ORION

science

PHYSICS CATALOGUE

Table of Contents

- Electricity
  - Basic Electricity .....
  - Coulomb's Law.....
  - Current Balance.....
  - Equipotential Lines.....
  - Electric Field and Dielectric Constant in Plate Capacitors....
  - Helmholtz Coils .....
  - Induction with Pendulum.....
  - Photoelectric Effect.....
  - Lorentz Force.....
  - Magnetic Induction.....
  - Biot Savart's Law.....
- Mechanics
  - Air Table.....
  - Air Track.....
  - Angular Velocity and Acceleration.....
  - Gyroscope.....
  - Projectile Motion and Ballistic Pendulum.....
  - Torsion.....
  - Maxwell Disc.....
  - Springs.....
  - Free Fall and Atwood's Machine .....
  - Universal Force Table .....
  - Elasticity.....
  - Air Table Computer Based.....
  - Simple Pendulum.....
  - Multiple Mechanical Experiment Set .....
  - Multiple Mechanical Experiment Set .....
- Optics
  - Advanced Optics with Brewster .....
  - Optic Sets With Multiple Laser.....
- Waves
  - Resonance Tube.....
  - Sound Frequencies.....
- Thermodynamics
  - Ideal Gas Laws.....
  - Heat of Combustion .....
  - Heat Capacity Ratio For Gasses.....
  - Thermal Linear Expansion of Metals.....
  - Determining The Specific Heat of Solids and Liquids.....
- Modern Physics
  - Hall Effect.....
  - Milican Oil Drop.....
  - Blackbody Radiation .....

BASIC ELECTRICITY

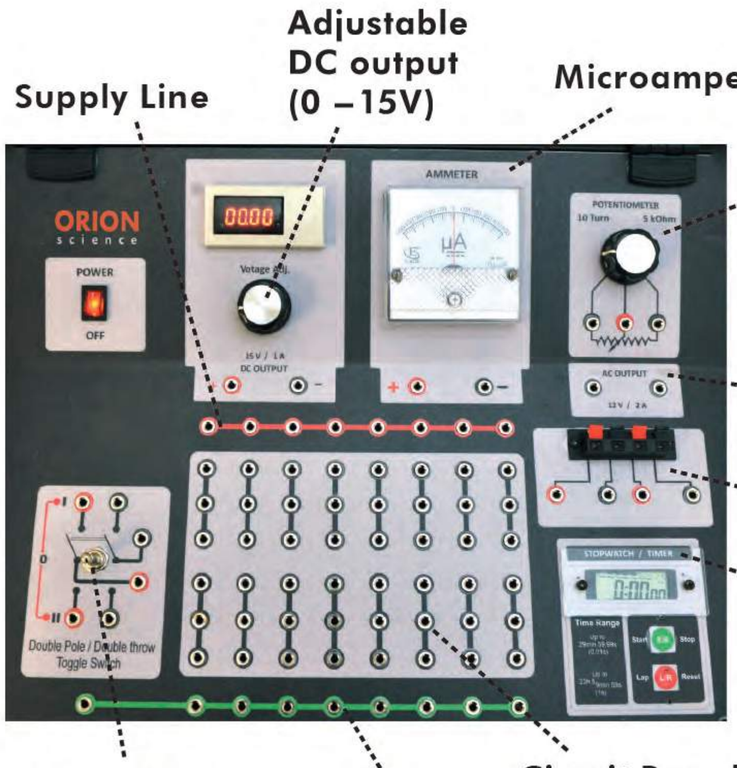
REED-9010-b

Description

This experiment set allows you to investigate Basic Electricity laws by using the board with mulitple sockets and various types of electrical components. The experiment kit is also designed to store the cables and components. With the Basic Electricity Experiment set you can perform the following experiments:

- Ohm's Law
- Serial and parallel circuits with resistors and light bulbs
- Kirchoff's Rule
- Charging and discharging a capacitor
- RLC circuits
- Using the Microampermeter as voltmeter or ampermeter

Parallel Connected Bulbs



EE-0166-00
19 pieces of Circuit Components Different Types of
*** Resistors**
*** Capacitors**
*** Inductors**
*** Diodes**
*** Light Bulb Set**

EE-0165-00
Basic Electricity Experiment Kit
with storage box

EE-0167-00
Shunt Resistance

used with microampermeter for ampermeter design

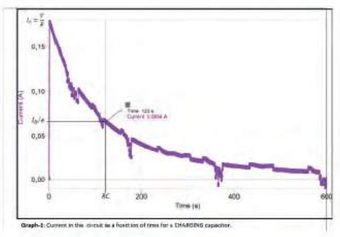
REED-9010-V BASIC ELECTRICITY VERNIER VERSION
REED-9010-GDX BASIC ELECTRICITY VERNIER GO DIRECT VERSION(WIRELESS DATA SHARE)

REED-9010-V
Required and not included vernier sensor

Vernier Voltage Probe
VP-BTA
Vernier Current Prob
DCP- BTA
LabQuest® 3
LABQ3

REED-9010-GDX
Required and not included vernier sensor

Vernier Go Direct® Voltage Probe
GDX-VOLT
Vernier Go Direct® Current Probe
GDX- CUR



Order Information

Item Code	Item Name
EE-0165-00	Basic Electricity Experiment Kit
EE-0033-00	Multimeter (Optional)
EE-0166-00	Circuits Components
EE-0167-00	Shunt Resistance
EE-0120-00	Connection Cable Set
MA-0052-00	Teacher and Student Guideline

