supplied

1 Dropper	1 Glass stirrer
1 Semi-transparent screen	1 Basin
1 Polarizing filter	

Equipment not supplied

1 LED projector
1 Base
1 Whole Milk



4336

Inflatable globe NR13

Diameter: 40 cm.

NR13

Magnetic globe 2075

The item is a globe with a diameter of 13 cm and a bar-magnet inside it, so to simulate the magnetic field of the Earth. The compass, included in the equipment, allows you to perform experiment on the basic concepts of orienteering.

2075

The geographical globe "Elite 2001" NR4

Globe showing physical cartography when its inner lamp is switched off, and physical-political cartography when the lamp is on. Diameter: 30 cm

NR4

Solar system map 7218

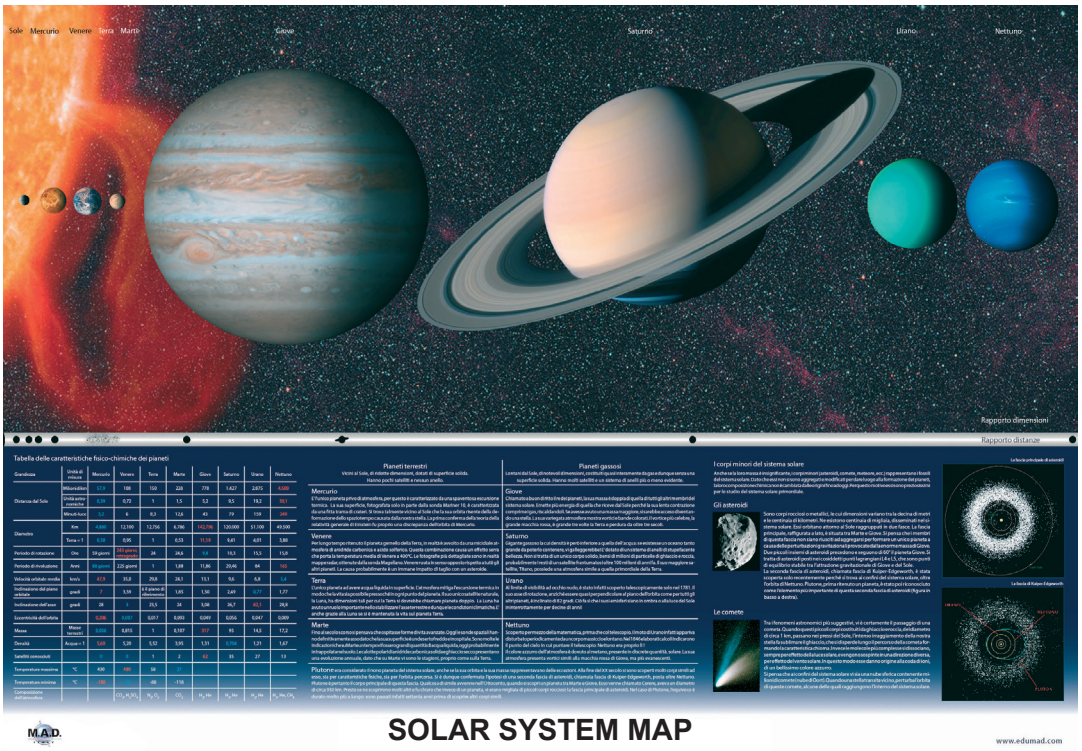
Solar system plastic poster;it is updated to the most recent astronomical discoveries. There are pictures of the planets, taken from space probes, whose dimensions are proportional to each other. A line with one mark for every planet's position is drawn apart to illustrate the distances' scale.

The chart contains the most important physical/chemical data: distance, dimensions, mass, rotation period, revolution period, maximum and minimum temperatures, atmosphere's components and many other data.

The principal features of the planets are reported, enriched by historical notes.

The less important elements of the solar system aren't forgotten as well: asteroids and comets have a full description, with scale map of both asteroid belts.

Dimensions 70x100 cm, support rods included.



7218

Index

Teaching guide in digital format

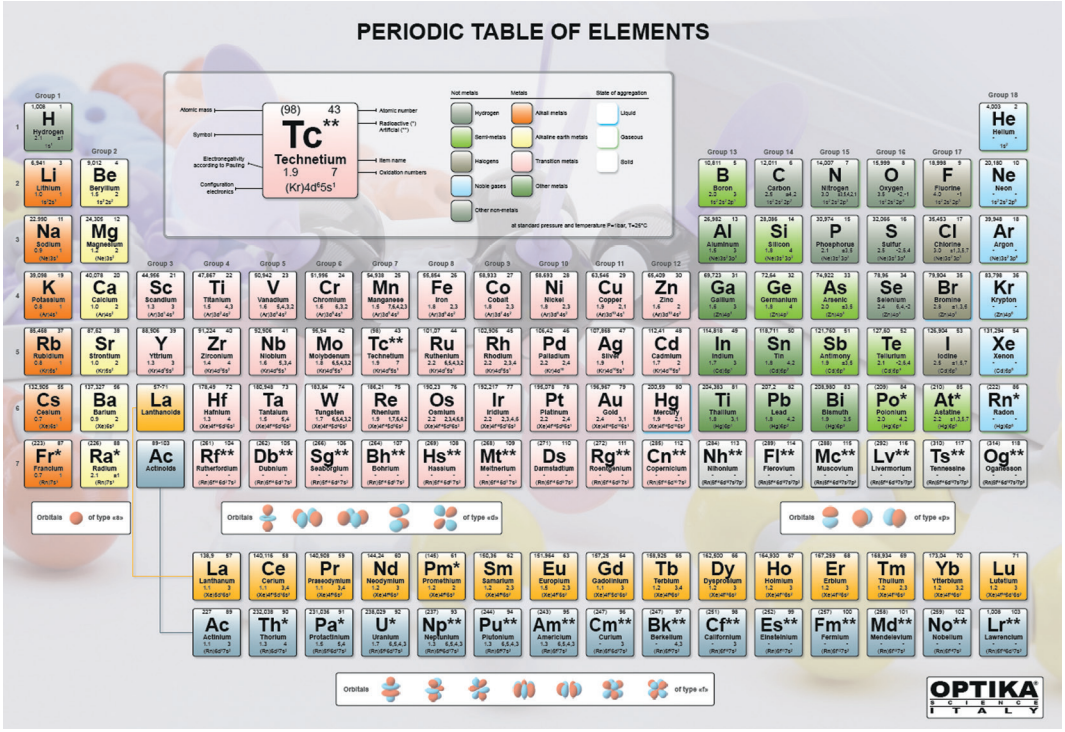
Minimum invoiced order: € 130,00 + VAT

Periodic table 6300.2

Updated periodic table, laminated and fitted with support bars. The main physical and chemical features of every element are mentioned, essential for every laboratory.
A graphic illustrates the energetic level of the orbitals which determines the sequence of the periodic table's blocks. It is very interesting to notice the mathematically correct represantation of the orbitals s, p, d and f. Even the recent chemical elements are present. The numerical data are updated according to the IUPAC recommendations.
Size 100 x 70 cm.

Periodic table for students 6301.2

Periodic table, graphically the same as code 6300.2, but with A3 (42x29,7 cm) format. This model is not fitted with support bars.



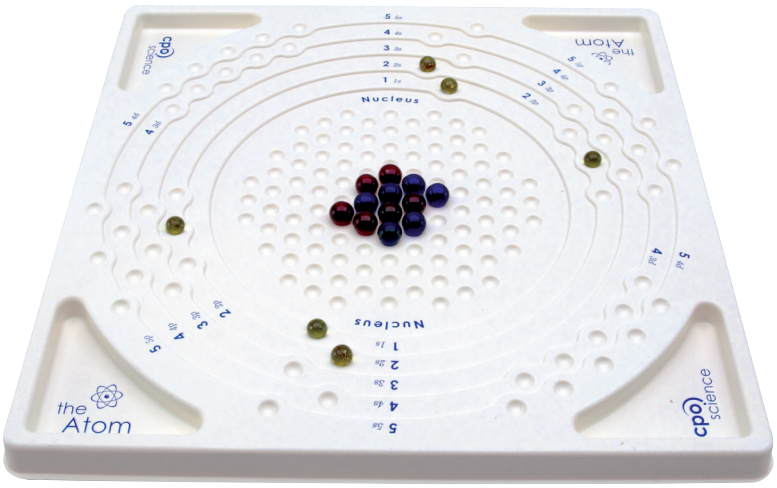
6300.2 - 6301.2

Atom model 5716

This model helps the students to understand the atom, because it permits them to create different atoms using coloured spheres which represent the protons, the neutrons and the electrons. The holes on the plate are ordered according to the different energetic levels of the orbit. In this way it is possible to understand the chemical links, the isotopes, the emission spectra and other matters concerning the atom. Size: 475x475 mm.

Topics

- Periodic table of elements
- When an atom has no charge
- Energy levels and principal quantum number (n)
- Energy levels and secondary quantum number
- Orbitals and magnetic quantum number (m)
- Electronics configurations
- How energy levels vary
- Electronics configuration at fundamental state
- Interaction between atoms
- Natural radioactivity
- Natural radioactivity transformations
- Nuclear reactions



Equipment supplied

1 Atom model (table)
48 Electrons (yellow spheres)
57 Protons (red or green spheres)
57 Neutrons (black spheres)
48 Cards regarding photons absorption
48 Cards regarding nuclear reactions
2 Periodic table of elements

5716

Organic chemistry (teachers) MM003

In this box you can find: 40 Hydrogen atoms, 38 Carbon atoms, 12 Oxygen atoms, 4 Nitrogen atoms, 2 Sulfur atoms, 4 Phosphorous atoms, 8 Chlorine atoms, 3 Metal atoms, 55 simple bond, 25 complex bonds, 60 bonds, 1 key for bonds.

MM003

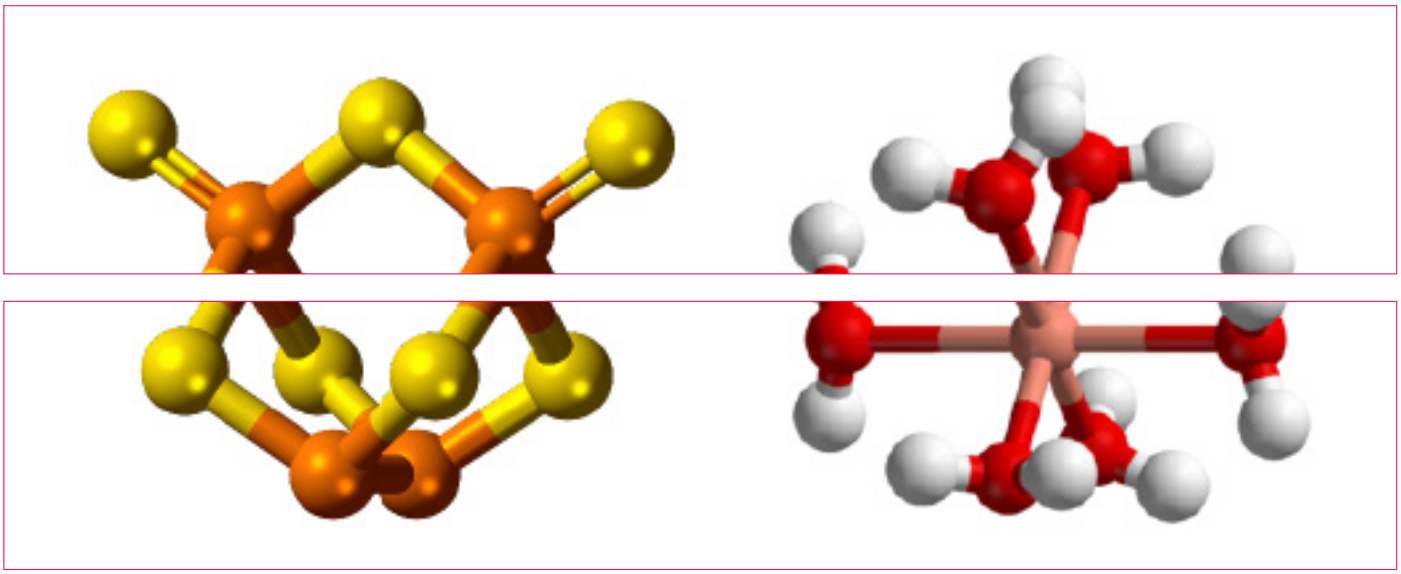
Organic chemistry (students) MM051

This kit is recommended for group of students: 30 Hydrogen atoms, 20 Carbon atoms, 6 Oxygen atoms, 8 Chlorine atoms, 2 Bromine atoms, 2 Iodine atoms, 2 Metal atoms, 4 Nitrogen atoms, 12 orbitals, 40 simple bonds, 12 complex bonds, 50 tie points, 1 key for bonds.

MM051

Organic and inorganic chemistry MM004

Fitted with organic and inorganic molecules, complex ions and covalent hydrogen.
The package consists of: 14 metal atoms; 14 hydrogen atoms; 8 halogen atoms; 22 oxygen atoms; 13 sulphur atoms; 10 nitrogen atoms; 12 carbon; 7 phosphorus; 50 bridges for simple connection; 36 bridges for double and triple connection.



MM004

Organic and inorganic chemistry 7041

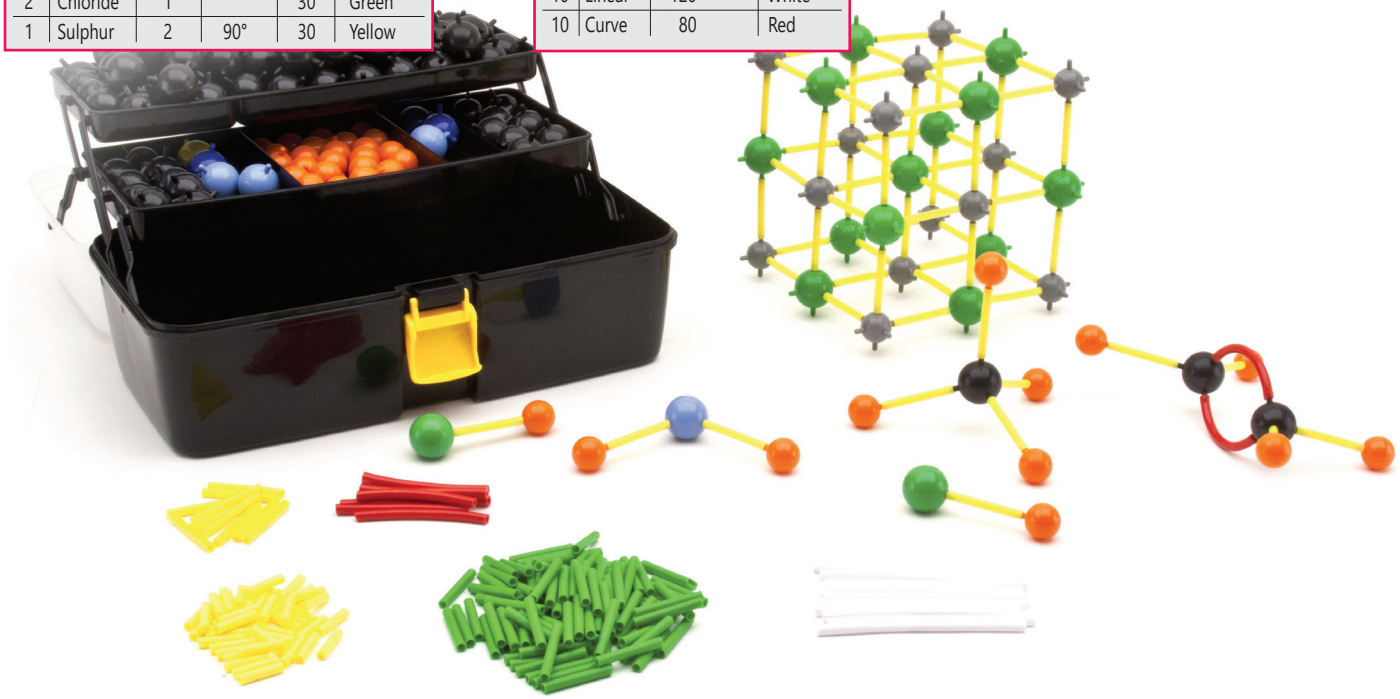
The different components of this set allow creation of a wide range of inorganic and organic compounds' molecules and rystalline structures.
The size of the components allows both the teacher to use them for desk demonstration and the students to perform group practical experiments.
The components contained in a wooden box are as follows:

ATOMS

N.	Descrip.	Bond	Angles	(mm)	Colour
50	Carbon	4	109°	30	Black
48	Carbon	5	120°,90°	30	Black
40	Hydrogen	1		23	Orange
14	Sodium	6	90°	23	Grey
13	Chlorine	6	90°	30	Green
4	Oxygen	2	105°	30	Sky-blu
2	Nitrogen	4	109°	30	Blue
2	Chloride	1		30	Green
1	Sulphur	2	90°	30	Yellow

LEGAMI

N.	Bond	Lenght (mm)	Colour
100	Linear	40	Green
75	Linear	50	Yellow
40	Linear	25	Yellow
10	Linear	120	White
10	Curve	80	Red



7041

Replacement plates for chromatography on thin layer 6237

Pack of 10 plates, 100x100 mm.

6237

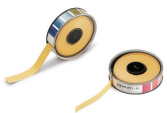
Paper for chromatography 6261

Pack of 100 pieces, 110x140 mm sheets.

6261

Roll paper universal pH 1-14

Blue litmus	**RA2001**
Red litmus	**RA2002**
Neutral litmus	**RA2003**
Universal pH 1-14	**RA2004**



RA2001 - RA2002 - RA2003 - RA2004

Pocket pH Tester — PH-2

Suitable for measuring water's and soil's pH. To perform the measurement, just immerse the electrode in the sample to be examined. At the cost of a few litmus papers, you can have the most convenient pocket pH meter available on the market. This tool allows you to perform fast and accurate measurements from 0 to 14 pH with a resolution of 0.1, immediately reading the measurement on the liquid crystal display.
The instrument can be manually calibrated on 2 points. a fast, accurate, practical and light instrument; It works with batteries of common type for over 1000 hours of work.

pH range	0.0 to 14.0 pH
pH resolution	0.1 pH
pH accuracy (at 20°C)	±0.2 pH
pH calibration	automatic with 1 or 2 points
Auto off	after 8 or 60 minutes or disabled
Power supply	1.5V CR2032 (1) / ca 1000 hours of continuous use
Condizioni di Utilizzo	0 to 50°C (32 to 122°F); R.H. max 95%

PH-2

Electrode for PH-2 — HI1271

Replacement electrode for PH-2.

HI1271

pH Electrode with Bluetooth — HI12302

Flexibility and simplicity of use, no cables, no tools. Simply download the free app to turn your compatible Apple or Android device (not included) into a full-featured pH meter. HI12302 is equipped with a combined pH electrode with plastic body (PEI), double junction, gel filling, for general use. The high quality electrode is equipped with a built-in temperature sensor that ensures automatic temperature compensation both during measurement and during calibration.
HI12302 is able to perform pH measurements on a scale ranging from 0.00 to 13.00 pH, measurements in mV and temperature measurements on a scale ranging from -5.0 to 70.0 °C. It can be used almost anywhere: in the laboratory, on the field, in production or in the classroom.

Reference system	Double, Ag/AgCl
Junction	Ceramic
Electrolyte	gel
pH range	0.00 to 13.00 pH
mV range	±420 mV
Temperature scale	-5.0 to 70.0°C
Operating temperature	-5.0 to 70.0°C
Tip	spherical
Temperature sensor	yes
Body	PEI
Probe dimensions	Tip diameter 12 mm
Power supply	CR2032 3V lithium ion/ about 500 hours
Connection	Bluetooth 4.0, 10 m

Tablet and stand are not included

HI12302

pH Tester — HI98107

The pocket tester is robust and reliable and is ideal for both laboratory and field use. This new tester has a thickness of less than 2 cm and is extremely ergonomic, comfortable to hold in your hand. The instrument is simple to use because it is equipped with only 2 buttons: one dedicated to switching on and off; the other dedicated to calibration.

Range	0.0 to 14.0 pH
pH resolution	0.1 pH
pH accuracy (at 20°C)	±0.1 pH
Temperature range	0.0 to 50.0°C / 32.0 to 122.0°F
Temperature resolution	0.1°C / 0.1°F
Temperature accuracy (at 20°C)	±0.5°C / ±1.0°F
pH calibration	automatic with 1 or 2 points
Temperature compensation	automatic 0 to 50°C (32 to 122°F)
Power supply	1x3V CR2032/about 800 hours of continuous use
Automatic shut off	after 8 or 60 minutes. It can be disabled
Operational conditions	0 to 50°C; U.R. max 100%

HI98107

PH / ORP / Temperature tester — PH-6

Io PH-6 is a waterproof pocket pH, ORP and temperature meter.
This instrument is protected from moisture and is designed to float.
The pH electrode is replaceable and easy to insert as it is equipped with a round stainless steel connector.

Parameter	pH/ORP/Temperature
PH scale	-2.00 a 16.00 pH
PH resolution	0.01 pH
PH accuracy	±0.05 pH
PH calibration	automatic
Compensation	automatic
ORP scale	±1000 mV
ORP precision	±2 mV
The temperature scale	da -5.0 a 60.0°C / da 23.0 a 140.0°F
Resolution temperature	0.1°C / 0.1°F
Precision temperature	±0.5°C /±1°F

PH-6

Edge pH Bluetooth Meter — HI2002

Modern, thin and light design - pH electrode monitoring technology
Temperature sensor integrated in all electrodes - Data storage -
Large, easy-to-read LCD - Capacitive Keypad - Two USB ports - GLP functions
Rechargeable battery.

pH range	da -2.00 a 16.00 pH
pH resolution	0.01 pH, 0.001 pH, 0.1 mV
pH accuracy (at 20°C)	±0.01 pH, ±0.002 pH; ±0.2 mV
ORP Range	±2000.0 mV
ORP Resolution	0.1 mV
Temperature Range	-20.0 to 120.0°C; -4.0 to 248.0°F
pH Calibration:	2-points, manual
Memorizzazione:	Up to 1000 records in total, between: - Sample storage (max 200 log) - Manual log on Stability (max 200 log) - Automatic storage at programmable intervals up to 100 batches (max 600 logs/lot)
PC connection	USB; micro-USB

HI2002

Storage solution for electrodes — HI70300M
Bottle, 230 ml.

HI70300M

Buffer solutions for pH meters calibration

Buffer solution pH 4,01; 500 ml.	**HI7004L**
Buffer solution pH 7,01; 500 ml.	**HI7007L**
Buffer solution pH 10,01; 500 ml.	**HI7010L**

Solutions for conductivity meter calibration

12880 µS/cm; 230 ml.	**HI7030M**
111800 µS/cm; 230 ml.	**HI7035M**

Solution for cleaning electrodes of pH meters — HI7061M
230 ml bottle to clean the junction of the electrodes.

HI7004L - HI7007L - HI7010L - HI7030M - HI7035M - HI7061M

The operation mode of refractometers is based on the principle that the refractive index of a solution is proportional to the concentration of a solute. Thanks to a few drops of the sample, it is easy to define the concentration of the substances. This simple and accurate method is usually used to measure the concentration of sugar solutions (Brix). The refractometers are also used in food field for products such as maramalades, fruit juices, syrups, wine, honey and so on.

Hand refractometer, 0-32% ATC — HR-130N
Built in illuminator LED type. Measuring range: 0-32% Brix. Resolution: 0.2% Brix. With automatic temperature compensation (ATC).

Hand refractometer, 0-80% — HR-150N
Built in illuminator LED type. Measuring range: 0-80% Brix. Resolution: 1% Brix. Without ATC.

HR130N - HR150N

Abbe bench refractometer — 2WAJ

Main prism	horizontal
Secondary prism	hinge mounted
Refraction index range	n_D 1,300 - 1,700
Precision	n_D ±0,0003
Division	n_D 0,0005
Sugar range	0-95% from n_D 1,300 - 1,530.
Precision	0-50% = 0,2%; 51-95% = 0,1%
Division	0,25%
Weight	4
Dimensions	140x100x235 mm

2WAJ

Bench polarimeter with monochromatic LED light source — POL-X

Used for measuring the concentration of optically active substances (for example sugars) in a solution.
Measuring range of optical rotation: ± 180°
Resolution: 1°
Accuracy: 0.05°
Magnification factor of the magnifying glass: 4x
Light source: Monochromatic LED, 1.2 W, ld = 590 nm
(equivalent to sodium lamp)
Length of test tubes: 100mm and 200mm.
Power Supply: Input 100/240V ac, 50/60 Hz; Output 5V dc 500 mA
Weight: 1,7kg

POL-X

Simple spectroscope — 4126

The item can test the emission and the absorption of spectral radiations.
Model for direct vision.

4126

Kirchoff-Bunsen's spectroscope — 4028

The item is mounted on a circular metal platform, it is composed of: 1 collector with adjustable slit, 1 collector with graduated scale and 1 collimator with 2 interchangeable eyepieces. The slit of the collector is supplied with a small prism. While the collector, equipped with achromatic objective, is fixed to the platform, the collimator can rotate on an alidade, keeping the directional axis in the centre of the apparatus. The collector with graduated scale requires a small white light source to project the image of the scale in the eyepiece of the collimator by means of the reflection on a face of the prism. The equilateral prism made of highly dispersive material. With this device you can study the spectrum of a source of monochromatic or polychromatic light.

4028

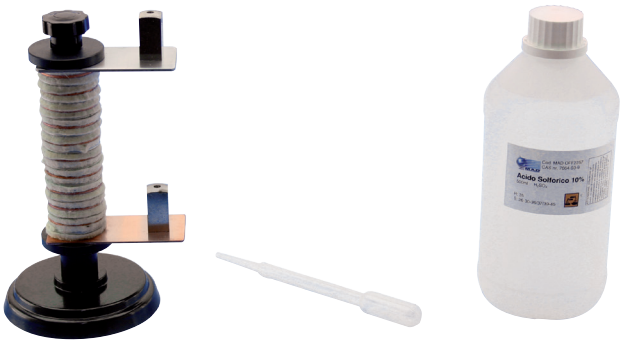
Spectrometer — 4209

This instrument has very good optic and mechanical features which allow the exact measurement of the optical ray deviation angles; therefore it can determine the refractive index of solids and liquids and the wavelength of monochromatic sources. Base: made of firevarnished cast-iron. Goniometer: Ø 17.5 cm and divided in 360° with a precision of 1°. It is equipped with a vernier, which allows to measure with an accuracy of 1/10°. Telescope: it has achromatic objectives with an 178 mm focal length and an eyepiece 15x. Focusing allows fine regulation. Collimator: endowed with achromatic objective with 178mm focal length and with a steady adjustable slit up to 6 mm. Plane of the prism: it can be adjusted both vertically and horizontally and it is supplied with boss-heads for the fixing of the diffraction grating. Diameter: 80 mm. Equipment: 1 Crown glass equilateral prism 32x32 mm; 1 diffraction grating 500 lines/mm; 1 magnifying lens. Dimensions: 48x33x33h cm. Weight: 12 Kg. The purchase of the diffraction gratings 80 lines/mm and 1000 lines/mm is suggested to verify the variation of the spectral resolution.

4209

Volta's battery, column type 5124

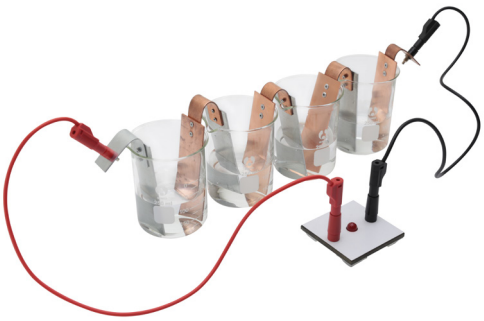
It is made of copper and zinc parts, separated by felt disks soaked in an acid solution. It is supplied with a bottle of acid solution.

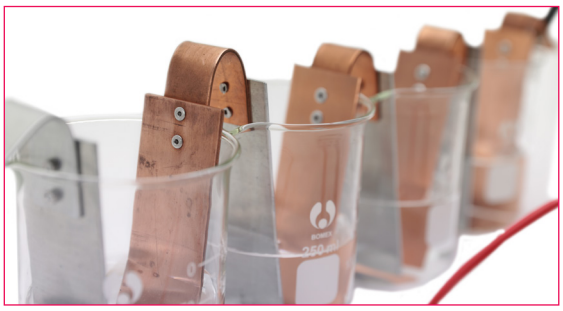


5124

Volta's battery, cups type 5167

It is composed of 4 voltmeters in series. It is supplied with copper and zinc electrodes, acid solution, cables and an LED assembled on a panel.





5167

Apparatus for the electrical conductivity of liquids 5113

Comprised of 4 bulbs in parallel. The electrolytic liquids must be poured into the four glasses, in which the electrodes are immersed. With this simple device, the electrolyte solutions can be recognised and the variation of conductivity as a function of the concentration can be studied.

5113

Human battery 5287

Placing your hand on two of the four metal plates (zinc, lead, aluminium and copper), you create a potential difference between the plates because of the electrical conduction properties of the human body. This potential difference can be measured through the use of a millimetric voltmeter (not included)
Trying all possible combinations between metals, it is possible to guess the existence of the electrochemical series.
Plates dimensions: 15x23 cm.
Board dimensions: 23x65 cm.

5287

Electrolytic cell 5415

Topics

- Electrical conductivity in liquids
- Volta's battery
- Electricity accumulator
- Electroplating

Equipment supplied

1 Base for electrolytic cell	1 Brass electrode
2 Supports for electrolytes	1 Sulphuric acid bottle, 10% solution
2 Coal electrodes	1 Bottle of copper sulphate's solution
2 Copper electrodes	1 Glass beaker
2 Zinc electrodes	3 Electrical leads
2 Lead electrodes	

Equipment required not supplied

1 Battery holder	1 Digital multimeter
4 1,5V Battery	

5415

Replacements for electrolytic cell

All electrodes kit for cod. 5415	**5415.1**
Brass electrodes (couple)	**5043.1**
Lead electrodes (couple)	**5043.2**
Copper and zinc electrodes (couple)	**5043.3**

5415.1 - 5043.1 - 5043.2 - 5043.3

Hofmann's voltameters

With graduated tubes and their metal stands. Height: 70 cm. Power supply unit (suggested code 4991) and connecting wires requested.

With carbon electrodes 5102

Equipment required not supplied

10% sulphuric acid solution	Code 6247
Power supply unit	Code 4991
Connection cables	Code 5012 or 5013
Ammeter	Cod. 5732

With platinum electrodes 5103

Equipment required not supplied

10% sulphuric acid solution	Code 6247
Power supply unit	Code 4991
Connection cables	Code 5012 or 5013
Ammeter	Cod. 5732

Replacements for Hofmann's voltmeter

Glass part only **5102.1**

Carbon electrodes (couple) **5165**

Platinum electrodes (couple) **5166**

5102 - 5103 - 5102.1 - 5165 - 5166

Index

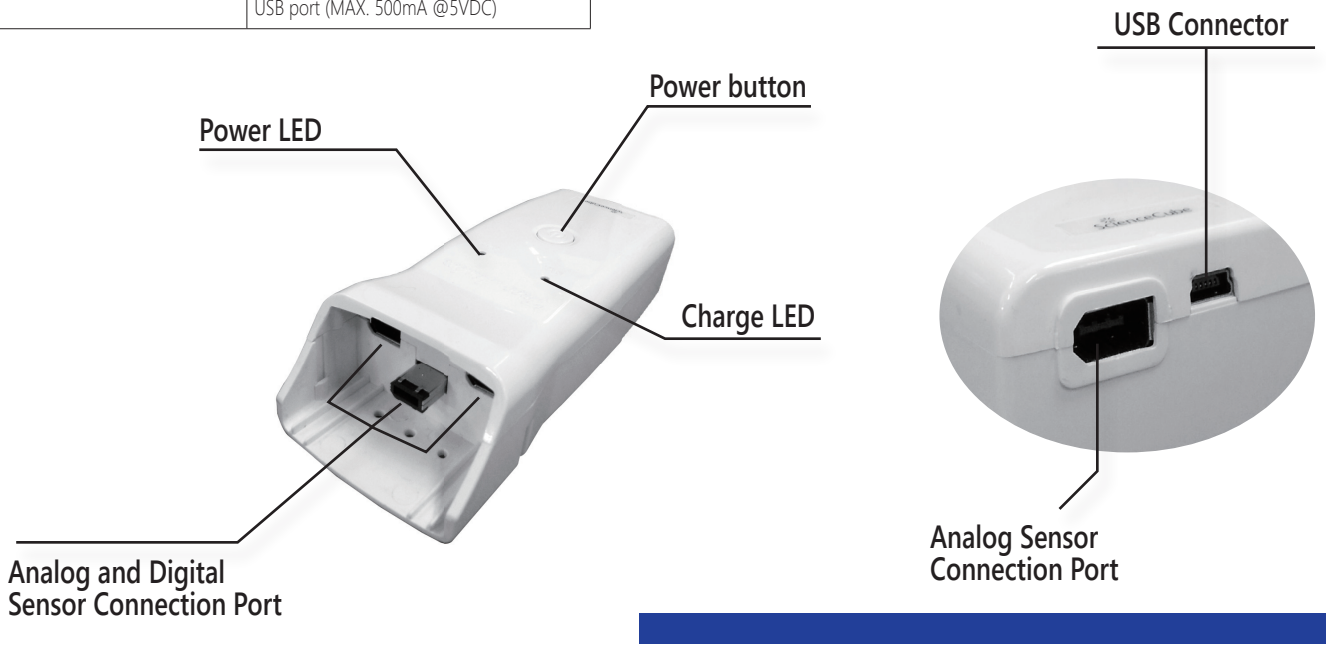
Teaching guide in digital format

Minimum invoiced order: € 130,00 + VAT

Free Linker 9107

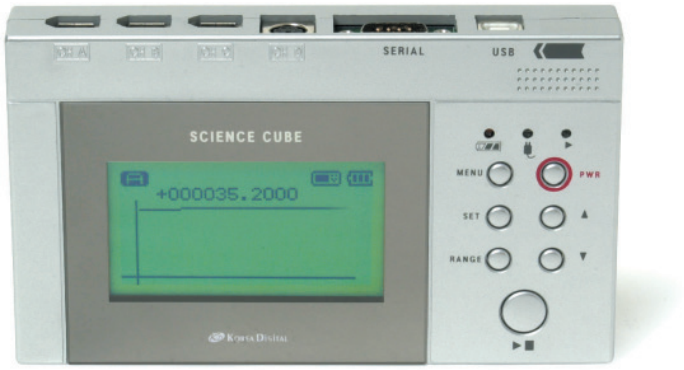
Features

Input port	4 channels (analog and digital)
Network	Wireless bluetooth (RF 2.4GHz) / USB 2.0
Sampling rate	Max 10 kHz / 1 CH
Resolution	12bit ADC
Battery	Li - polymer 2000 mAh
Charge	USB port (MAX. 500mA @5VDC)



9107

ScienceCube Pro 9001



Features

- Dimensions: 160x90x25 mm
- Display: 128x64 ampio graphic mono screen
- Data management: it is able to collect up to 50.000 data - up to 16 experiments
- Battery: rechargeable Lithium-polymer (1250mAh)
- Sensor input: up to 3 channels at the same time.
- Sampling rate:
  Sampling rate:
  0.05 sec (3 channels)
  0.005 sec (1 channel)
  stan-alone mode: 0.0001 sec (1 channel)
- Resolution: 12 bit A/D
- Digital input/output channel: 1 channel output: PWM, sine, square, triangularsawtooth wave
- Communication port: USB, serial port.
- USB cable and 3 sensor connection cables included.