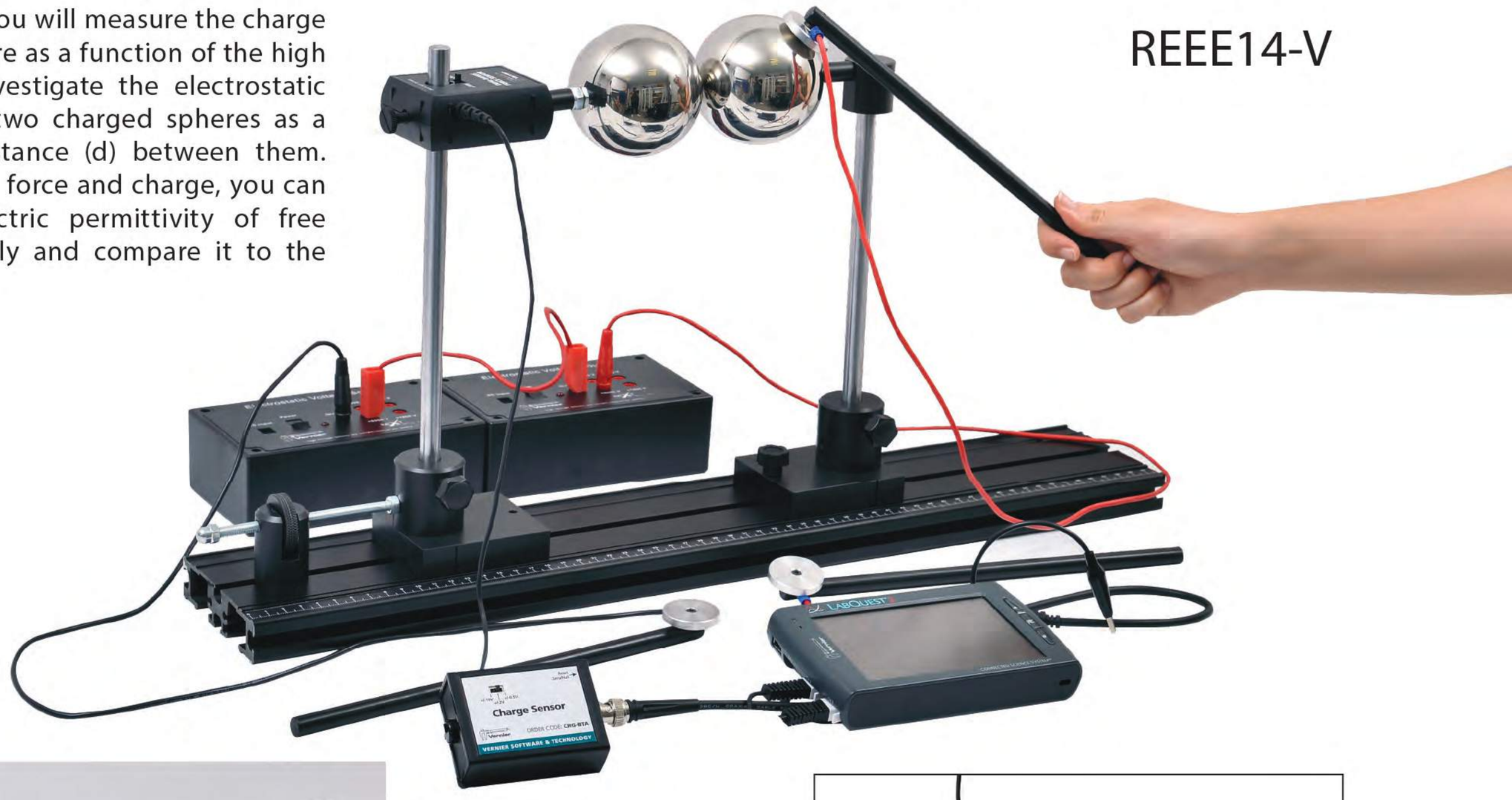
ORION science

COULOMB'S LAW

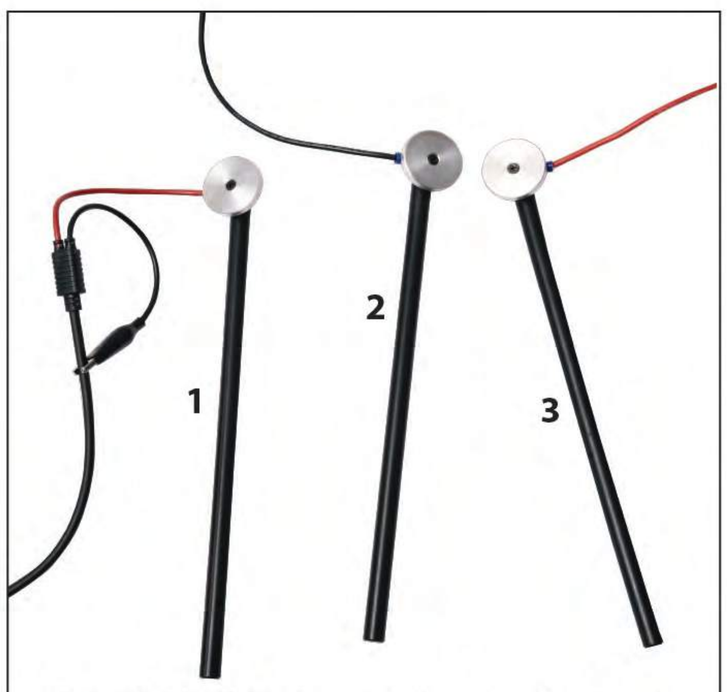
REEE14-V

Description

In this experiment you will measure the charge (Q) on a metal sphere as a function of the high voltage (V) and investigate the electrostatic force (F) between two charged spheres as a function of the distance (d) between them. Using the measured force and charge, you can determine the electric permittivity of free space experimentally and compare it to the expected value.



ST-0208-00 Charge Spheres
- Diameter: 76 cm
- Material Type: Stainless Steel



1) **EE-0154-00 Charge Measuring Probe**
2) **EE-0022-00 Discharging Probe**
3) **EE-0021-00 Charging Probe**

ST-0111-00 Sphere Holder Apparatus
The Vernier Force Sensor attached to sphere measures the Coulomb Force.

ME-0039-00 Distance Adjusting Mechanism
Distance between the two spheres can be adjusted to submillimeter accuracy.

Distance between the two spheres is measured by stripped ruler on bench and manually entered into LabQuest® 3

Order Information

Item Code	Item Name
ST-0208-00	Charge Spheres (2 Pcs)
ST-0175-06	Bench (60 cm)
ST-0206-00	Sphere Holders with Bench Slider (2 Pcs)
ST-0111-00	Sphere Holder Apparatus
EE-0021-00	Charging Probe
EE-0022-00	Discharging Probe
EE-0154-00	Charge Measuring Probe
ME-0039-00	Distance Adjusting Mechanism
EE-0120-02	Connection Cable (20 cm)
MA-0053-00	Teacher and Student Guideline
CRG-BTA	Vernier Charge Sensor (required, not inculded)
DFS-BTA	Vernier Dual-Range Force Sensor (assembled to set)
LABQ3	LabQuest® 3 (required, not inculded)
	Vernier Electrostatic Voltage Source (required, not inculded)

Required Units

Charge Sensor
CRG-BTA

Dual-Range Force Sensor
DFS-BTA

Electrostatic Voltage Source

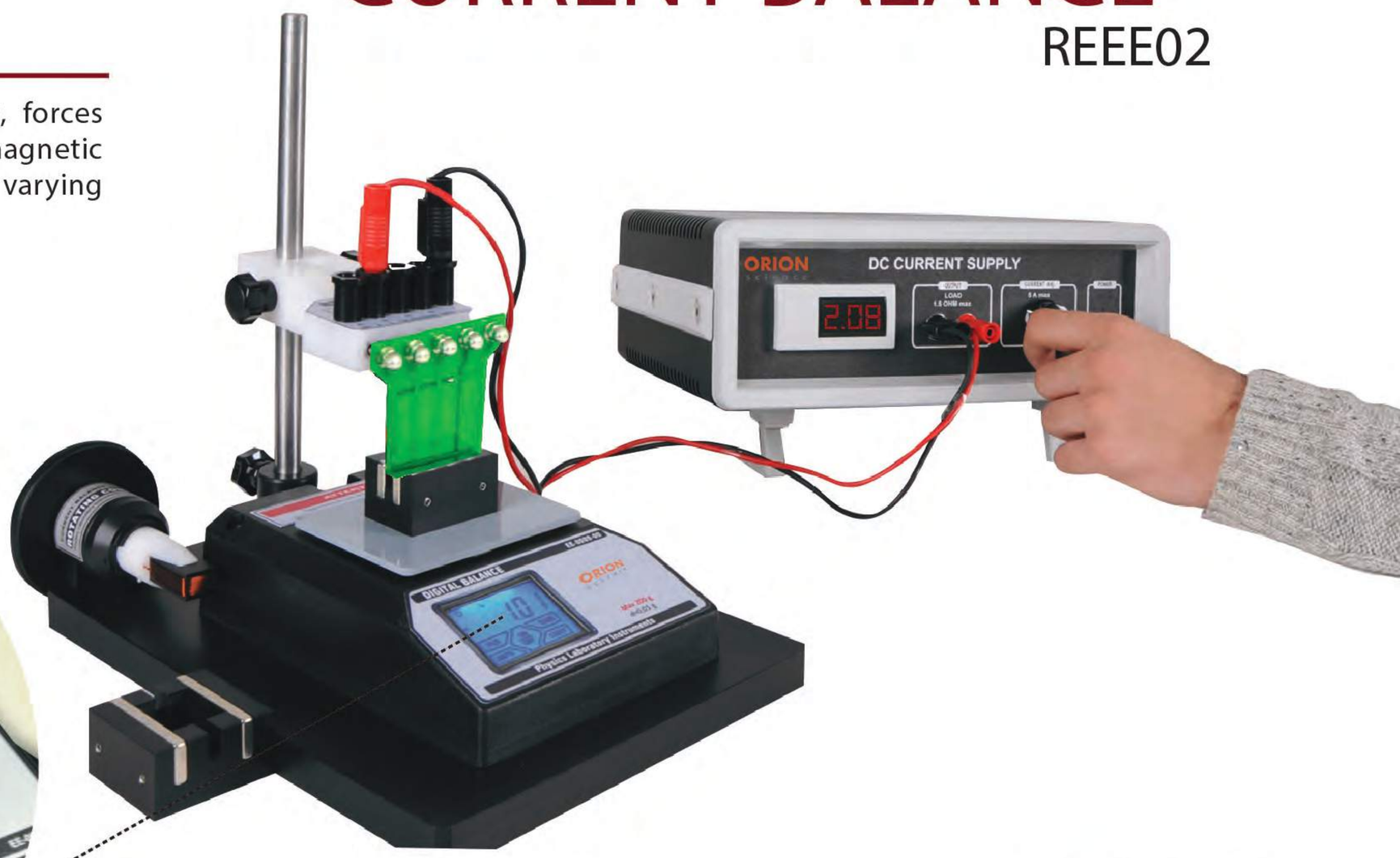
LabQuest® 3
LABQ3

CURRENT BALANCE

REEE02

Description

With the current balance experiment, forces acting on a current carrying wire in a magnetic field are measured accurately over varying currents, wire length and coil angles.



Conductive wire is placed between the magnetic poles of a magnet. Magnetic force acting on the magnets can be changed by current intensity, wire length and current direction. The magnetic force changes the weight of the magnets. The change is observed with digital balance

Included Accesories

EE-0013-00 Wire Board
Variable Length: 1-5 cm

EE-0014-00 Rotating Coil
Graduated between 0-180°
Accuracy: 5°
10 turns

EE-0011-00 Magnet Set
2 Magnets
Gap : 5 mm , 22 mm
Magnetic Field: 0.4 T , 0.14 T

DC Current Source

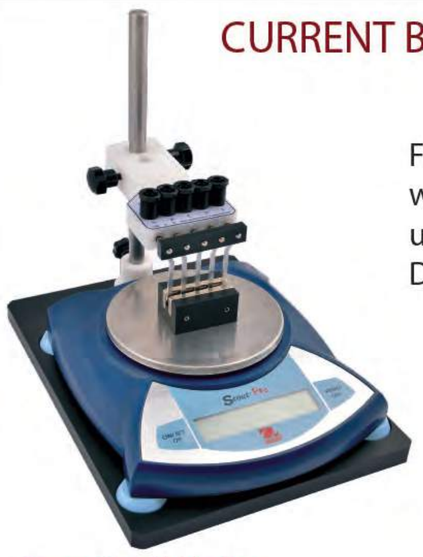
EE-0006-00

Order Information

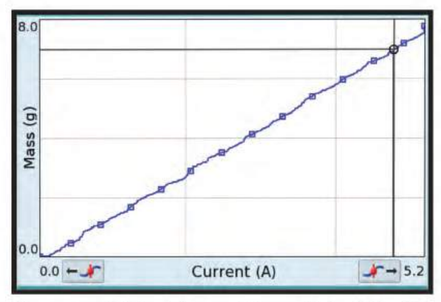
Item Code	Item Name
EE-0006-00	DC Current Source
EE-0009-00	Digital Scale Base
ST-0017-00	Conductor Holder
EE-0011-00	Magnet Set (Large and Small Spaced)
EE-0013-00	Wire Board (Variable Length)
EE-0014-00	Rotating Coil
ST-0018-00	Screws
ST-0016-00	Support Rod
EE-0120-05	Connection Cables (50 cm, 2 Pcs.)
MA-0054-00	Teacher and Student Guideline

CURRENT BALANCE-VERNIER VERSION

REEE02-V



Forces acting on a current carrying wire in a magnetic field are measured using the Vernier Current Probe, Ohaus Digital Balance and LabQuest 3.