Features

- It can be used as a stand-alone: the interface can be used without a PC connection.
- Easy to use and portable.
- It doesn't need any special card or driver. Sensors are identified automatically.
- Thanks to the LCD graphic display, you are able to read easily the collected data.
- Different languages are available.
- The firmware is constantly updated and implemented. ScienceCube Pro will update itself to be able to interface with the new sensors.

9001

MBL sensors - need interface code 9107 or 9001

Accelerometer 5g 9019

Range: - 47 m/s² ~ + 47 m/s²
Best resolution: -19.6 m/s² ~+19.6 m/s²
Resolution: 0.038 m/s²
Frequency response : 0 Hz ~ 100 Hz

9019

Accelerometer 25g 9020

Range : - 245 m/s² ~ + 245 m/s²
Best resolution: -98 m/s² ~ +98 m/s²
Resolution: 0.2 m/s²
Frequency response: 0 Hz ~ 100 Hz

9020

Motion sensor (II) 9041

Range: 0.15 m ~ 6 m (max. 10 m)
Resolution: 1 mm
Ultrasonic transducer
Beam angle: cone, 15° circa
Sampling rate: max. 100 samples/s, depends on measuring distance
Application: contactless, measure distance vs time
Channel A is used as digital channel

9041

Photogate 9046

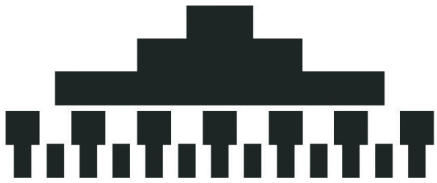
Inner Gate
Infrared source peak wavelength: 880 nm
Rising time: 2.5 ms
Falling time: 3.8 ms
External Gate
Infrared source peak wavelength: 880 nm
Spectrum sensitivity: 500 nm ~ 1050 nm
Rising time: 8 ms
Falling time: 10 ms

Includes 13 cm metal support rod.

9046

Cart picket fence 9050

It is a useful accessory for the low friction rail.



9050

Picket fence 9049

This type of barrier is recommended for free fall experiments.

9049

Pulley 9047

Effective circumference: 20 cm
Pulse/rotation: 10
Diameter: 64 mm
External diameter: 67 mm

9047

Rotational motion sensor (analogic) 9124

Range : 0° ~ 360° (10 turns)
Resolution : 0.88°

9124

Red laser pointer 9048

Wavelength: 650 nm
Security class: 2
Max power < 1 mW

9048

Barometer 9021

Range : 0 hPa ~ 2068 hPa
Resolution : 0.6 hPa

9021

Absolute pressure sensor 9120

Range : 0 hPa ~ 6900 hPa
Resolution : 1.69 hPa

9120

MBL sensors - need interface code 9107 or 9001

Gas pressure sensor (A) 9033
Range : - 1000 hPa ~ + 3000 hPa
Resolution: 1.3 hPa
Differential relative pressure
Response time: average 0.2 ms

9033

Gas pressure sensor (B) 9034
Range : - 650 hPa ~ + 650 hPa
Resolution: 0.335 hPa
Differential relative pressure
Response time: average 0.2 ms

9034

Current probe 9027
Range: DC /AC -1.2A ~ +1.2A
Resolution: 0.6 mA
This sensor is insulated from ground
Max 5W (0.01 Ω)

9027

Differential voltage probe 9029
Input voltage range: -12.0 V ~ +12.0 V
Input impedance (to ground): 10 MΩ
Linearity: 0.01%
Resolution: 3.1 mV
Supply voltage: 5V DC
Supply current (typical): 9 mA
Output voltage range: 0 V ~ 5 V

9029

Galvanometer 9028
Range: DC
- 12.5 mA ~ + 12.5 mA
- 1.25 mA ~ + 1.25 mA
- 0.125 mA ~ + 0.125 mA
Resolution: 6mA, 0.6mA, 0.06mA
This sensor is insulated from ground

9028

Charge sensor 9133
Ranges: ± 0.5 V (± 5 nC)
± 2 V (± 20 nC)
± 10 V (± 100 nC)
Input max: ± 150V
Typical bias input current: 0.005pA
Instrument time constant: 0.1s
Operating conditions:
humidity: 0 ~ 95% RH
temperature: 0 ~ 50°C

9133

Oscilloscope probe 9125
Range: - 100 V ~ + 100 V
- 10 V ~ + 10 V
Sampling rate: 40 K S/s

9125

Dual range force sensor II 9032
Range: - 10 N ~ + 10 N
- 80 N ~ + 80 N
Resolution: 0.0056 N
0.056 N
Sensor type: electrical strain gage

9032

Thermocouple probe 9062
Range: - 200°C ~ + 1200°C
Resolution: 0.6°C
Sensor properties: K-type, stainless steel covered
Linearity: 0°C ~ 400°C (± 3°C)
- 200°C ~ 0°C (± 2°C)
Chemical resistance: 15 min (1 M HCl)

9062

Temperature probe Stainless steel body 9061
Range: - 25°C ~ + 125°C
Resolution: 0.1°C
Sensor properties: thermistor, stainless steel covered.
Reading speed: 10 s (90%)
Chemical resistance: 15 min (1 M HCl)

9061

Platinum temperature probe Stainless steel body 9060
Range: - 50°C ~ + 180°C
Resolution: 0.06°C
Sensor properties: platinum temperature element (RTD), stainless steel covered.
Reading speed: 10 s (90%)
Chemical resistance: 15 min (1 M HCl)

9060

Thermocouple probe with wire 9063
Range: -200°C ~ +1200°C
Resolution: 0.6°C
Sensor properties: K-type, stainless steel covered
Linearity: 0°C ~ 400°C (±3°C)
-200°C ~ 0°C (±2°C)
Chemical resistance: 15 min (1 M HCl)

9063

MBL sensors - need interface code 9107 or 9001

Conductivity probe 9023
Range_1: 0 ~ 200 µS/cm (0 ~ 100 mg/L TDS)
Range_2: 0 ~ 2000 µS/cm (0 ~ 1000 mg/L TDS)
Range_3: 0 ~ 20000 µS/cm (0 ~ 10000 mg/L TDS)
Resolution :
Range_1: 0.1 µS/cm (0.05 mg/L TDS)
Range_2: 1 µS/cm (0.5 mg/L TDS)
Range_3: 10 mS/cm (5 mg/L TDS)

9023

Salinity sensor 9090
Range: 0 ppt ~50 ppt
Resolution: 0.02 ppt

9090

Dissolved CO_2 in water sensor 9135
Range: 1 x 10^{-4} a 10^{-2} M (4.4 ~ 400 ppm CO_2)
Resolution 12 bit: 0.5 mV
Range pH: samples and standars must be adjusted between 4.0 e 4.5 pH
Temperature range: 0 ~ 50°C
Electrode resistance: less than 1000 MΩ
Reproducibility: ±2%

9135

CO_2 gas sensor 9022
Range: 0 ppm ~ 5000 ppm (0 ~ 0.5%)
Resolution: 2.44 ppm
Accuracy (a pressione standard 1 Atm):
±100 ppm (0 ppm ~ 1000 ppm)
±10% (1000 ppm ~ 5000 ppm)

9022

CO_2 gas sensor High concentration 9089
Range of measured CO_2 concentration:
0% ~ 10% (0 ppm ~ 100000 ppm)
Resolution: 30 ppm
Accuracy (at standard pressure of 1 atm):
0 ppm ~ 10000 ppm: ± 1000 ppm or ± 10% of the value read; 10000 ppm ~ 50000 ppm: ± 20% of the value read; over 50000 ppm: qualitative measurements only.

9089

O_2 gas sensor (0~100%) 9126
Range : 0 ~ 100%
Resolution: 0.03%
Accuracy: Full Scale ± 1.0% or ± 1.0% on the value read
Power: 15 mA

9126

Dissolved oxygen probe 9030
Range: 0 mg/L ~ 15 mg/L (or ppm)
Accuracy: 0.3 mg/L
Resolution: 0.004 mg/L
Response time: 95% in 30 secondi
98% in 45 secondi
Temperature compensation: automatic at 5°C ~ 35°C

9030

ORP Sensor 9043
ORP Electrode
Type: sealed, gel-filled, epoxy body, Ag(AgCl)
Storage solution: pH 4, KCl (10g KCl in 100 ml, pH 4 buffer solution)
Temperature range: 0°C ~60°C
Impedance: ~20 MΩ a 25°C
Electrode ORP Amplifier
Amplifier input range:
-450 mV ~ +1100 mV
Resolution : 0.5 mV

9043

Oxygen gas sensor (II) 9044
Range: 0% ~ 27%
Output voltage range:
0 V ~ 4 V in air at 25°C sea level
Resolution: 0.01%

9044

CO^2 - O^2 three-way tube 9045
Dimensions: 45x12.5x12.5 mm
Material: plastic
Quantity: 10pcs in 1 set

9045

Relative humidity sensor 9038
Range : 0% RH ~ 100% RH
Resolution: 0.0375% RH

9038

pH-meter 9053
Range : pH 0 ~ 14
Resolution: 0.0036 unità pH

9053

MBL sensors - need interface code 9107 or 9001

Electrode amplifier 9082

The selective ion electrodes amplifier can be connected to pH sensors, ORP and TDS. It is designed tlk.,o amplify small signals at a higher level with low noise

9082

Ion selective Electrode

The electrode amplifier code 9082 must be used.

Calcium probe (Ca^{2+}) 9076

Range: 5x10-7 M ~ 1 M
(0.02 ppm ~ 40000 ppm)
Resolution: 0.5 mV

Nitrate probe (NO^{3-}) 9078

Range: 5x10-7 M ~ 1 M
(0.1 ppm ~ 14000 ppm)
Resolution: 0.5 mV

Ammonium probe (NH^{4+}) 9077

Range: 5x10-6 M ~ 1 M
(0.1 ppm ~ 18000 ppm)
Resolution: 0.5 mV

Chloride probe (Cl^{-}) 9079

Range: 5x10-6 M ~ 1 M
(1.8 ppm ~ 35000 ppm)
Resolution: 0.5 mV

9076 - 9078 - 9077 - 9079

Colorimeter (II) 9025

Range: 10 ~ 90% T
Resolution: 0.035% T
Wavelength: 430 nm, 470 nm, 565 nm, 635 nm

9025

Photodiode light sensor 9052

Range: 0 lux ~ 15000 lux
General purpose range: 0 lux ~ 6000 lux
Sensitive range: 0 lux ~ 600 lux
Resolution: adjusted according to range settings
Spectral response range : 330 nm ~ 720 nm
Peak spectral response: 580 nm

9052

UV sensor 9132

Spectral response: 210 nm ~ 380 nm (UVA ~ UVB)
Range: 0 ~ 1000 W/m^2
Resolution: 0.25 W/m^2
Accuracy (in this range): ±5%, @25°C
Temperature range: 0 ~ 40°C

9132

Turbidity sensor 9057

Range: 0 NTU ~ 200 NTU
Resolution: 0.25 NTU

9057

Cuvette 9026

Dimension: 45x12.5x12.5 mm
Material: plastic
Quantity: 10pcs in 1 set

9026

Electric field meter 9084

Range : 1 ~ 1999V/m
Type: plate type
Output: V-RMS
Accuracy: ± 1 [dB] of reading
Operating temperature: -10°C ~ 70°C
Sampling time: 0.2s
Frequency range: 15Hz ~ 2kHz
No interface required

9084

MBL sensors - need interface code 9107 or 9001

Magnetic field meter 9083

Range : 0.1 mG ~199,9 mG
1 mG ~ 1999 mG (auto range)
Type: pick up coil
Output: V-RMS
Accuracy: ± 1 [dB] of reading
Operating temperature: -10°C ~ 70°C
Sampling time: 0.2s
Frequency range: 30 Hz ~ 2 kHz
No interface required

9083

Magnetic field sensor 9039

Range : - 50 G ~ + 50 G (5 mT)
Resolution: 0.024 G
Sensor length: 5.0 mm
Sensor type: radiometric, linear hall effect sensor
Strobe timing: changes according to interface used (max. 0.1 ms)

9039

Magnetic field sensor (II) (with scale) 9091

Range: - 50 G ~ + 50 G (5 mT)
Resolution: 0.024 G

9091

Radiation sensor (II) 9055

Range: 0 mR/hr ~ 20 mR/hr
(0 CPM ~ 20000 CPM)
Resolution: 1 CPM
Temperature range: 0°C ~ 50°C

9055

Microphone 9042

Range: 20 Hz ~ 20000 Hz
- 50 dB Vrm ~ + 20 dB Vrm
No interface required

9042

Sound level sensor 9130

Range: 40 ~ 110 dB
Resolution (12-bit): 0.12 dB
Accuracy (a 94 dBA, 23°C ± 5°C): ±3 dB
Temperature range: 0 ~ 50°C

9130

Sound level meter 9065

Range: 30 dB ~ 130 dB
Accuracy: -1.5 dB ~ +1.5 dB
5 digit display
No interface required

9065

Stethoscope 9056

With this stethoscope you can see your heartbeat on a chart.
No interface required

9056

Spirometer 9122

Range: - 5 ~ +5 L/S
Temperature range: 0°C ~ 50°C

9122

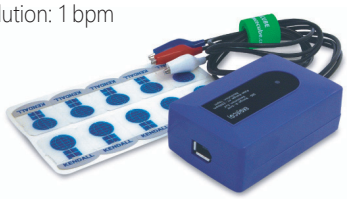
Blood pressure sensor 9127

Range: 0 ~ 250 mmHg
Resolution: 0.0685 mmHg
Accuracy: ±3 mmHg

9127

EKG Set 9031

EKG
Range: 0 mV ~ 5 mV
Resolution: 5 µV
PULSE
Number of pulse: 47 bpm ~ 250 bpm
Resolution: 1 bpm



9031

Heart rate monitor 9037

Range: 0 bpm ~ 250 bpm
Resolution: 1 bpm

9037

MBL sensors - need interface code 9107 or 9001

Heart rate monitor (hand-grip type) 9121

Range: 0 BPM ~ 250 BPM
Resolution: 1 BPM

9121

Heart rate monitor (Ear clip type) 9123

Range: 0 BPM ~ 250 BPM
Resolution: 1 BPM

9123

Adapter for sensors 9058

Range: 0 ~ 5 V
Resolution: 0.0012 V
Power suppply: 3 mA

9058

SERIES OF USB SENSORS TO BE USED WITHOUT AN INTERFACE

ScienceCube produces sensors with USB connection which can be connected directly to the computer.
The sensors don't need any connection interface and can be used directly through ScienceCube software which is supplied free of charge with each sensor.
The USB sensors are easy to use and allow recording of the conditions of any experiment.

USB distance sensor 9066

Range: 0.15 ~ 6 m (max. 10 m)
Resolution: 1 mm
Measurement principle: Sonar
Field of view: conical, approximately 15°
Sampling frequency: max. 100 measurments/s

9066

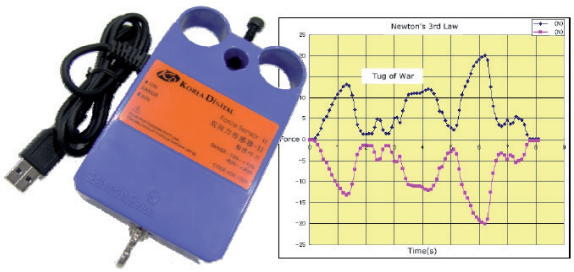
USB temperature sensor 9085

Range: -25°C ~ +125°C
Resolution: 0.1°C
Type of sensor: thermistor
Protected by stainless steel
Response time: 10 s (90%)
Chemical resistance: 15 minutes (1M HCl)

9085

USB force sensor 9068

Range: ±10 N / ±80 N
Resolution: 0.0056 N / 0.056 N
Type of sensor: extensometric



9068

USB light sensor 9072

Range: 0 ~ 15000 Lux
Resolution: depending on sensivity
Sensitivity:
Low: 0 ~ 15000 Lux
Averge: 0 ~ 6000 Lux
High: 0 ~ 600 Lux
Spectrum range:
3300 Å (330 nm) ~ 7200 Å (720 nm)
Wavelength at the maximum sensitivity:
5800 Å (580 nm)

9072

USB pH sensor 9071

Range: pH 0 ~ 14
Resolution: 0.0036 pH

9071

USB magnetic field sensor 9067

Range: -50 G ~ +50 G
Resolution: 0.024 G

9067

USB current sensor 9073

Range: DC -1.2 A ~ +1.2 A
Resolution: 0.6 mA

9073

USB sound level meter 9087

Range: 40 ~ 110 dB
Resolution: 1.5 dB

9087

USB 5g accelerometer 9140

Range: -47 m/s² ~ +47 m/s²
Best resolution: -19.6 m/s² ~ +19.6 m/s²
Resolution: 0.038 m/s²
Frequency response:
0 Hz ~ 100 Hz

9140

USB barometer 9139

Range: 0 hPa ~ 2068 hPa
Resolution: 0.63 hPa

9139

USB turbidity sensor 9141

Range: 0 NTU ~ 200 NTU
Resolution: 0.25 NTU

9141

USB photogate 9075

Internal gate:
Infrared source peak wavelength: 880 nm
Rising time: 2.5 µs
Falling time: 3.8 µs

External gate:
Spectrum sensitivity: 500 nm ~ 1050 nm
Rising time: 8 µs
Falling time: 10 µs

9075

USB gas pressure sensor (A) 9136

Range: -1000 hPa ~ +3000 hPa
Resolution: 1.3 hPa

9136

USB ORP sensor 9138

ORP electrode
Tipology: sealed, gel filled, Ag(AgCl)
Solution: pH 4, KCl
Temperature range: 0°C ~ 60°C
Impedance: ~20 MΩ at 25°C

ORP electrode amplifier
Input range: -450 mV ~ +1100 mV
Resolution: 0.5 mV

9138

USB umidity sensor 9086

Range: 0 ~ 100%
Resolution: 0.1%

9086

USB differential voltage sensor 9074

Input range: -12.0 V ~ +12.0 V
Resolution: 3.1 mV

9074

USB O_2 gas sensor 9088

Range: 0 ~ 27% O_2
Resolution: 0.01%

9088

Index

Teaching guide in digital format

Minimum invoiced order: € 130,00 + VAT

Magnetic board with stand 1329

With white surface in order to draw diagrams and write formula with MDT drawing pens. It can hang from the wall or be table-mounted in vertical position.
Dimensions: 60 x 90 cm.

1329

Magnetic board set 7136

Components:
1 plastic circle Ø 50 cm
1 plastic circle Ø 40 cm
3 erasable drawing pens (red, black and blue)

7136

White magnetic boards with MDT drawing pens, to be hung on walls

Dimensions: 90 x 120 cm	BLV/256
Dimensions: 100 x 150 cm	BLV/257

Abacus ID054

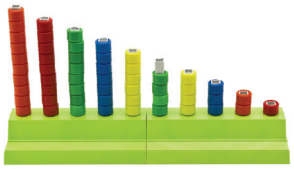
Made of plastic material.
Dimensions: 190x170 mm.

ID054

Scalar abacus 7082

Made of solid plastic.
Composed of:
- 2 numbered bases with 5 holes each.
- 10 scalar rods.
- 60 little cylinders.

It enables the comprehension of the concept of variable quantity.



7082

Multibasis abacus 7081

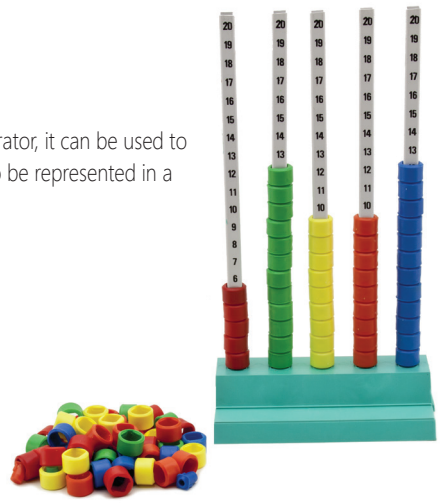
Made of solid plastic.
It is composed of:
- Bases with 5 holes.
- 5 four-basis rods.
- 5 six-basis rod.
- 5 ten-basis rod.
- 45 little cylinders.

7081

Column numerator 7083

Made of solid plastic.
Composed of:
- 1 numbered basis.
- 5 numbered rods.
- 100 little cylinders.

In couple with another numerator, it can be used to visuazile the data collected to be represented in a graph.



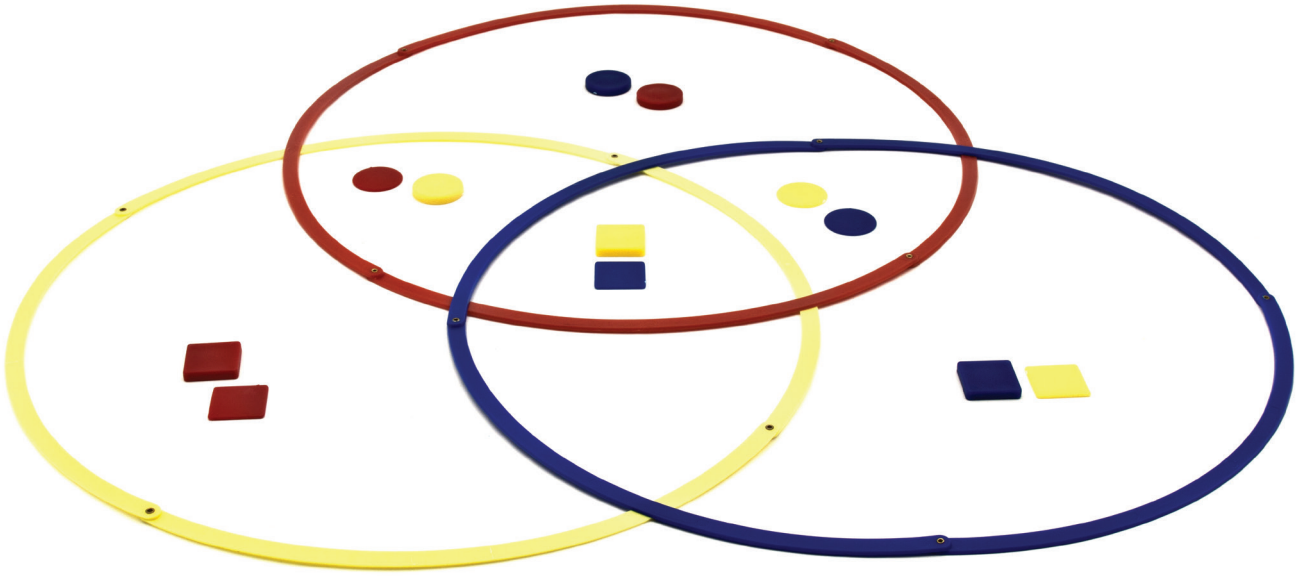
7083

LOGICAL PATTERNS

They have different thickness, different dimensions and are of three different colors. They are particularly indicated for performing operations on the set theory and for learning the basic concepts of geometry.

Grouping circles 7086

This item is composed of three flexible circles of different colors enabling the performance of logic activities through the use of items code ID057 or ID058.
Made of plastic, shockproof material; circles diameter: 50 cm.



7086

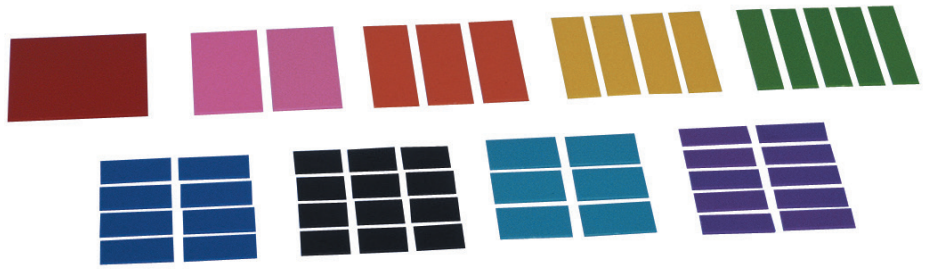
Fraction, decimal and percent tower 7090

This teaching aid is composed of a plastic base with 6 holes where different pieces can be housed and piled up. These pieces represent the unit's fractions from 1/2 to 1/12, decimals and percentages.
Components:
51 fraction cubes
51 decimal cubes
51 percent cubes

7090

Square's fractions 7088

Made of shockproof, brightly colored plastic , this teaching aid is composed of 51pieces: the first one is a square whose side measures 10 cm, and the other pieces are fractions , from 1/2 to 1/12. All pieces are stored in a transpatrent, plastic case with lid.



7088

Circle's fractions 7089

Made of shockproof, brightly colored plastic , this teaching aid is composed of 51pieces: the first one is a circle whose diameter measures 10 cm, and the other pieces are fractions, from 1/2 to 1/12. All pieces are stored in a transpatrent, plastic case with lid.

7089

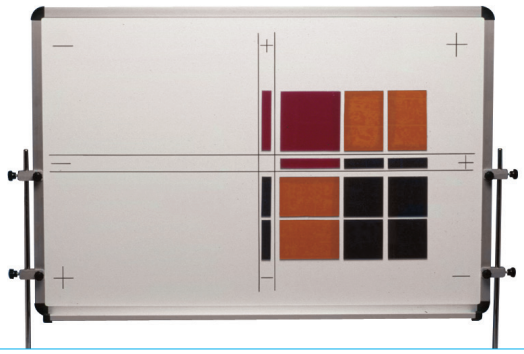
Algebraic models for magnetic board 7134

24 pcs.

Topics

- Operations with relative numbers
- Geometric significance of monomials and operations with monomials
- Operations with polynomials
- The equations of I for one unknown factor
- The disequations of I for one unknown factor

$(x+2y)\,(x-2y) = x^2-4y^2$

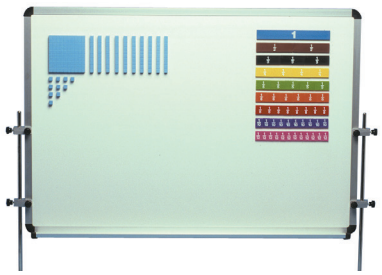


7134

Hereafter there are some mathematic teaching aids, whose components are magnetic, in order to be used by the teacher on a magnetic whiteboard ;it can be a mural one, or with stand (cod. 1329), and the dimensions are at least 60x90 cm.

Metric decimal system for magnetic board 7095

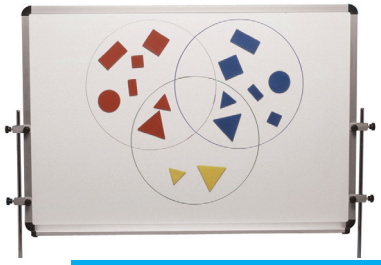
Composed of: 1 dm^2 - 10 dm - 10 cm.



7095

Logic figures for magnetic board 7130

Pack of 24 pcs.



7130

Circle fraction for magnetic board 7133

Made of magnetic, brightly colored plastic , this teaching aid is composed of 51 pieces: the first one is a circle whose diameter measures 10 cm, and the other pieces are fractions, from 1/2 to 1/12. All pieces are stored in a transpatrent, plastic case with lid.

7133

Index

Teaching guide in digital format

Minimum invoiced order: € 130,00 + VAT

Measurement instruments set 7250

This kit includes all items needed to perform weight , length, angle capacity, time, temperature, force and electrical measures. Items stored in a small plastic case.

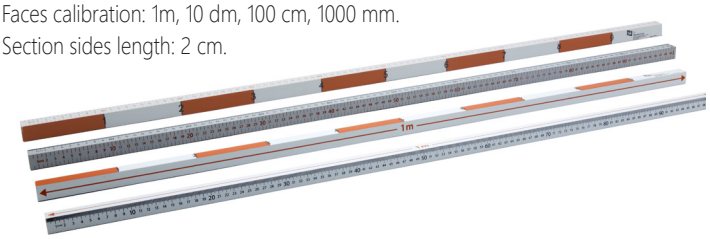
Equipment supplied

1 Decimal Metric system
1 Metric wheel 10m
1 Vernier caliper
1 Tape measure
1 Protractor
1 Inclinometer
1 Big-size vernier caliper
1 graduated cylinder 100ml
1 graduated cylinder 250ml
1 Digital timer
1 Spring scale 100g/1N
1 Spring scale 250g/2,5N
1 Spring scale 1000g/10N
1 Mathematical scales
1 Digital thermometer -50+150° C
1 Wall Thermometer
1 Portable Digital Multimeter
1 Case

7250

100-cm ruler with square section 7009

Faces calibration: 1m, 10 dm, 100 cm, 1000 mm.
Section sides length: 2 cm.



100-cm ruler with triangular section 7011

Faces calibration: 10 cm, 1 cm, 1 mm.
Section sides length: 2 cm.

7009 - 7011

Decimal measuring system 7013

It consists of a graduated rigid meter and battens, ten for each number from 1 to 10. It can be used also for decimals and percentages learning.

7013

Linear ruler 1116

Fibreglass made, 100 cm length.

1116

Flexible ruler 1117

Steel, length 2 m.

1117

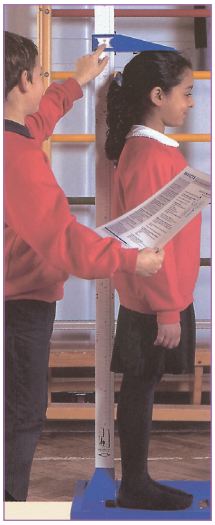
Measuring roller 1118

10 m length.

1118

Height meter 7019

Extremely accurate and sturdy, this height meter is made of plastic and is 2 meters high. Removable and foldable for an easy transport.



7019

Vernier caliper 1190

Fibreglass made. 120 mm opening.

1190

Vernier caliper 1027

Stainless steel. 150 mm opening.

1027

Micrometer 1028

0 to 25 mm opening. With case.

Micrometer 1120

25 to 50 mm opening. With case.

1028 - 1120

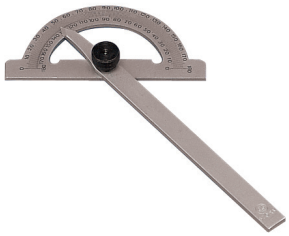
Measuring wheel 7018

This instrument permits to measure long distances and it is useful to compare rotary motion and translation motion.
Made of plastic shock-resistant material, it is equipped with a calibrated (in meters and 1/10 of a meter) rev counter. Telescopic arm. The wheel is protected by a rubber ring to prevent the rotary surface from being damaged and avoid noises.

7018

Protractor 1030

Stainless steel made.



1030

Measuring roller 1411

Fibreglass made. 30 m length.

1411

Teaching cathetometer 1037

Dual calibration, horizontal and vertical.
Bar height 80 cm

1037

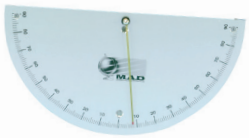
Cathetometer without base 1392

Aluminum bar height: 80 cm.

1392

Inclinometer 7125

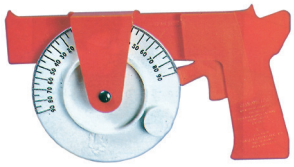
This item is used to measure the angle according to which you can see a tree, a tower, an hill, etc., in order calculate their height using draw to scale.
Protractor diameter 30 cm.