Current Vs Mass Graphic Plotted by LabQuest® 3

Required Units

LabQuest® 3
LABQ3

High Current Probe
HCS-BTA

Ohaus Digital Balance
OHSP-202

EE-0009-01 Base is used in this version instead of EE-0009-00 Base with digital scale

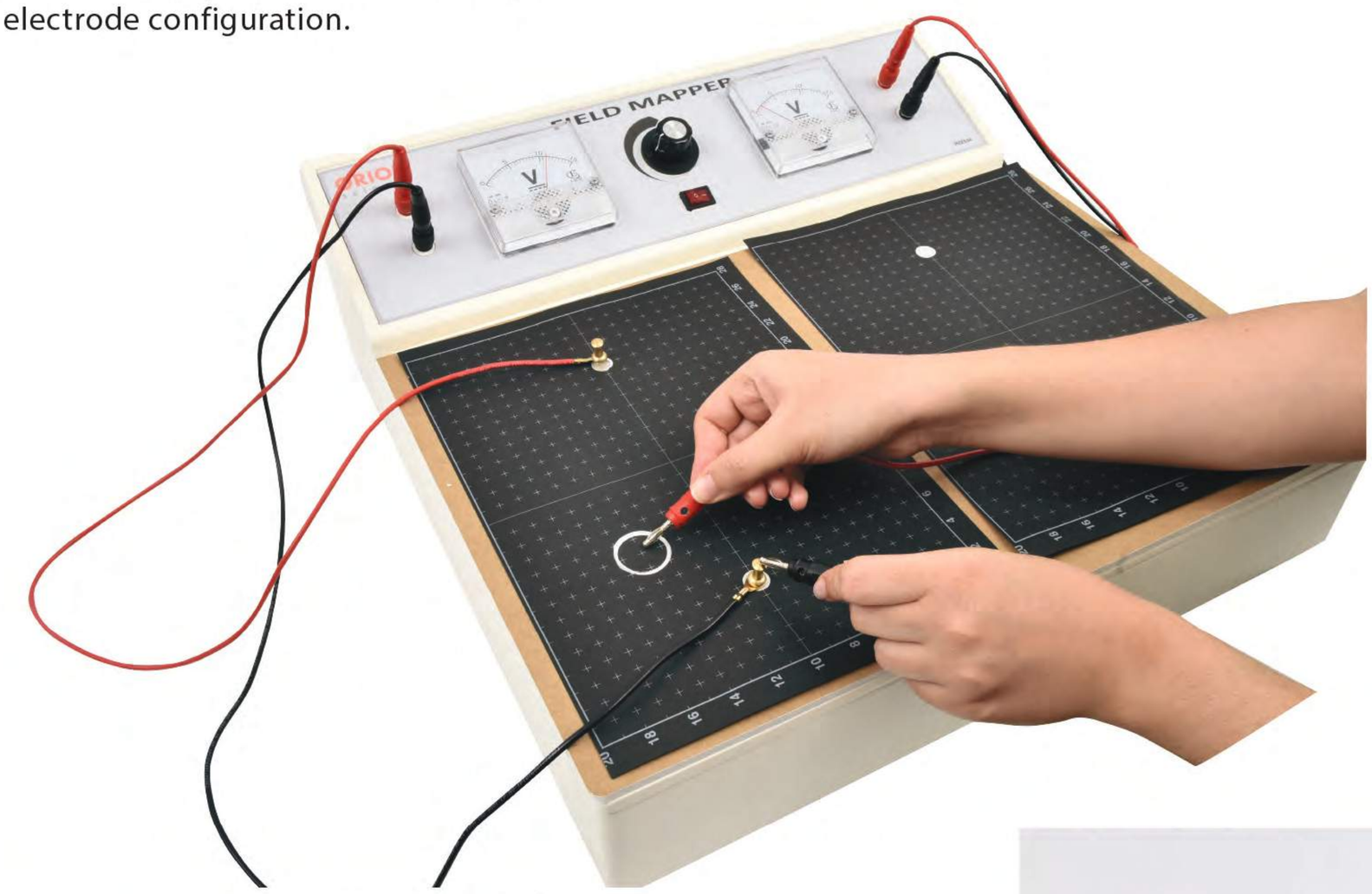
ORION science

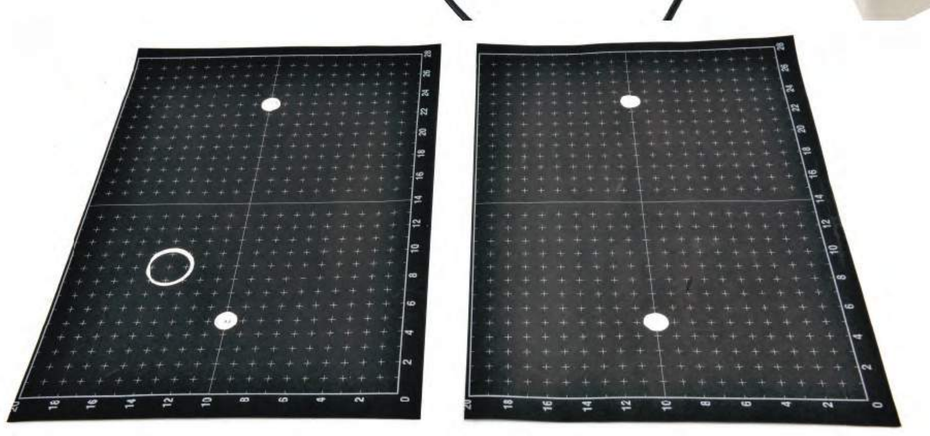
EQUIPOTENTIAL LINES

REEE04

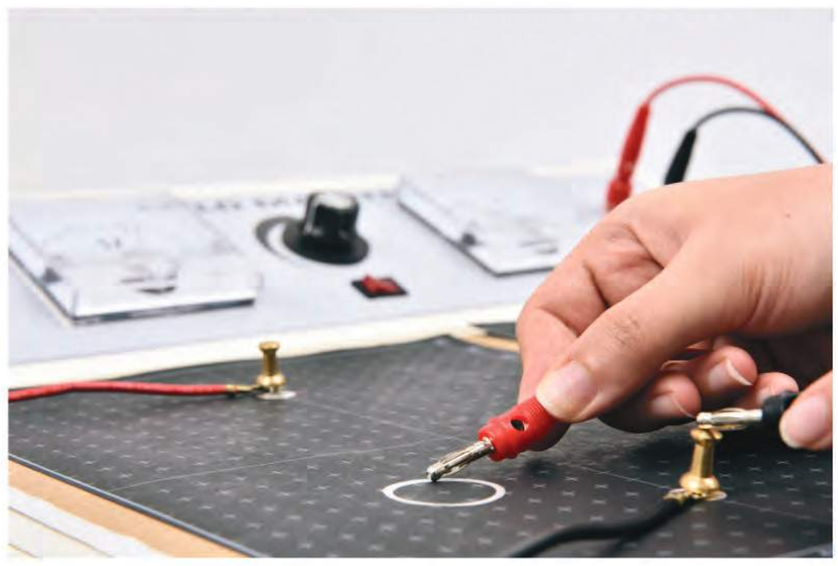
Description

Explore equipotential surfaces and lines in the space between two equal and opposite point charge analogs (electrodes) and from these equipotential lines map the electric field lines for each electrode configuration.