7125

Clinometer 7128

Teaching clinometer, plastic made.
Wheel diameter: 13 cm.



7128

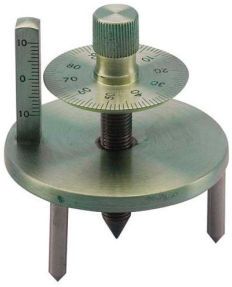
Inclinometer with trestle 7213

As Inclinometer cod. 7125, but mounted on a telescopic trestle. This trestle permits the clinometer to rotate 360° on the horizontal axis, to be lengthwise and widthways inclined. Instrument height considering the maximum extension of the trestle: 180 cm.

7213

Spherometer 4027

To measure the bending rays of spherical sufaces.



4027

Set of 6 capacity measurers 7025

Transparent plastic made, capacity 0,62 ml, 1,25 ml, 2,50 ml, 5,00 ml, 7,50 e 15 ml.

7025

Cubic basin of 1 dm³ 7020

Transparent-plastic made with plug.
Graduated (decilitres).

7020

Cubic basin of 1 dm³ with shelves, slide rules and cubes 7024

Transparent-plastic made. Used to demonstrate the equivalence between a dm³ and a litre. Equipped with: 9 Shelves 10x10x1cm - 9 Slide rules 10x1x1cm - 10 Cubes 1x1x1cm.

7024

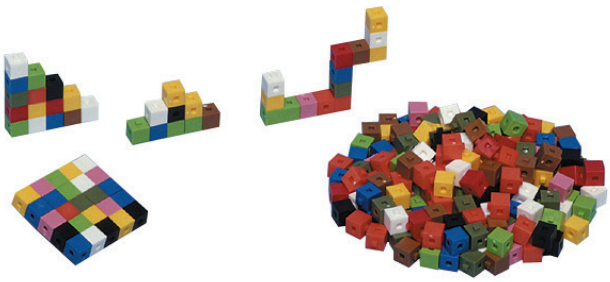
Set of 7 graduated cylinders 7057

Plastic made.
Capacity:
- 10 ml
- 25 ml
- 50 ml
- 100 ml
- 250 ml
- 500 ml
- 1000 ml

7057

Series of 200 cubes of 1 cm³ - 1 g 7028

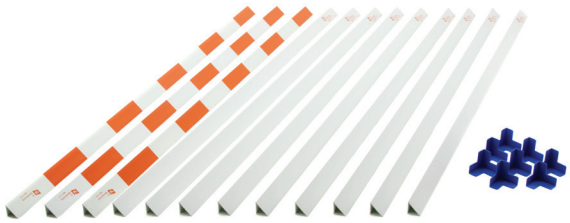
Made of coloured plastic. They can be assembled and they allow to measurement of surfaces and volumes. They can be used for measurements weigh with two plates scales.



7028

Modular metric cube 7067

Easy to assemble, it consists of 8 edges e 12 bars measuring 1 m, three of them are graduated (dm). All the components are plastic made.



7067

Pair of hourglasses 7031

Time of the first: 1 minute; time of the second: 3 minutes.
Size: 18x60 mm.

7031

Hourglass 7222

With sand, made from sturdy and unbreakable plastic.
Size: Ø 60x135mm. Time interval: 10 minutes.

7222

Sundial model 7121

This model is supplied without the calibration, which has to be done by the students according to the supplied teaching guide explanations (pdf version). In this guide it is possible to read the physical principles that make it work.It is supplied with protractor and compass.
Size: 20x20 cm.

7121

Digital stopwatch "stratos" F1023

Measuring range: 9h, 59 min, 59 sec.
Time unit: 1/100 sec.

F1023

Digital table stopwatch 1416

- Liquid crystals display: 82x40 mm
- Accuracy: 1/100 sec
- Power supply: 1.5 V battery
- Reading: hours - minutes - seconds.

Clock function, with date, the day of the week and alarm clock to be set.

1416

Clock model 7054

Plastic made, it permits to understand how a clock works.
Diameter: 32 cm.

7054

Analog chronometer "amigo" F1006

Model of 15 minutes, accurancy 1/10 of a second.
1. Green button: to start the calculation.
2. Red button: to stop the calculation.
3. Black button: zeroing.

Box made of synthetic material; Ø 60mm.

F1006

Electromagnetic ticker tape timer 1408

Alternating voltages working 4-8V. Fitted with support, paper roll, carbonate paper disks and two connecting wires.
Frequency: 50 Hz.
Power supply not included.

Spare paper tapes 1408.1

6 rolls for the ticker tape timer code 1408.

Carbonate paper disks for ticker tape timer 1408.2

1408

Hydrometers

0,600 - 0,700 g/ml; division 0,001	**T50**
0,700 - 0,800 g/ml; division 0,001	**T51**
0,800 - 0,900 g/ml; division 0,001	**T52**
0,900 - 1,000 g/ml; division 0,001	**T53**
1,000 - 1,100 g/ml; division 0,001	**T54**
1,100 - 1,200 g/ml; division 0,001	**T55**
0,650 - 1,000 g/ml; division 0,005	**T56**
0,800 - 1,000 g/ml; division 0,002	**T57**
1,000 - 1,200 g/ml; division 0,002	**T58**
1,000 - 2,000 g/ml; division 0,01	**T59**

T50 - T51 - T52 - T53 - T54 - T55 - T56 - T57 - T58 - T59

Optika precision spring scales

Transparent plastic made with engraved graduated scale. Protection against overload and possibility to set to zero.

Linear, capacity 1N, division 0,01N	**1193.1**
Linear, capacity 2N, division 0,02N	**1256.1**
Linear, capacity 5N, division 0,05N	**1257.1**
Linear, capacity 10N, division 0,1N.	**1258.1**
Linear, capacity 20N, division 0,2N	**1259.1**

1193.1 - 1256.1 - 1257.1 - 1258.1 - 1259.1

Teaching spring balances

Plastic made with engraved graduated scale.
Protection against overload and possibility to set to zero.

Capacity 100 g/1N, division 2 g/0,02N	**1347**
Capacity 250 g/2,5N, division 5 g/0,05N	**1348**
Capacity 500 g/5N, division 10 g/0,1N	**1356**
Capacity 1000 g/10N, division 20 g/0,2N	**1357**
Capacity 2000 g/20N, division 40 g/0,4N	**1358**
Capacity 5000 g/50N, division 100 g/1N	**1359**

1347 - 1348 - 1356 - 1357 - 1358 - 1359

Set of Spring balances 1424

Set of Spring balances with double calibration: 100 g/1N ; 250 g/2,5N ; 500 g/5N; 1000 g/10N; 2000 g/20N ; 5000 g/50N.
Plastic case.

1424

Basic scale 7069

Made from resistant plastic. Capacity: 2000 g, sensibility: 1 g. Plates surface: 100 cm2. Supplied with 8 masses and with instructions guide. Size: 30x12x11 cm.

7069

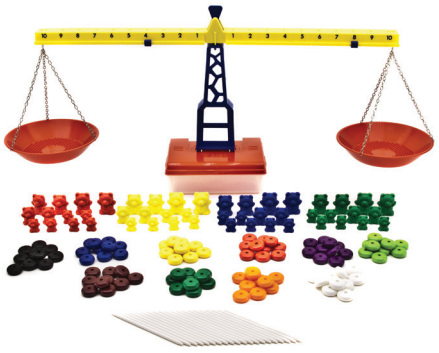
Teaching scale 1150

Wooden base, marble surface, polished brass plates, capacity: 2 Kg, fitted with 1 mass of a 1 Kg, 10 masses of 100g, 10 masses of 10g, 10 masses of a 1g. Size: 40,8x22x18 cm.

1150

Mathematical scale 7077

Plastic made. It's an important teaching support for middle school. It is fitted with plates and with two buckets which permit the students to weigh water, sand, and so on, in order to understand scales working and measurement rules.



7077

Series of 200 g masses 1035

Made from nickel-plated brass in a plastic holder with cover; gramme fractions are kept in a small support with plexiglass cover; supplied with clasp.

Supplied weights:
100 g 1pc, 50 g 1pc,
20 g 2pcs, 10 g 1pc,
5 g 1pc, 2 g 2pcs,
1 g 1pc, 500 mg 1pc,
200 mg 2pcs, 100 mg 1pc,
50 mg 1pc, 20 mg 2pcs,
10 mg 1pc.

1035

Series of 2 kg masses 1148

Made from raw brass and painted steel, wooden support:
1000 g 1pc, 500 g 1pc, 200 g 1pc, 100 g 2pcs, 50 g 1pc, 20 g 1pc, 10 g 2pcs, 5 g 1pc, 2 g 2pcs, 1 g 1pc.

1148

Series of masses with hook 1147

Made from nickel-plated brass and painted steel with support:
1000 g 1pc; 500 gr 1pc; 200 g 2pcs; 100g 1pc; 50 g 1pc; 20 g 2pcs and 10 g 1pc.

1147

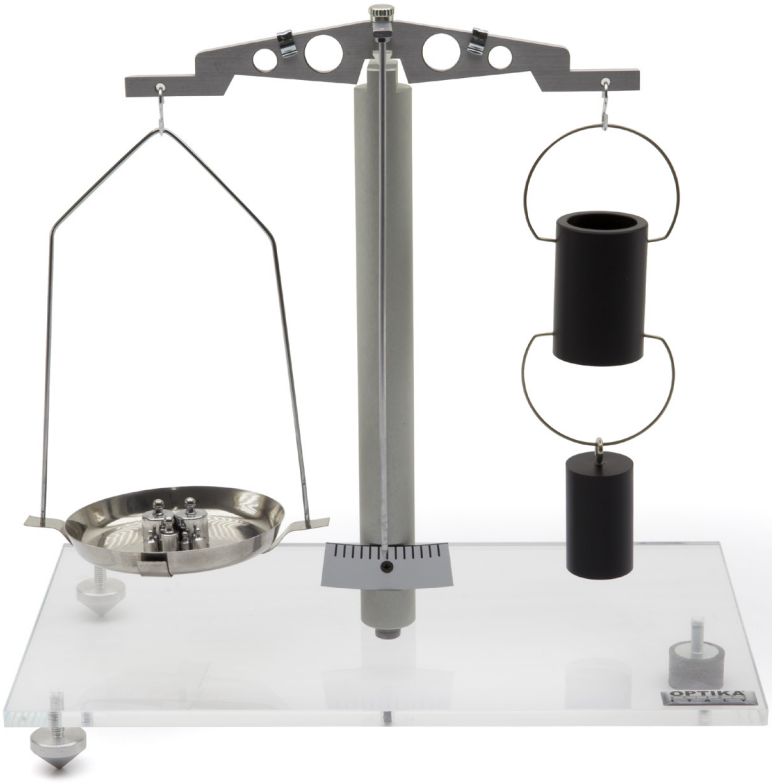
Technical balance 1433

The technical balance allows you to compare two masses. The two plates are supported by a beam that rests on a fulcrum. The beam is symmetrical to the vertical plane assing through the fulcrum and can freely rotate around it.
An index is rigidly attached to the beam. By putting masses on tl

Dimensions:
Height: 33 cm
Base: 32 x 20 cm
Three adjustable feet
Provided with a weight box, from 10 mg up to 100g

Bucket & cylinder Apparatus - optional 1461

Use this technical balance as an hydrostatic scale.



Bucket (external measures): h = 60 mm; d = 41 mm
Cylinder: h = 50 mm; d = 30 mm

The Bucket and Cylinder Apparatus is used to verify the Archimedes' Principle, or law of buoyancy.
By immersing the filled cylinder into the water, you can notice an apparent weight reduction: the upward buoyant force that is exerted on a body immersed in a fluid, whether fully or partially submerged, is equal to the weight of the fluid that the body displaces. By filling the hollow bucket with water, the buoyant force is balanced.

1433 - 1461

Electronic scale, accuracy 0,1g — LG501

Capacity 1000 g, accuracy 0.1 g
Stainless steel plate: 150 x 180 mm.
Display LCD. Dual power supply: adapter AC/DC (included) and battery (not included).

LG501

Mohr-Westphal scale — 1040

Used to measure the density of the liquids up to the fourth decimal number.
The support allows to height adjustment.
It is fitted with an immerser, a thermometer, a glass cylinder, a masses holder with hooks and clasp.

1040

OPTIKA BALANCES ITALY

For the full range of Optika scales, please visit **www.optikabalances.com**

Electronic scale, accuracy 0,1g — L3201

Capacity 3100 g, accuracy 0,1 g. Diameter plate 130 mm.
External calibration. Power supply included.

L3201

Electronic scale, accuracy 0,01 g — M422

Capacity 420 g, accuracy 0,01 g. Plate Ø 110 mm. External calibration.
Power supply included. Also works with AA batteries (not included).

Electronic scale, accuracy 0,1 g — M2201

Capacity 2200 g, accuracy 0,1 g. Plate 150x140 mm. External calibration. Power supply included. Also works with AA batteries (not included).

M422 - M2201

Certified masses

Weight of 100 g class E2	**PS100E2**	Weight of 200 g class F1	**PS200F1**
Weight of 100 g class F1	**PS100F1**	Weight of 1000 g class F1	**PS1F1**
		Weight of 2000 g class F1	**PS2F1**

Electronic scale, accuracy 0,01g — I3102

Capacity 3100 g, accuracy 0,01 g. Diameter plate 130 mm.
External calibration. Power supply included.

Electronic scale, accuracy 0,01 g — I622

Capacity 620 g, accuracy 0,01 g.
Diameter plate 130 mm.
External calibration.
Power supply included.

I3102 - I622

Electronic scale, accuracy 0,001 g — H423

Capacity 420 g, accuracy 0,001 g
Diameter plate 80 mm.
Display LCD.
Power supply included.

H423

Electronic scale, accuracy 0,0001g — B214A

Capacity 220 g, accuracy 0,0001 g.
Diameter plate 80 mm.
External calibration.
Power supply included.

B214A

Big themometer model 7055

It is possible to make scroll a coloured tape on a scale calibrated in Celsius and Fahrenheit, heigth: 60 cm and width: 15 cm.

7055

Thermometer for demonstration AF10

Length: 65 cm, diameter: 3 cm.
Blue-coloured alcohol.
Scale: -20 +110°C, div. 1°C.

AF10

Alcohol thermometers

Permanent graduated scale, chemical products-resistant.
Stem diameter: 6.5 mm, minimum length of the non-graduated part: 40 mm. All ecological thermometers, no risk of contamination in case of break.

-10°+60°C, divis. 0,5°C, length 305 mm.	**T19**
-10°+110°C, divis. 0,5°C, length 305 mm.	**T20**
-20°+110°C, divis. 1°C, length 305 mm.	**T22**
-20°+150°C, divis. 1°C, length 305 mm.	**T23**
-0,1°+51°C, divis. 0,1°C, length 470 mm.	**T24**
-1°+101°C, divis. 0,1°C, length 610 mm.	**T25**
-10°+250°C, divis. 1°C, length 410 mm.	**T26**

T19 - T20 - T22 - T23 - T24 - T25 - T26

Digital electronic thermometers

-50°+300°C, resolution: 0,1°C, probe integrated in the instrument's body.
Powered by 1 LR44 battery (not included).
Unit of measurement: °C and °F. **AF15**

-50°+150°C, resolution: 0,1°C, probe integrated in the instrument's body. **CHT**

-50°+150°C, resolution: 0,1°C, fitted with steel probe connected to the instrument's body thanks to a cable (1m length). **CHT-1**

AF15 - CHT - CHT-1

Thermometer 2038

Maximum and minimum thermometer (indoor and outdoor). Mounted on a small plastic base and fitted with small roofing for external use.

2038

Wall thermometer 2080

-30°+50°C, division 1°C.

2080

Ground thermometers, set of 3 7147

They allow measurement of soil temperature at 3 different depths; 50 cm, 100 cm and 150 cm.

7147

Infrared rays thermometer 2135

Measurament range: -50~550°C (-58~1022°F)
Accuracy: ±1.5% or ±1.5°C
Repeatability: ±1% or ±1°C
Distance spot ratio: 12:1
Emissivity: 0.95
Resolution: 0.1°C / 0.1°F
Response time: 500 mS
Wavelength: 8-14 µm

2135

Ammeter DC 5730

Safety sockets.
Range: 0 - 50 mA; 0 - 500 mA; 0 - 5 A.
Class 2.5.

5730

Voltmeter DC 5729

Safety sockets.
Range: 0 - 3 V; 0 - 30 V; 0 - 300 V.
Class 2.5.

5729

Ammeter AC 5732

Safety sockets.
Range: 0 - 500 mA; 0 - 1 A; 0 - 5 A.
Class 2.5.

5732

Voltmeter AC 5731

Safety sockets.
Range: 0 - 15 V; 0 - 150 V.
Class 2.5.

5731

Galvanometer 5733

Safety sockets.
Range: ± 35 µA. Class 2.5.

5733

Digital Voltmeter DC 5725

Range: 0-200 V
Accuracy: 0.5%
Batteries not included.

Digital Voltmeter AC 5727

Range: 0-1000 V
Accuracy: 1%
Batteries not included.

5725 - 5727

Digital ammeter DC 5726

Range: 0-2 A
Accuracy: 0.5%
Batteries not included.

Digital ammeter AC 5728

Range: 0-20 A
Accuracy: 1%
Batteries not included.

5726 - 5728

Digital wattmeter 5262

To measure the energy and / or power absorbed by a resistive charge in a DC or AC electrical circuit. Two measuring units available: mJ / mW for currents up to 10mA J / W for currents up to 10A Capacity: for DC circuits, voltage not exceeding 20V; for AC circuit, voltage not exceeding 14V. Equipped with digital display, reset button, J/W switch and measuring unit selector.

5262

Coulombmetro 5721

For charge detection and measurement. Useful for a wide range of experimental applications including charging by induction or Coulomb's law. Power supply: 9V Battery PP3 type
Dimensions: 130x60x90mm
Weight: 0.20kg
Range: 0 - 1999nC
Resolution: 1nC
Accuracy: ±10% of full scale

5721

Analogical portable multimeter 5116

Function	Measurement ranges				Allowance	Remarks
Voltage DC	(±)0 ~ 0.25, 2.5, 10, 50, 250, 10000 V				Within ±3% F.S.	Input impedance 30 KΩ/V
Voltage AC	0 ~ 10, 50, 250, 10000V				Within ±4% F.S.	Input impedance 10 KΩ/V
Current DC	(±)0 ~ 0.25, 2.5, 25, 250 mA 10 A (10 A±5%F.S.)				Within ±3% F.S.	Voltage drop 250 mV
Current AC	0 ~ 10 A (10A±5%F.S.)				Within ±4% F.S.	
Resistance	Range	Min.	Mid.	Max.	Within ±3% of scale length	
	x1	0.2 Ω	20 Ω	2 KΩ		
	x100	20 Ω	2 KΩ	200 KΩ		
	x1 K	200 Ω	20 KΩ	2 MΩ		
	x10 K	2 KΩ	200 KΩ	20 MΩ		
CONT test	about 3 K Ω conduction					
Decibel	- 10 ~ + 22 dB ~ + 62 dB					

5116

Digital portable multimeter 5196

Model with display LCD 3,5 digit

Input impedence	10 MΩ for VDC and 4,5 MΩ for VAC
Precision	Voltage DC ±0,8% + 5 digit Current DC ±1,5% + 5 digit Voltage AC ±1,5% + 5 digit Resistance ±0,8% + 5 digit
Range	Volt DC 200 mV - 2 V - 20 V - 200 V - 600 V maximum resolution 0,1 mV Ampère DC 200 µV - 2 mA - 20 mA - 200 mA - 10 A maximum resolution 0,1 µA Volt AC 200 V - 600 V maximum resolution 100 mV Ohm 200 Ω - 2 KΩ - 20 KΩ - 200 KΩ - 2 MΩ - 20 MΩ maximum resolution 0,1 Ω
Functions	Continuity test with buzzer signaling Diodo tester Memory Transistor tester (hFE)
Protections	Up to 200mA with fuse - 10A without fuse
Power supply	Battery 9 V type 6F22 (included)
Dimensions/Weight	145x80x35 mm / 200 g
Accessories included	Test leads Instructions

5196

Digital portable multimeter 5197

Model with display LCD 3,5 digit

Input impedence	10 MΩ for all voltage ranges
Precision	DC voltage ± 0.8% + 4 digits DC current ± 1.0% + 5 digits AC voltage ± 1.0% + 5 digits AC current ± 1.5% + 5 digits Resistance ± 1.2% + 3 digits Capacity ± 3.5% + 5 digits Temperature ± 2, 0% + 5 digits
Range	Volt DC 200mV – 2V – 20V – 200V – 1000V; res. max. 0.1 mV Ampère DC 200µA – 2mA – 20mA – 200mA – 10A; res. max. 0.1 µA Volt AC 200mV – 2V – 20V – 200V – 750V; res. max. 0.1 mA Ampère AC 200µA – 2mA – 20mA – 200mA – 10A; res. max. 0.1 µA Volt AC 200mV – 2V – 20V – 200V – 750V Ohm 200Ω – 2kΩ – 20kΩ – 200kΩ – 2MΩ- 20MΩ; res. max. 0.1Ω Ampère AC 200µA – 2mA – 20mA – 200mA – 10A Capacity 2nF – 20nF – 200nF – 2µF – 20µF – 200µF; res. max. 1pF Temperature from -40 °C to +1000 °C; res. max. 1°C
Functions	Continuity test with acoustic signal by buzzer Test LED 1.5V and 9V battery test Memory Auto power OFF
Protections	Measurements in Ampère with fuse
Power supply	9V battery type 6F22 (supplied)
Accessories included	Pair of tips – Protective shell Type K temperature probe (200°C) – Instruction manual

5197

Digital bench multimeter 5421

DC Voltage

Range	Resolution	Accuracy
600 mV	0.1 mV	± (0.6% + 2)
6 V	0.001 V	± (0.3% + 2)
60 V	0.01 V	
600 V	0.1 V	
1000 V	1 V	± (0.5% + 3)

DC Current

Range	Resolution	Accuracy
600µA	0.1µA	± (0.5% + 3)
6000µA	1µA	
60mA	0.01mA	
600mA	0.1mA	± (0.8% + 3)
10A	10mA	± (1.2% + 3)

Resistance

Range	Resolution	Accuracy
600 Ω	0.1 Ω	± (0.8% + 3) + circuito di test, valore di resistenza di cortocircuito
6 kΩ	0.001 kΩ	± (0.5% + 2)
60 kΩ	0.01 kΩ	
600 kΩ	0.1 kΩ	
6 MΩ	0.001 MΩ	± (0.8% + 2)
60 MΩ	0.001 MΩ	± (1.2% + 3)

- **Continuity test**
- **Resistance**

AC Voltage

Range	Resolution	Accuracy
600 mV	0.1 mV	40 Hz-50 kHz: ± (0.6% + 5); 50 kHz-100 kHz: ± (1% + 5)
6 V	0.001 V	40 Hz-1 kHz: ± (0.6% + 5); 1 kHz-10 kHz: ± (1.0% + 5); 10 kHz-100 kHz: ± (3% + 5)
60 V	0.01 V	40 Hz-1 kHz: ± (0.6% + 5); 1 kHz-10 kHz: ± (1.5% + 5); 10 kHz-20 kHz: ± (3% + 5); 20 kHz-100 kHz: ± (8% + 5)
600 V	0.1 V	40 Hz-1 kHz: ± (0.6% + 5); 1 kHz-10 kHz: ± (3.5% + 5)
1000 V	1 V	40 Hz-1 kHz: ± (1.2% + 3); 1 kHz-3 kHz: ± (3% + 3)

AC Current

Range	Resolution	Accuracy
600 µA	0.1 µA	40 Hz-10 kHz: ± (1.0% + 5); 10 kHz-15 kHz: ± (2%+ 5)
6000 µA	1 µA	
60 mA	0.01 mA	40 Hz-10 kHz: ± (1% + 5); 10 kHz-15 kHz: ± (3%+ 5)
600 mA	0.1 mA	
10 A	10 mA	40 Hz-5 kHz: ± (2.0% + 6)

5421

Digital Oscilloscope – 20 MHz, 2 Channels, 250 MS/s 5195

Developed specifically for the education and hobby sector, this series of digital oscilloscopes offers the best possible price/performance ratio without compromising on functionality or technical features.
It has Autoset and Autoscale functions, Math Functions, FFT, Cursor or XY Modes and even a Zoom Function. All standard functions are integrated.
Waveform data storage is internal with memory for 16 waveforms or external, on a USB memory, in TXT, CSV or BIN format. The data can be read with the included software.
Configurations can be saved internally, display screens can be saved externally.
With the Autoset function you can view waveforms quickly and intuitively. With the Autoscale function waveforms can be displayed even more precisely, as needed. Settings can also be performed Manually.

- Two-channel oscilloscope, 20 MHz bandwidth, 250 MS/s sampling rate
- 17.5 cm (7") TFT color display with 800 x 480 pixels
- USB "device" interface for real-time data transmission
- USB "host" interface for external USB memories
- Handy and slim, with carrying handle
- Autoset function for easy use
- Registration up to 10,000 points
- Automatic measurement mode, XY and FFT function
- Complies with safety standards: EN 61010-1; CAT II 400V
- Accessories: USB cable, CD software for Windows, power cable, 2 probes, operation manual

5195

Index

Teaching guide in digital format

Minimum invoiced order: € 130,00 + VAT

THE FOLLOWING INSTRUMENTS IN BOROSILICATE CAN BE USED AT A MAXIMUM TEMPERATURE OF 140 °C

GRADUATED BEAKERS

Glass low-form beakers

50 ml	V27
100 ml	V28
150 ml	V29
250 ml	V30
400 ml	V31
600 ml	V32
1000 ml	V34
2000 ml	V35

V27 - V28 - V29 - V30 - V31 - V32 - V34 - V35

Glass tall-form beakers

100 ml	V41
150 ml	V42
250 ml	V43
400 ml	V44
600 ml	V45
1000 ml	V47

V41 - V42 - V43 - V44 - V45 - V47

Trasparent plastic beakers

25 ml	K1541
50 ml	K1542
100 ml	K1543
250 ml	K1545
500 ml	K1546
1000 ml	K1548

K1541 - K1542 - K1543 - K1545 - K1546 - K1548

Opaque plastic beakers

25 ml	K1801
50 ml	K1802
100 ml	K1803
250 ml	K1805
500 ml	K1806
1000 ml	K1808

K1801 - K1802 - K1803 - K1805 - K1806 - K1808

CONICAL ERLENMEYERS FLASKS

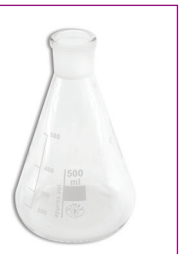
Glass Erlenmeyer flask - narrow neck

50 ml	V71
100 ml	V72
250 ml	V75
500 ml	V77
1000 ml	V79

V71 - V72 - V75 - V77 - V79

Glass Erlenmeyer flask - neck NS 29/32

250 ml	V95
500 ml	V97



V95 - V97

Filtering flask

100 ml	V100
250 ml	V101
500 ml	V102
1000 ml	V103

V100 - V101 - V102 - V103

ROUND FLASK

Round flask with flat base and narrow neck

50 ml	V217
100 ml	V218
250 ml	V219
500 ml	V220
1000 ml	V221

V217 - V218 - V219 - V220 - V221

Round Flask for distillation

250 ml	V911

V911

EVAPORATING DISHES

Made of glass - wiht spout

Ø 95x45h mm	V432
Ø 125x65h mm	V433
Ø 140x80h mm	V434

V432 - V433 - V434

FUNNEL

Separating funnel with neck NS 29/32

250 ml	V312
500 ml	V313
1000 ml	V314

V312 - V313 - V314

FUNNEL

Made of glass - short stem

Ø 55 mm	V276
Ø 80 mm	V278
Ø 100 mm	V279
Ø 120 mm	V280

V276 - V278 - V279 - V280

Made of plastic - short stem

Ø 45 mm	K146
Ø 65 mm	K148
Ø 80 mm	K150
Ø 100 mm	K152
Ø 120 mm	K153

K146 - K148 - K150 - K152 - K153

Plastic bottles with a narrow neck

100 ml	K319
250 ml	K323
500 ml	K324
1000 ml	K325

K319 - K323 - K324 - K325

BASINS

Made of antacid plastic material

200x150x50h mm	K280
320x260x70h mm	K282

K280 - K282

Plastic bottles - rectangular shape

50 ml	K609
100 ml	K610
250 ml	K611
500 ml	K612
1000 ml	K613

K609 - K610 - K611 - K612 - K613

Narrow-neck bottles

10 lt	K1646
10 lt with stopcock	K1662

K1646 - K1662

TEST TUBES

Glass (pack of 100 pcs)

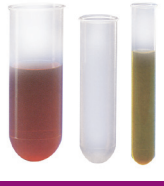
Made of borosilicate glass,
heat resistant up to 200°C.

Ø 10x100h mm	V607
Ø 12x100h mm	V610
Ø 16x150h mm	V613
Ø 18x180h mm	V614
Ø 21x180h mm	V615

V607 - V610 - V613 - V614 - V615

Plastic (pack of 100 pcs)

Ø 10x100h mm, 7 ml	K302
Ø 16x100h mm, 16 ml	K303
Ø 22x90h mm, 31 ml	K305



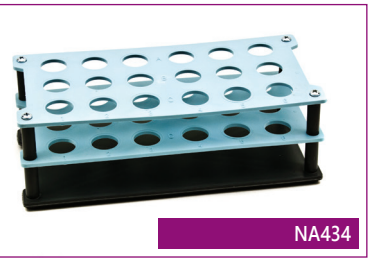
K302 - K303 - K305

TEST TUBES RACK

12 positions: 6 positions for test-tubes diameter up to 16 mm and 6 positions for drying	**SM1106**
50 positions for test-tubes (diameter up to 16 mm)	**NA432**
18 positions for test-tubes (diameter up to 20 mm)	**NA434**

SM1106

NA432



NA434

GRADUATED BURETTES AND CLAMPS FOR BURETTES

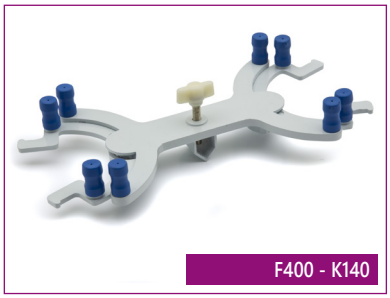
Mohr graduated glass burette

10 ml, div. 1/20	**V155**
25 ml, div. 1/10	**V156**
50 ml, div. 1/10	**V158**

V155 - V156 - V158

Burette pliers to be mounted on a rod

2 positions, metal	**F400**
2 positions, plastic	**K140**



F400 - K140

PIPETTES

Glass made - graduated up to tip

1 ml, div. 1/100	**V498**	5 ml, div. 1/20	**V502**	25 ml, div. 1/10	**V507**
2 ml, div. 1/50	**V500**	5 ml, div. 1/10	**V503**		
2 ml, div. 1/10	**V501**	10 ml, div. 1/10	**V504**		

V498 - V500 - V501 - V502 - V503 - V504 - V507

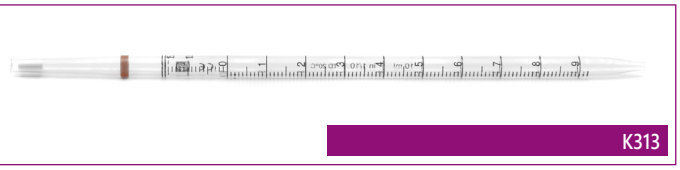
Glass made - graduated with syringe

1 ml, div. 1/100	**V900**	10 ml, div. 1/10	**V903**
5 ml, div. 1/10	**V902**	25 ml, div. 1/10	**V904**

V900 - V902 - V903 - V904

Plastic made, graduated

10 ml, div. 1/10	**K313**



K313

Glass made, graduated

10 ml, 1 step	**V539**	10 ml, 2 steps	**V566**
5 ml, 2 steps	**V565**		

V539 - V565 - V566

DISPENSERS FOR PIPETTES

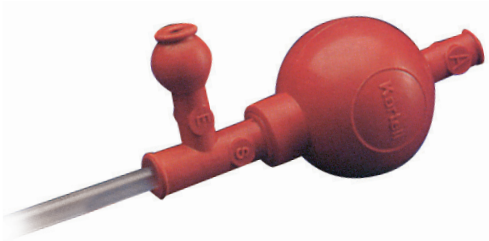
Through these dispensers, you can load the pipette until filling and then dose the specific quantity of solution desired.

from 0 to 10 ml	**AF02**
from 0 to 25 ml	**AF03**

AF02 - AF03

Vacuum pipette with 3 valves (Peleo's ball) K200

Made of rubber, suitable for every kind of pipette up to 100 ml.