Conducting Papers (silver painted)



A conductive ring creates a region with equal potential on and inside the ring.

Continuously Adjustable Output Voltage

Voltmeter 1 shows the applied output voltage between electrodes.
Voltmeter 2 shows voltage of any conductive point with respect to the ground electrode.

EE-0038-00 Equipotential Lines Kit
Power supply and voltmeters in single case.
Can also be used to store components together.

Order Information

Item Code	Item Name
EE-0038-00	Equipotential Lines Kit
EE-0039-00	Conducting Paper (with Conductive Circle)
EE-0039-01	Conducting Papers (without Conductive Circle, 2 Pcs)
ST-0072-00	Cunducting Pins (4 Pcs)
ST-0073-00	Millimetric Paper Notebook
ST-0029-00	Copy Paper (10 Pcs)
ST-0081-00	Ruler
EE-0120-05	Connection Cables (50 cm,4 Pcs)
EE-0133-00	Power Loading Cable (with Cable Lug, 2 Pcs)
MA-0055-00	Teacher and Student Guideline

ELECTRIC FIELD AND DIELECTRIC CONSTANT IN PLATE CAPACITORS

REEE17-V

Description

Allows investigation of parallel plate capacitance, exploring the inverse proportionality against spacing, and the effect of different dielectric materials.

EE-0146-01 Plate (with Conductive Rod)

EE-0146-02 Plate (with Isolated Rod)

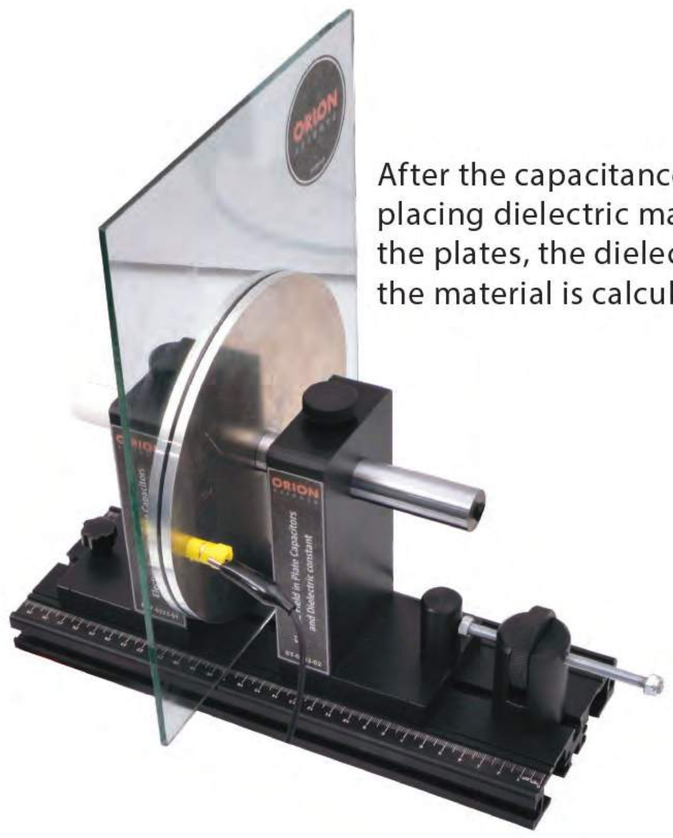
Voltage is applied to the isolated plate and charge is measured on it. Capacitance of metal plate is calculated.

Dielectric Materials

ST-0222-01 Plastic Plate

ST-0222-02 Paperboard Plate

ST-0222-03 Glass Plate



After the capacitance is calculated; by placing dielectric materials between the plates, the dielectric constant of the material is calculated.

Order Information

Item Code	Item Name
EE-0146-01	Metal Plate (with Conductive Rod)
EE-0146-02	Metal Plate (with Isolated Rod)
ST-0175-03	Bench (30 cm)
EE-0147-00	Power Supply (450 V DC)
EE-0154-00	Charge Measuring Probe
EE-0021-00	Charging Probe
ST-0222-01	Plastic Plate
ST-0222-02	Paperboard Plate
ST-0222-03	Glass Plate
ST-0233-01	Plate Holder
ST-0233-02	Plate Holder (with Micrometer Support)
ME-0039-00	Distance Adjusting Mechanism
EE-0120-05	Connection Cable (50 cm)
MA-0056-00	Teacher and Student Guideline
CRG-BTA	Vernier Charge Sensor (required, not included)
LABQ3	LabQuest® 3 (required, not included

Required Units

Charge Sensor
CRG-BTA

LabQuest® 3
LABQ3

ORION science

HELMHOLTZ COILS

REEE09-V

Description

Observe the magnetic field distribution in the immediate volume around the axis of Helmholtz coils, using Vernier Magnetic Field Sensor and LabQuest 3

The position of a Vernier Magnetic Field Sensor can be adjusted in 3 dimensions

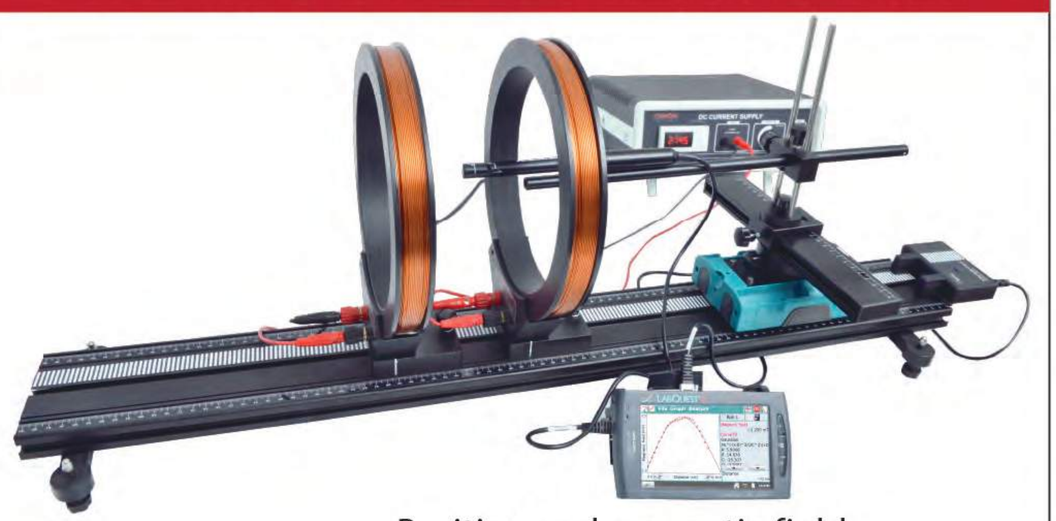
Probe Alignment Screen

After positional data is entered on the LabQuest Datalogger manually, the LabQuest® 2 plots the magnetic field against position.