K200

DISPOSABLE TIPS

50 disposable tips pack for micropipettes cod. SX821.2	**OR70**
50 disposable tips pack for pipettes cod. SX831	**OR71**
Pasteur pipettes without bulb, 250 pcs	**V800**
Latex bulbs for Pasteur pipettes, 10 pcs	**V800.1**

OR70 - OR71 - V800 - V800.1

DROPPER

Glass dropper with bulb **2024**

2024

Ranvier glass dropper 100 ml **V341**

V341

Ranvier plastic dropper 100 ml **K389**

K389

GRADUATED CYLINDERS

Glass made - tall form

10 ml	**V106**
25 ml	**V107**
50 ml	**V108**
100 ml	**V109**
250 ml	**V110**
500 ml	**V111**
1000 ml	**V112**

V106 - V107 - V108 - V109 - V110 - V111 - V112

Glass made - tall form with stopper

25 ml	**V115**
250 ml	**V118**
1000 ml	**V120**

V115 - V118 - V120

Plastic made - tall form

25 ml	**K1077**
50 ml	**K1078**
100 ml	**K1079**
250 ml	**K1080**
500 ml	**K1081**
1000 ml	**K1082**

K1077 - K1078 - K1079 - K1080 - K1081 - K1082

Graduated plastic goblets

100 ml	**K1422**
1000 ml	**K1425**

K1422 - K1425

Glass graduated flasks with stopper

10 ml	**V448**
50 ml	**V451**
100 ml	**V452**
250 ml	**V454**
500 ml	**V455**
1000 ml	**V456**

V448 - V451 - V452 - V454 - V455 - V456

Plastic wash bottles

100 ml	**K180**	500 ml	**K183**
250 ml	**K182**	1000 ml	**K185**

K180 - K182 - K183 - K185

Watch glasses with ground edge

Ø 60 mm	**V672**	Ø 100 mm	**V676**
Ø 80 mm	**V674**		

V672 - V674 - V676

PETRI DISHES

Glass

Ø 60 mm	**V617**	Ø 120 mm	**V620**
Ø 80 mm	**V618**	Ø 150 mm	**V621**
Ø 100 mm	**V619**		

V617 - V618 - V619 - V620 - V621

Plastic

Ø 60 mm (pack of 10 pcs)	**K357**
Ø 80 mm (pack of 10 pcs)	**K358**
Ø 100 mm (pack of 10 pcs)	**K359**

K357 - K358 - K359

GLASS RODS AND TUBES

Stirring glass rod Ø 6x200mm **V142**

Linear glass tubes

Ø 2(inn)x6x200 mm capillary	**V960**
Ø 5(inn)x7x200 mm	**V961**
Ø 5(inn)x7x300 mm	**V962**

V960 - V961 - V962

"U" shaped tubes

Ø 12x100 mm simple	**V964**

V964 - V967 - V968

"L" shaped tube

100x100 mm	**V969**

V969

JOINTS FOR RUBBER TUBES

"Y" shaped joints

Ø 6 mm	**K465**	Ø 8 mm	**K466**	Ø 12 mm	**K468**

K465 - K466 - K468

LABORATORY PORCELAIN

Medium form crucibles

Ø 30x29h mm	**V764**
Ø 48x52h mm	**V768**

V764 - V768

Capsule round bottom

Ø 60x25h mm	**V776**
Ø 70x28h mm	**V777**
Ø 100x39h mm	**V779**

V776 - V777 - V779

Mortars with pestle

Ø 60 mm	**V785**
Ø 100 mm	**V787**
Ø 160 mm	**V789**

V785 - V787 - V789

AUXILIARY ITEMS

Wall strainer K213

72 positions with rungs.

Mixed stopper pack 0091

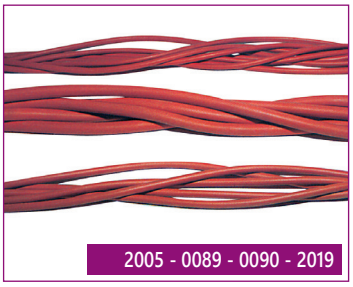
20 matched plugs: solid, 1 hole and 2 holes.

Nr.	Cod.	Dimens. mm	Hole
2	G6.1	Ø12xØ9x18h	-
2	G12.1	Ø23xØ16x26h	-
2	G15.1	Ø32xØ25x34h	-
1	G16.1	Ø37xØ28x38h	-
1	G17	Ø42xØ32x42h	-
2	G30.1	Ø16xØ12x20h	1
2	G31.1	Ø16xØ12x20h	1
1	G32.1	Ø20xØ14x24h	1
2	G33.1	Ø23xØ16x26h	1
2	G36.1	Ø32xØ25x34h	1
1	G37.1	Ø37xØ28x38h	1
1	G38	Ø42xØ32x42h	1
1	G51.1	Ø37xØ28x38h	2

RUBBER ITEMS

Rubber tubes

7x10x500 mm	2005
7x10x1000 mm	0089
7x17x1000 mm for vacuum	0090
7x10x500 mm transparent	2019



Rubber gloves G1

Pair of antacid gloves.

Latex gloves G2

100 pieces pack

Parafilm G3

Cling film to seal. 38 meters long roll, width 10cm.

NICKEL-PLATED STEEL RODS

Ø 6 mm with hook top. Length 13 cm. 0005

Modular threaded rod Ø10 x 350 mm 1463

HPL base with hole 1462

Support for sensors 4014

Conical small base 0038

Aluminium, with Ø 6 mm holes.
Base Ø 65 mm.

RECTANGULAR STEEL BASE WITH NICKEL-PLATED STEEL ROD

Base 140x165 mm, rod 10x500 mm	F711/F
Base 200x260 mm, rod 12x600 mm	F712/F

Base with rod 0039

Base diameter 130 mm;
rod height 250 mm;
rod diameter 10 mm.

0039

Support in acid-resistant porcelain steel F709

2 positions. Dimension: 180x360 mm, rod 15x1000 mm.

F709

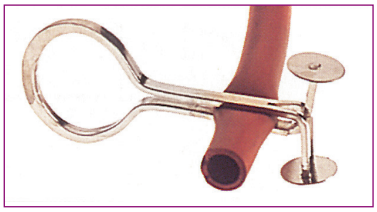
Ring supports with clamp

Ø 50 mm **F660**
Ø 85 mm **F661**

F660 - F661

Mohr clamp F418

Nickel brass, length 50 mm.



F418

Table clamp 1155

With conical hole for bars with diameter up to 12 mm.

1155

Lift table with adjustable height 0074

Metallic plate 20 x 20 cm

0074

CLAMPS FOR RODS

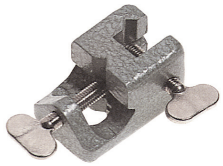
Double bosshead, for rods Ø up to 13mm **0159**

0159

Double and jointed bossheads, for bars with diameter up to 16 mm. **F297**

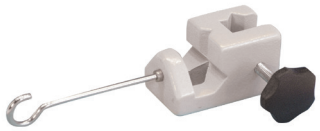
F297

Double sturdy bossheads, for bars with diameter up to 15 mm. **F292**



F292

Clamp with hook. **0097**

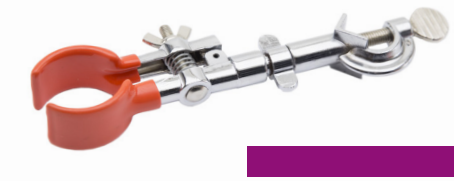


0097

CLAMP FOR FLASKS

With bosshead F435

Maximum opening 40 mm, length 120 mm.



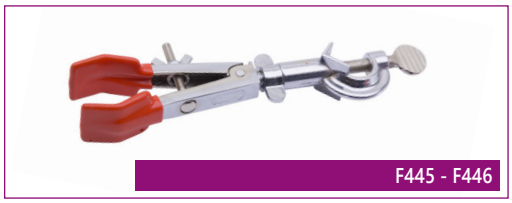
F435

UNIVERSAL CLAMPS

With bosshead

Opening 10-20 mm, length 120 mm. **F445**

Opening 20-30 mm, length 120 mm. **F446**

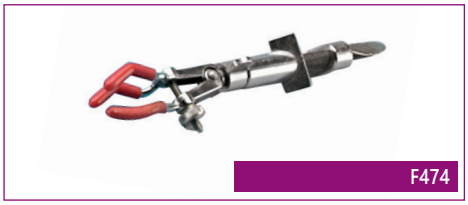


Free stem

Opening 30-50 mm, stem 12x200 mm. **F439**

3 branches with bosshead

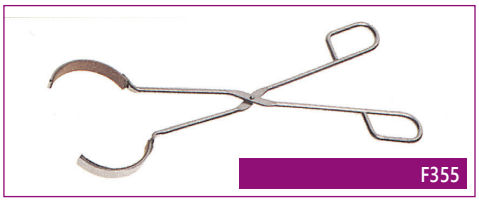
Opening 10-25 mm, length 85 mm. **F474**



CLAMP

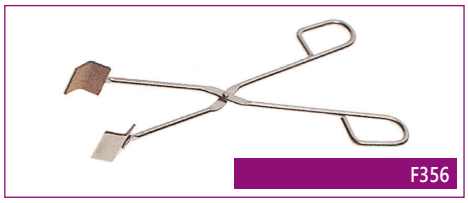
For beakers F355

Stainless steel, length 310 mm.



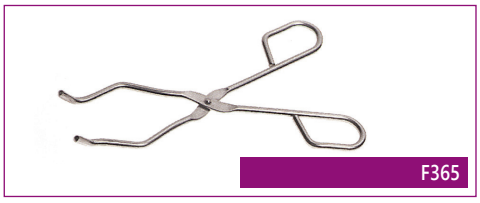
For flasks F356

Stainless steel, length 250 mm.



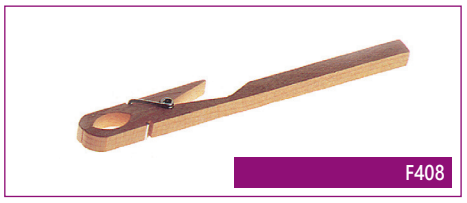
For crucible and capsules F365

Nickel iron, length 220 mm



Wood clamp for test-tubes F408

Wood, length 180 mm.



LABORATORY SPATULAS

Spatula with 2 wide and rigide paddles F800

Stainless steel, paddles width 20 mm, total length 150 mm.

Spoon/spatula F792

As F800 but with a spoon paddle, length 120 mm.

Double flexible spatulas

Stainless steel, dimension 6x120 mm **F760**

Stainless steel, dimension 6x210 mm **F759**

BRUSHES

Brush for test-tubes, 15 mm diameter. **F601**

Brush for burettes, 12 mm diameter. **F621**

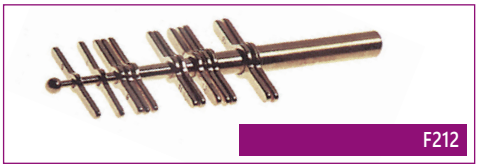
Brush for beakers, length 380 mm. **F622**

Brush for flasks and glass balls. **F624**

CUTTING AND HANDLING TOOLS

Hand stopper-piercer F212

From 6 to 11 mm.



Disposable scalpel F364

With plastic handle.

Laboratory scissors F942

Length 140 mm.

Stainless steel scalpel handle F370

Blade for scalpel, potbellied-shape F370-10

For code F370.

Laboratory clamps

Round points tweezers. 120 mm, stainless steel	F329
Straight points tweezers. 120 mm, stainless steel	F340
Laboratory clamp, length 200 mm	F333

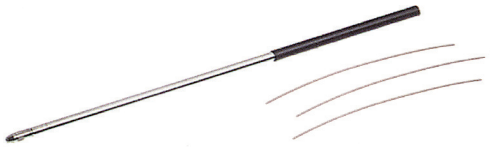

F329


F340


F333

Kolle handle and stainless steel handle holder

Kolle handle holder, with clamp for handles	F348
Stainless wire for handles, dim. 0,5x100 mm	F348-20
Stainless wire for handles, dim. 0,8x100 mm	F348-21


F348 - F348-20 - F384-21

FILTER PAPER

Quick filter paper, square sheets 50x50 cm CF1
100 sheets pack.

Quick filter paper, flat disks

Diameter 80 mm, 100 sheets pack	CF3
Diameter 100 mm, 100 sheets pack	CF4
Diameter 120 mm, 100 sheets pack	CF5
Diameter 150 mm, 100 sheets pack	CF6
Diameter 180 mm, 100 sheets pack	CF7


CF1 - CF3 - CF4 - CF5 - CF6 - CF7

Alcohol burner 2072

100 ml, made from stainless steel.


2072

SAFETY AND CLEANING IN THE LABORATORY

Paper holder

Fire-painted steel.	F2810
Cellulose wadding roll. 2 rolls pack.	F2800


F2810 - F2800

Protective glasses F2021

With side protections.


F2021

Ocular first aid

Bottle for eyes washing, 500 ml	K383
Eyes washing bottle holder	K2384

Instructions printed on the cover

K383 - K2384

Bunsen gas burner with tap F010

"BUNSEKUR"with safety valve which stops gas flow within 15 seconds if the flames accidentaly extinguish. For every kind of gas.


F010

Autonomous Bunsen burner Laborgaz F284

Portable, for laboratories without gas bungs. Provided without recharge, to be used with the tripod cod. F566.

190 g calor gas recharge for laborgaz. F285


F284 - F285

Gas tube (CEI, UNI-CIG)

Length 2 m, Ø 8x13 mm FC2

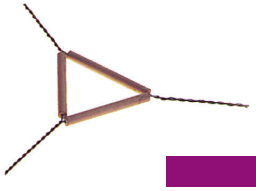
FC2

Cable tie diameter 11-19 mm FC3


FC3

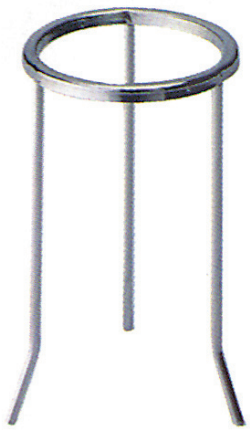
Pipeclay triangle 50 mm

50mm F580


F580

Tripod support for burner

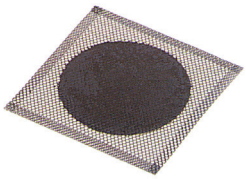
Diameter 100 mm, height 180 mm	F564
Diameter 120 mm, height 210 mm	F565
Diameter 150 mm, height 210 mm	F566



F564 - F565 - F566

Wire gauze with ceramic disk

120x120 mm	F541/K
160x160 mm	F542/K
200x200 mm	F544/K



F541/K - F542/K - F544/K

Heating plate 6149

Electric plate with adjustable thermostat and control light, highly heat resistant coating paint.
Plate: Ø 185mm / Power: 1500W
Max. temperature approx. 400 °C

6149

Cast-iron heating plates with electronic settings

Plate diameter 120 mm, max. temperature 500°C, power 700 W	6150
Plate diameter 160 mm, max. temperature 500°C, power 1000 W	6151

6150 - 6151

Glass-ceramic heating plate F1154

Acid-resistant plate, 175x175 mm, max. temperature 600°C, power 700 W.

F1154

Round flasks heater F856

Temperature +350
External dimensions 205×150 mm
Power supply V / HZ 230 / 50-60
Weight Kg 1.8
Safety class 0
Protection class IP 30
For 500 ml flasks
Plate accuracy ± 5
Power res. heating W 250
Balloons Ø 105 mm

F856

Small waterbath with thermostat F934

Suitable for operations that need heating of low quantities. It can be used also as a sand bath. Stainless basin. Capacity 6 litres, max. temperature 120°C.
Power 1000 W.

F934

Steel cover with concentric rings F934.1
Steel test tube holder F934.2

3plates and 36 openings, 21mm diameter

F934.1 - F934.2

Mini incubator F720.10

Transparent Plexiglass for easy chamber inspection door. Natural air circulation.
Microprocessor temperature control PID with PT100 probe.

Capacity	lt 5.4	**Number racks included**	n. 2
Item	F720.10	**Max racks number**	n. 4
Temperature	80 °C	**External dimension**	mm 380x240x300
Precision	± 0.5	**Power**	V/Hz 230-50/60
Risolution	0.1	**Weight**	Kg 10
Heating power	W 120	**Security class**	3.1
Internal dimension	mm 190x150x190	**Protection class**	IP 40

F720.10

Small laboratory oven F720.04

Aluminium inner chamber for better heat diffusion.
Bimetalic thermoregulator with fluid expansion probe.
Timer 0-120 minutes + infinity.

Capacity:	5,4 lt
Temperature +5 amb:	+150°C
Accuracy:	70°C ±3
Heating power:	360 W
Standard shelves:	2
Max number of shelves:	4
Internal dimensions:	190x150x190 mm
External dimensions:	380x240x300 mm
Weight:	10 kg

F720.04

Laboratory natural ventilation oven (52 liters) DAS42000

External structure in steel painted with acid-proof epoxy powder.
Stainless steel inner chamber.
Double door locking for a perfect seal (upper and lower part).
Ø45 mm hole on the rear side for smoke discharge with device for regulation of opening/closing of the passage of cables, probes, etc.
Ø10 mm hole on the upper side for thermometer or probe insertion
Temperature control with microprocessor.
Timer from 0 to 12 hours + infinity
Safety class 3.1

	DAS42000
Capacity	52 lt
Temperature + 5 amb.	+300°C
Accuracy	70°C ±1,5
	150°C ±2,5
	300°C ±3,0
Risoluzione	0,1 °C
Heating power	1200 W
Internal dimensions LxPxH	390x350x390 mm
Grid shelves as standard	2
Max number of shelves	6
Power supply	230/50-60 V/Hz
Weight	55 kg

DAS42000

Muffle furnace MZ-1

For heat treatments with temperature up to 1100°C, with electronic safety thermoregulator provided with digital display. Chamber size: 100x200x65 mm.
Mitt with protective garment, made in only one block, door opening thanks to a thermo isolated lever.
Insulation thanks to ceramic fibre. Fumes discharge on the back.