Helmholtz Coils

- 2 Coils
- Material Type: Copper
- 190 turns

HELMHOLTZ COILS WITH VERNIER ENCODER SYSTEM



Position and magnetic field graph plotted automatically by LabQuest ®3

Additional Units

Motion Encoder Cart with Probe Stand

Vernier Motion Encoder Receiver
MEC-BTD

Motion Encoder Long Track Strip
METS-LONG

* There is an option in this model with Go Direct® Encoder and Go Direct® Sensor.

OPTIONAL

Teslameter

REEE09-GDX HELMHOLTZ COILS VERNIER GO DIRECT VERSION (WIRELESS DATA SHARE)

Required and not included vernier sensörs

Vernier Go Direct®
Magnetic Field Sensor
GDX-2MG

Order Information

Item Code	Item Name
EE-0006-00	DC Current Source
EE-0057-00	Helmholtz Coils
ST-0175-08	Bench (80 cm)
ST-0178-00	Probe Stand
ST-0177-00	Probe Holder
ST-0176-00	Probe Alignment Screen.
EE-0120-05	Connection Cables (50 cm, 3 Pcs.)
MA-0057-00	Teacher and Student Guideline
MG-BTA	Vernier Magnetic Field Sensor (required, not included)
LABQ3	LabQuest® 3 (required,not included)

INDUCTION WITH PENDULUM

REEE19-V

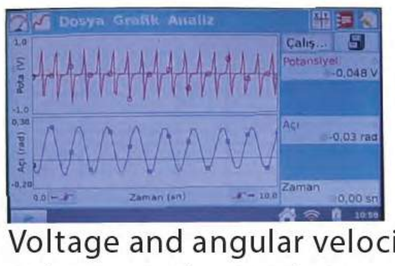
ME-0027-00
Induction Coil With Pendulum Rod
- 1600 Turns
- 80 g

Description

The relative motion of coil to the magnet creates an induced current on induction coil. The amount of the current produced is function of the magnetic field and the oscillation of the pendulum.

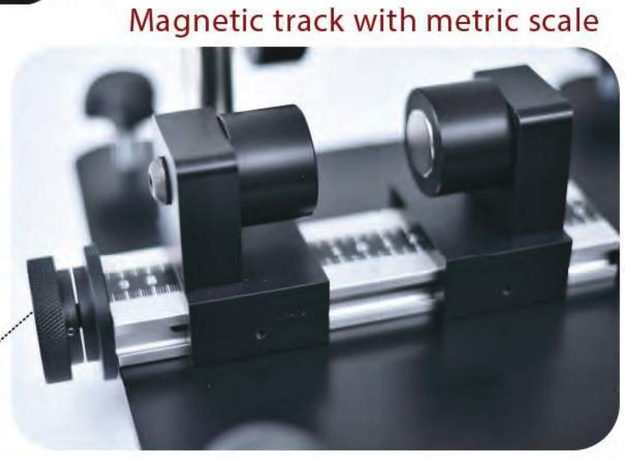
INDUCTION WITH PENDULUM VERNIER GO DIRECT VERSION

Go Direct Rotary Motion Sensor
GDX-RMS
Computer Based



Voltage and angular velocity values are observed on LabQuest® 3 screen.

Magnetic track with metric scale



Manual gap adjustment of magnets

Order Information

Item Code	Item Name
ME-0026-00	Experiment Main Unit (with Support Rod, Angle Scale Vernier Rotary Motion Sensor and Voltage Probe)
ST-0180-00	Track
ST-0180-01	Magnet Set (2 Pcs)
ME-0027-00	Pendulum Rod with Induction Coil
RMV-BTD	Vernier Rotary Motion Sensor (assembled to set)
VP-BTA	Vernier Voltage Probe (assembled to set)
LABQ3	LabQuest® 3 (required, not included)

PHOTOELECTRIC EFFECT

REMA01

Description

A classic experiment that explores Hertz's and Einstein's Photoelectric Effect by experimentally determining the value of Planck's Constant and finding the work function of a given metal (cathode) surface.

EE-0128-00 Light Source Box
6 different LED light sources of wavelengths λ = 385 nm, 470 nm (I), 470 nm (II), 502 nm, 575 nm and 605 nm, together with a vacuum Phototube

EE-0127-00
Photoelectric Effect Apparatus
Variable voltage output : -15 V— +15 V

Order Information

Item Code	Item Name
EE-0127-00	Photoelectric Effect Apparatus
EE-0128-00	Light Source Box (with Photo Tube)
EE-0120-05	Connection Cables (50 cm, 4 Pcs)
EE-0033-00	Multimeter (2 Pcs) (required, not included)
MA-0058-00	Teacher and Student Guideline

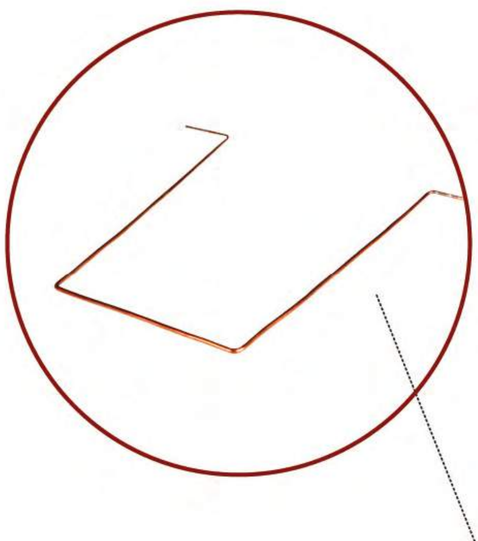
ORION science

LORENTZ FORCE

REEE10

Description

Study the magnetic force on a current carrying wire and bar immersed in a magnetic field.

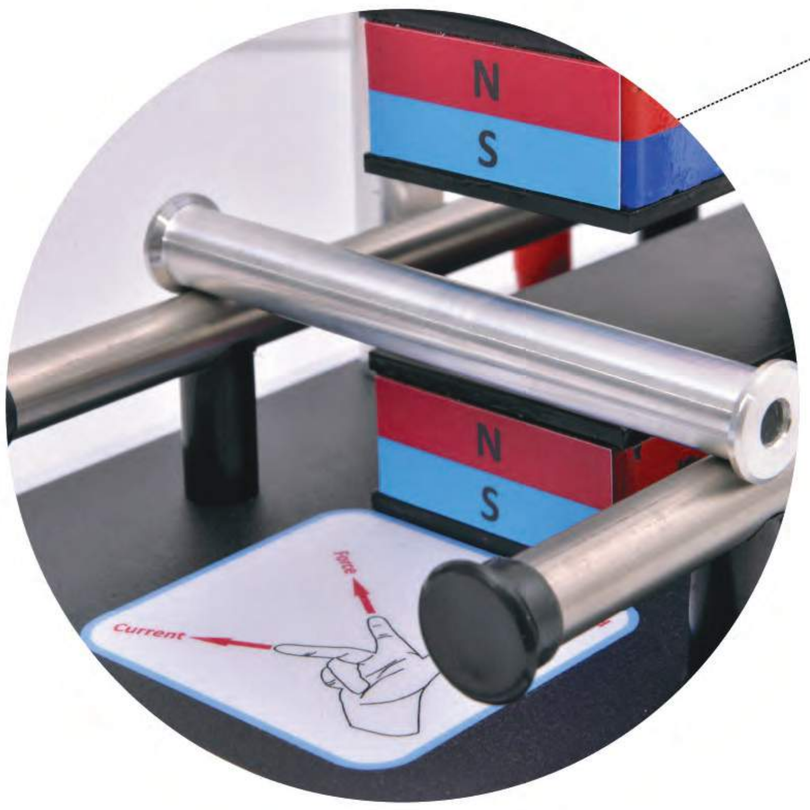


EE-0121-00 Conductive Wire

- Material Type: Copper
- Length: 7 cm
- Height: 13 cm

Current is sent through a wire immersed in a uniform magnetic field, generating a magnetic force on the wire. Over a wide range of different currents the angle of the wire is measured.

The experiment can be performed instead with a conductive, movable cylindrical bar. When current is applied to the bar it induces a motion and hence electromotive force.

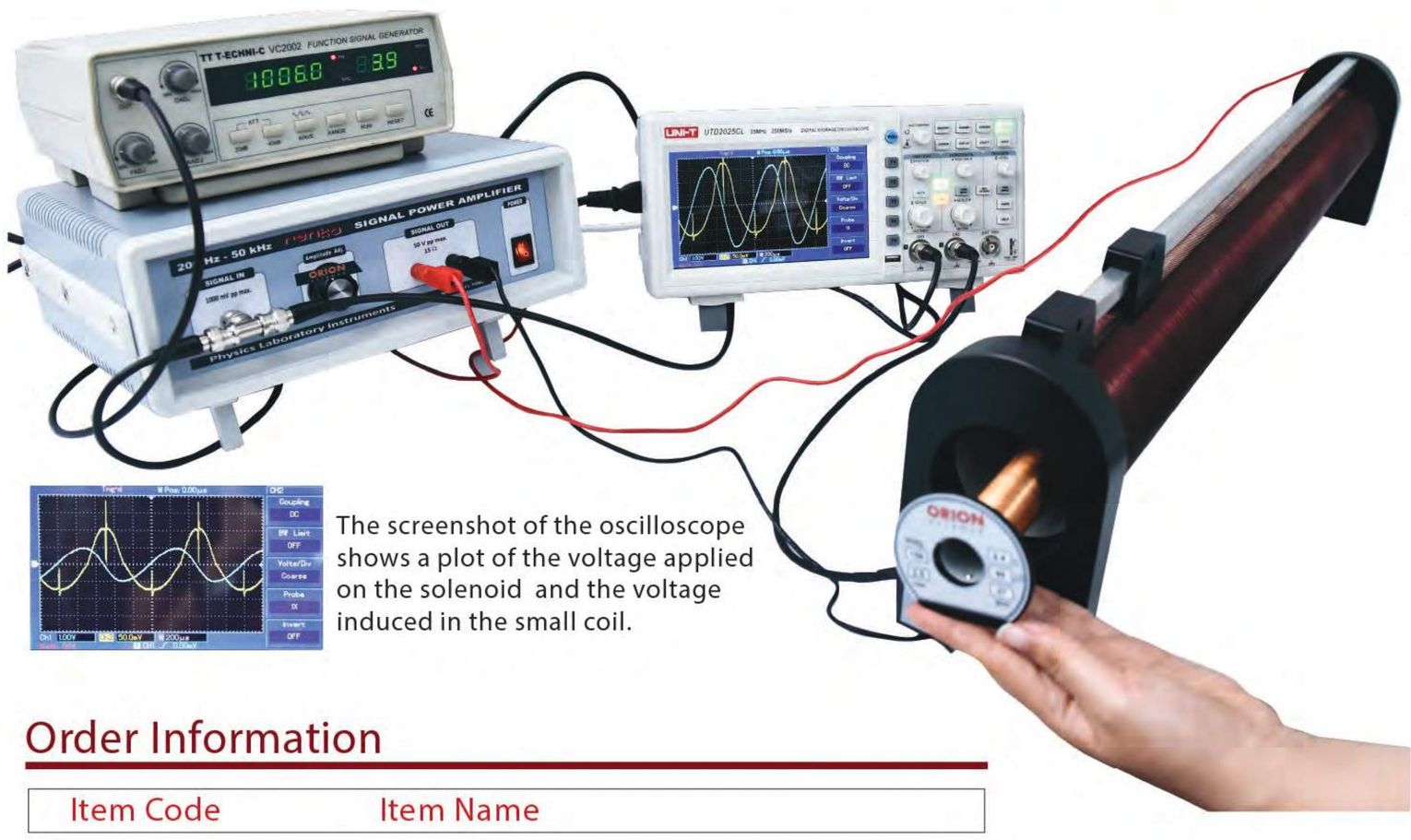


Order Information

Item Code	Item Name
EE-0006-00	DC Current Source
ST-0075-00	Lorentz Force Experiment Base (with Angle Scale , Magnets , Conductive Cylinders and Support Rods)
EE-0121-00	Conductive Wire
EE-0122-00	Conductive Bar
EE-0120-05	Connection Cables (50 cm, 2 Pcs)
MA-0059-00	Teacher and Student Guideline

MAGNETIC INDUCTION

REEE06



The screenshot of the oscilloscope shows a plot of the voltage applied on the solenoid and the voltage induced in the small coil.

Description

Faraday Induction Law is verified, by applying a voltage to the solenoid and oscilloscope that measures the induced voltage on small coils.