MZ-1

Glass spare part for code 5544 5543

5543

Glass distiller 5544

This glass distiller for teaching is particularly helpful because it allows a clear and complete view of the distillation process.
The heat source and the cooling circuit (code 5545) set are sold separately.

Equipment supplied

1 Glass distiller	1 Burner's tripod
1 Beaker 600ml	1 Wire gauze
2 Base with rod	1 Alcohol thermometer -20 +110°C
2 Clamp	1 Rubber tube 1 m

Optional accessories

5545 Cooling circuit set	F285 Calor gas recharge
F284 Bunsen burner	4991 Power supply

5544

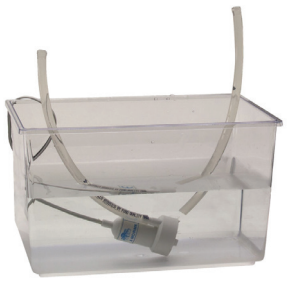
Electric glass distiller IC23000

It is provided with a vertical coolant with a double coil that assures high efficiency. Electric heating thanks to plug covered with quarz to avoid metals contamination. Provided with safety system for possible break or lack of water pressure. Distilled water production: 3-4 litres/hour. Electric power: 230V 50 Hz. Consume: 2600 W. Size: 600 x 175 x 460 mm.

IC23000

Cooling circuit set 5545

If the laboratory does not have a water tap with draining basin, the cooling circuit can be realized with the optional set including a electric pump, a water collection basin and a flexible tube for the circuit.
The power supply is sold separately.



5545

Small distiller 5542

It is fitted with a burner, supports and rubber tubes. Useful to perform experiments on distillation process. The cooling circuit (code 5545) set is sold separately.

Equipment supplied

1 Steel pliers with clamp	1 Rubber cover
1 Support with rod	1 250ml beaker
2 Rubber tubes	1 Filtration flask
1 Tripod support	1 Distilled water
1 Alcohol burner	1 Sodium sulfate
1 Cooling with latex junctions	1 Barium chloride
1 Wire gauze	1 Methylene blue

5542

Glassware kit and laboratory accessories 7029

Equipment supplied

1 Metallic rod	2 Plastic bottles
1 Metal clip with clamp	3 Rectangular plastic bottles 50ml
1 300mm glass tube with bung	1 Rectangular plastic bottles 250ml
1 Bent glass tube with bung	1 Graduated cylinder 100 ml
1 Curved glass tube with cap	1 Plastic spatula
1 Double clamp	1 Universal litmus paper pH 1-14
2 Base for rods	1 Test tubes holder for 12 tubes
1 Rubber stopper with hole	1 Thermometer -10 +110
2 Tripod support	1 Beaker, 100 ml
1 Pencil droppers	1 Beaker, 250 ml
1 Alchol burner	1 Beaker, 400 ml
1 Ring support	2 Graduated cylinders 50 ml
100 Nickel-chrome wire	1 Stirrer 6x200mm
1 Filter paper disks	1 Glass pipette 1 step, 5 ml
1 Wood clamp	1 Glass pipette 1 step, 10 ml
1 Mohr clamp	6 Test-tubes, glass 16x150 mm
1 Wire gauze	6 Test-tubes 20x180 mm
1 Refractory triangle	1 Conical flask 100ml
6 Spatula with spoon	1 Conical flask 250 ml
3 Rubber stoppers	1 Crucible medium form
2 Rubber stoppers with 1 holes	1 Round bottom capsule 60x25 mm
2 Rubber stoppers with 2 holes	2 Glass tube 2x6x200
1 Funnel	2 Glass tube 5x7x200
1 100ml wash battle	2 Glass tube5x7x300
1 Plastic pipette	1 Box

7029

VACUUM FILTRATION

Water vacuum pump K1395

It works thanks to water fall, with rubber junction.
It enables depressions up to 30 mm of mercury.
Plastic made.

K1395

Hand vacuum pump 1130

Provided with analogic vacuum gauge,light weight, portable and with a great capacity of suction. In few turns it is possible to get vacuum up to 135 mm of mercury. Equipped with an athmospheric pressure reinstatement valve, no need for unplugging. It can produce a positive pressure for liquid transfer.
Plastic made.

1130

Single stage rotary pump (oil included) 1415

The rotary vane vacuum pump is designed to create vacuum in a sealed container. single-stage; recycled lubrication, tank, fan, silencer. Voltage: 220V 50Hz, flow rate: 2.55 m^3/h, ultimate pressure: 0.05 mbar, power: 1/4 hp, oil tank capacity: 170 ml, dimensions: 243x114x207 mm weight: 6.5 kg.

1415

Double stage rotary pump AV-12

Nominal displacement: 3,6 m^3/h @50Hz
Ultimate pressure: 0,01 hPa(mbar)
Electric supply: 1ph ~ 220/240V 50/60Hz
Weight: 6,5 Kg
Oil filling: 0,3 Lt
Pumping speed: 3,1 m^3/h @50Hz
Motor power: 0,12 Kw
Noise: 57 dB(A)
Inlet dimension: 1/4"G

AV-12

Kit for vacuum pump faucet 1413

1413

Small metallic manual pump 1238

Aspiring and pressing provided with tube.

1238

Buchner porcelain funnel V290

External diameter 125 mm. To be used with filter paper flat disks (diameter 120 mm) cod. CF5, any flask for filtration and a rubber bung with hole.

V290

Rubber tube for vacuum pumps 0090

0090

Oil for pumps 0069

500ml

MAGNETIC STIRRER

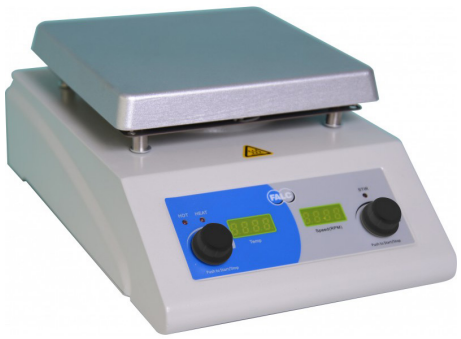
Mini-magnetic stirrer — HI180W

This mini-magnetic stirrer is compact and light, ideal for all types of laboratories. Coated in plastic resistant to aggressive chemicals, allows precise regulation of the stirring speed.
Maximum mixing volume: 1 liter
Minimum speed: 100 rpm
Maximum speed: 1000 rpm
Power supply: 230/240 V ac, 50/60 Hz
Coating: ABS plastic
The stirrer is supplied complete with PTFE-coated magnetic anchor and instructions.

HI180W

Electromagnetic stirrer with heating plate — 6134

Digital temperature regulation with separated control of temperature and speed.
Aluminium plateMetal stucture painted with anti-acid exoxy powder coating.
Heating power W: 750. Weight Kg: 4.
Dimension mm: 310x200x120. Security class: 1. Protection class IP: 41. 7
Stainless shelf mm: 160×160. Max stirring capacity lt: 20.
Variable speed Rpm: 150-1500. Hole for rod: Yes.
Thermometer connector: No. Plate Temperature C: +50 to +400.
Precision on the plate °C: ±3. Motor Power W: 12.
Stirring bar suggested ø mm: 6×30.



6134

Mini-magnetic stirrer with electrode holder stand — HI181W

Reliable, lightweight and economical magnetic mini-motor, made of ABS plastic material and equipped with electrode holder with adjustable arm.
The vibrations are reduced to a minimum and the rotating parts are perfectly balanced.
Maximum mixing volume: 1 liter
Minimum speed: 100 rpm
Maximum speed: 1000 rpm
Power supply: 230/240 Vac, 50/60 Hz
Coating: ABS plastic
The stirrer is supplied complete with PTFE-coated magnetic anchor and instructions.

HI181W

Magnetic anchors

Ø 6 x 20 mm	K756
Ø 6 x 30 mm	K758

K756 - K758

Power supply 1,5V ~ 15V DC, 2A 4991

Continuosly adjustable
Technical parameter
Input voltage:
100V ~ 253V AC 50Hz/60Hz ±2Hz
Protection:
inside fuse 2A, F
Voltage index accuracy:
LED ±1%+2digits
Environment:
0 ~ +40°C, relative humidity: <90%

4991

Power Supply AC and DC low voltage max 5 A with protection 5229

Voltage 2, 4, 6, 9, 12 or 14 V ac/dc at 4 A, or up to 5 A for periods of 1 hour; Voltage ranges are selected and locked by means of a removable key.
Electrical Supply: 220-240 V ac 50-60 Hz
Dimensions: 179x190x85 mm; Weight: 2.8 kg.

5229

5+5 A low voltage stabilized dual power supply 5361

This is a dual power supply unit, with independent adjustments of current and voltage as for power supply unit cod. 5360.
Two buttons allow to connect the two power supply units in series, resulting in a maximum voltage of 60 V, or in parallel, achieving a maximum current of 10 A.
Equipped with four digital instruments.
Voltage outputs continuously adjustable from 0 to 30V dc.
Current outputs continuously adjustable from 0 to 5A dc.
Dimensions: 255x300x155 mm; Weight: 9 Kg.

5361

Battery holder with 4 mm plug connection for LR20 batteries 5707

Battery holder in plastic material, equipped with 5 plugs with 4 mm connection.
Compatible with LR20 flashlight batteries (not included).

5707

Power supply DC and AC 5228

Voltage 2, 4, 6, 9, 12 o 14 V ac/dc at 4A, or up to 5 A for periods of 1 hour
Electrical Supply: 220-240 V ac 50-60 Hz.
Dimensions: 179x190x85 mm; Weight: 2.8 kg

5228

3 A stabilized low voltage power supply 5248

Suitable for the study of electrical phenomena in which you don't need high voltage.
This power supply unit is equpped with two independent outputs: 1st output: balanced voltage continuously adjustable from 0 to 20V dc. Its value is mentioned on a digital voltmeter.
Max. current 3 A.
2nd output: tension 6 V ac.
Max. current 5 A, suitable for optical projectors.
Size 240x130x160h mm.

5248

5 A stabilized low voltage power supply 5360

Equipped with regulator of supplied current and tension.
It is possible to perform tests in which the current must remain constant during a change of voltage.
Output voltage continuously adjustable from 0 to 0 V dc.
Current output continuously adjustable from 0 to 5 A dc.
Equipped with two digital devices.
Dimensions: 280x130x155h mm, weight: 5.5 kg.

5360

DC 5 KV power supply 5324

Its use does not constitute any danger to the operator since, even in case of short circuit, the maximum output current is limited to the value of 3 mA by the presence of a high output resistance. It comes with two high insulation safety cables.
Adjustable output voltage up to 5 KV dc continuously.
2-digit digital voltmeter built-in.
Fixed output 6.3 V ac / 2 A.

5324

Medium voltage DC power supply 5292

Suitable for powering electronic tubes.
Powering voltage: 230 V.
Output voltage: 0 - 300V dc adjustable 0 - 30 V dc adjustable 6.3 V ac fixed.

5292

Low frequency signal generator & amplifier 5718

It is a generator of precision signals, amplified in power. It is able to generate sine waves, square waves and triangular waves. The frequency of the main generator varies from 0.1 Hz to 100 kHz. The maximum output power is 4 W. Equipped with LED display showing the frequency. The output is taken from either 4 Ω or 600 Ω 4 mm white socket. This instrument is particularly suitable for teaching and for scientific research.

Technical data

4 Ω and 600 Ω output	Output width: 11 V peak to peak
Auxiliary input for the amplifier stage	Frequency range: 0.1 Hz - 100 kHz
Output attenuator 1x / 0.1x / 0.01x (on the 600 Ω output)	Electrical Supply: 220-240V AC 50-60 Hz
Wave shape: sine, square and triangular	Dimensions: 255x220x110mm overall
Output power: 4 W (into 4 Ω load)	weight: 3.2 Kg

5718

Digital timer 1427

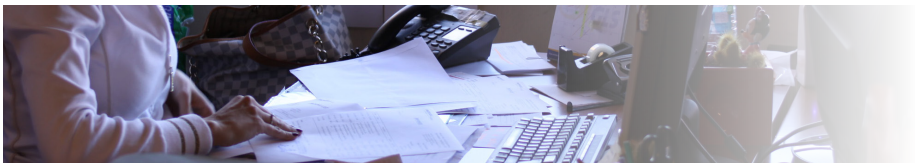
This timer is useful for the study of time and motion concepts.

Technical data

Ranges: 0 - 9.999s; 10 - 99.99s; 100 - 999.9s; 1000 - 9999s.	Weight: 1.6 kg
Power supply: 220-240 V ac 50-60 Hz	Accuracy: ±0.01%
Dimensions: 179x190x85 mm	

1427

CONDITIONS OF SALE



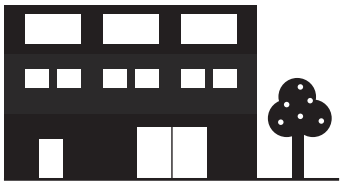
Minimum order

Minimum invoiced order : **€ 130,00 + VAT**

Website registration for online quotes

Quick and easy website registration - complete the online form in the reserved customer area to request your personalized quote.

Opening hours and mode of information request



Opening hours
Our offices are open from **8.30** to **13.00** and from **14.00** to **18.00** Monday to Thursday
from **8.30** to **14.30** every Friday.

We are in Via Rigla, 32 - 24010 Ponteranica (BG) Tel. **+39 035.571.392**

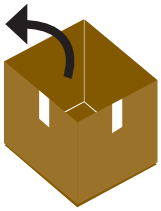
You can request your quote in the way you prefer:

Online: **www.optikascience.com** - in the reserved area.
Email: **info@optikascience.com**

In case of need for technical information, assistance or complaints, the customer must access the on-line Technical Assistance service directly at the following address:
http://support.optika-italy.com/

Warranty and information for the return of products

OPTIKA expressly disclaims any responsibility in the event that the products are not used in a manner consistent with their intended use. The Buyer and the end user are entirely responsible for the use and testing of the OPTIKA products and must ensure that the products are used in compliance with the laws and regulations in force, in particular those relating to safety and, more generally, all provisions regarding health, work, safety, the environment and prevention of fires and accidents. OPTIKA guarantees that the equipment produced is free from defects in workmanship.
All microscopes supplied are guaranteed for 120 months from the date of invoice. The warranty for the digital components of the microscopes, the electrical parts and the lighting is 24 months, except for the X-LEDs which are guaranteed for the entire life of the instruments. The warranty covers manufacturing defects of products or parts of products manufactured or supplied. All digital scales, excluding LG501 and KW2828, are warranted for 60 months on the instruments (and spare parts) and 24 months on labor from the date of invoice. All other products supplied are warranted for 24 months from the date of invoice. Normal wear parts and consumables are not covered by warranty. The warranty does not apply if the installation is not in accordance with the instructions, for improper use of the instrument or if the maintenance and/or testing has been carried out by unauthorized third parties. The warranty is void if non-original spare parts and consumables are used. Spare parts supplied under warranty are supplied ex-works by Ponteranica.



The buyer bears the cost of transport to OPTIKA, and the company bears the cost of transport of return in the event of repair or replacement of the instrument under warranty. In case of absence of defects, the buyer shall bear the costs of transport in both directions. Any packaging materials necessary to return the product to its original state "ready for shipment" will be borne by the Buyer. For on-site repairs carried out by OPTIKA engineers, travel time and expenses will be charged at cost. This warranty supersedes any other liability or warranty, oral, written, express or implied, for any reason. Replaced parts on repaired instruments are covered by a 6-month warranty from the date of repair. Replaced defective parts must be returned to OPTIKA within 60 days of replacement, otherwise they will be invoiced. according to the current price list.

www.optikascience.com

Browse the online catalog and discover the wide range of products and services OPTIKA.
The new site is thoroughly updated easily available thanks to enhanced search options and flexible services and offers online every week.
The 13 sections of the catalog allows quick reference, images and accurate item descriptions allow you to quickly orient themselves and to delve into the world of teaching to 360 degrees.
Register for free to get a quote online, get more information about our products and stay in touch with us.

OPTIKA® SCIENCE ITALY

OPTIKA Srl
Via Rigla, 30 - 24010 Ponteranica (BG) Tel. +39 035.571.392
www.optikascience.com - www.optikamicroscopes.com
info@optikascience.com