Coils

- EE-0155-00 : 75 turns
- EE-0156-00 : 150 turns
- EE-0157-00 : 300 turns

Order Information

Item Code	Item Name
EE-0052-00	Power Amplifier
EE-0055-00	Solenoid
EE-0155-00	Coil (75 Turn)
EE-0156-00	Coil (150 Turn)
EE-0157-00	Coil (300 Turn)
EE-0151-00	Double Sided BNC Cables (2 Pcs)
EE-0151-01	BNC-Banana Cables (2 Pcs)
EE-0007-00	BNC T Connector
EE-0120-09	Connection Cables (90 cm, 4 Pcs)
EE-0034-00	Function Generator (required, not included)
EE-0032-00	Oscilloscope (required, not included)
EE-0033-00	Multimeter (required, not included)
MA-0060-00	Teacher and Student Guideline

Solenoid

- 280 turns
- Length: 750 mm
- Diameter: 81 mm

MAGNETIC INDUCTION – VERNIER VERSION

REEE06-V NEW

Description

The signal from LabQuest 2 (signal generator) is amplified by Vernier Power Amplifier (PAMP). The data is read from LabQuest ® 2 screen

Required Units

Differential Voltage Probe DVP-BTA	Current Probe DCP-BTA	LabQuest® 3 LABQ3	Vernier Power Amplifier PAMP
			

- EE-0052-00 Power Amplifier
- EE-0034-00 Function Generator
- EE-0032-00 Oscilloscope
- EE-0033-00 Multimeter
- EE-0151-00 Double Siede BNC Cables
- EE-0151-01 BNC-Banana Cables
- EE-0007-00 BNC T Connector

are not required in this version

BIOT- SAVART'S LAW

REEE05

Description

The purpose of this experiment is to investigate Biot-Savart's Law. With this experiment we can determine the magnetic field constant and calculate the magnetic field in the selonoid.

Order Information

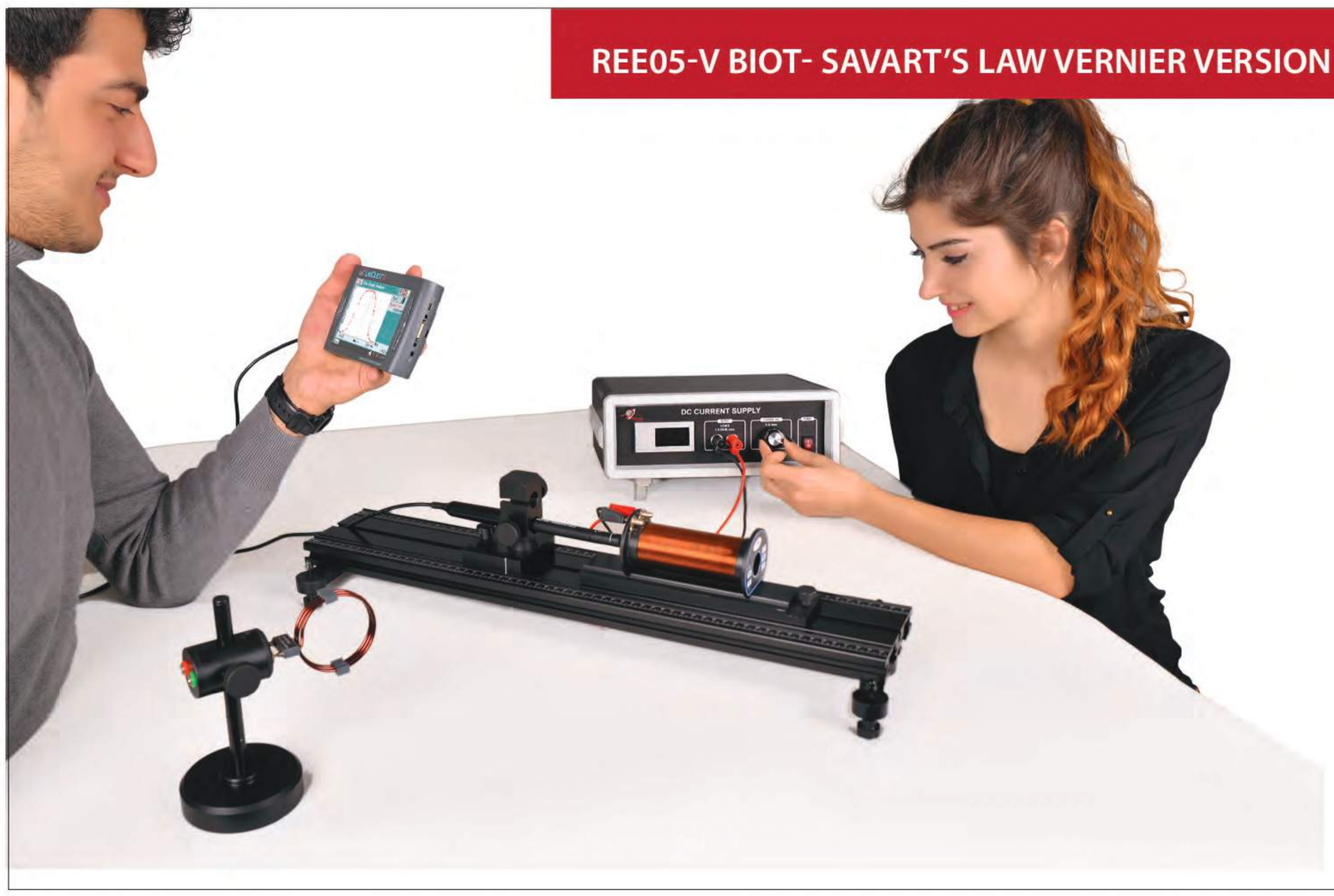
Item Code	Item Name
EE-0006-00	Current Source
ST-0175-00	Bench
EE-0042-00	Solenoid (100 turn)
EE-0043-00	Solenoid (200 turn)
EE-0044-00	Solenoid (300 turn)
EE-0045-00	Circular Conductors (1 turn, 2 Pcs,Different Diameter)
EE-0046-00	Circular Conductors(2 turn,2 Pcs,Different Diameter)
EE-0047-00	Circular Conductors (3 turn,2 Pcs,Different Diameter)
EE-0056-00	Prob Holder
EE-0074-00	Conductor Coil Holder
EE-0120-05	Connection Cable (Black)
EE-0120-15	Connection Cable (Red)
EE-0049-00	ORION Teslameter
EE-0049-01	Hall Probe For Teslameter
EE-0033-00	Digital Multimeter (required, not included)
MA-0014-00	Teacher and Student Guideline

Solenoid

- 3 Solenoids
- Turn: 100, 200, 300
- Resistance: 1.5Ω, 3Ω, 3.7Ω
- Inductance: 125μH, 560μH, 600μH

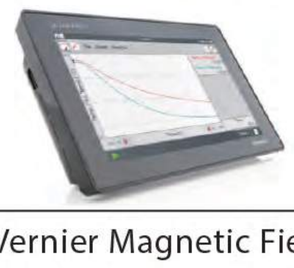
EE-0049-00
Teslameter

REE05-V BIOT- SAVART'S LAW VERNIER VERSION



Required and not included vernier sensor

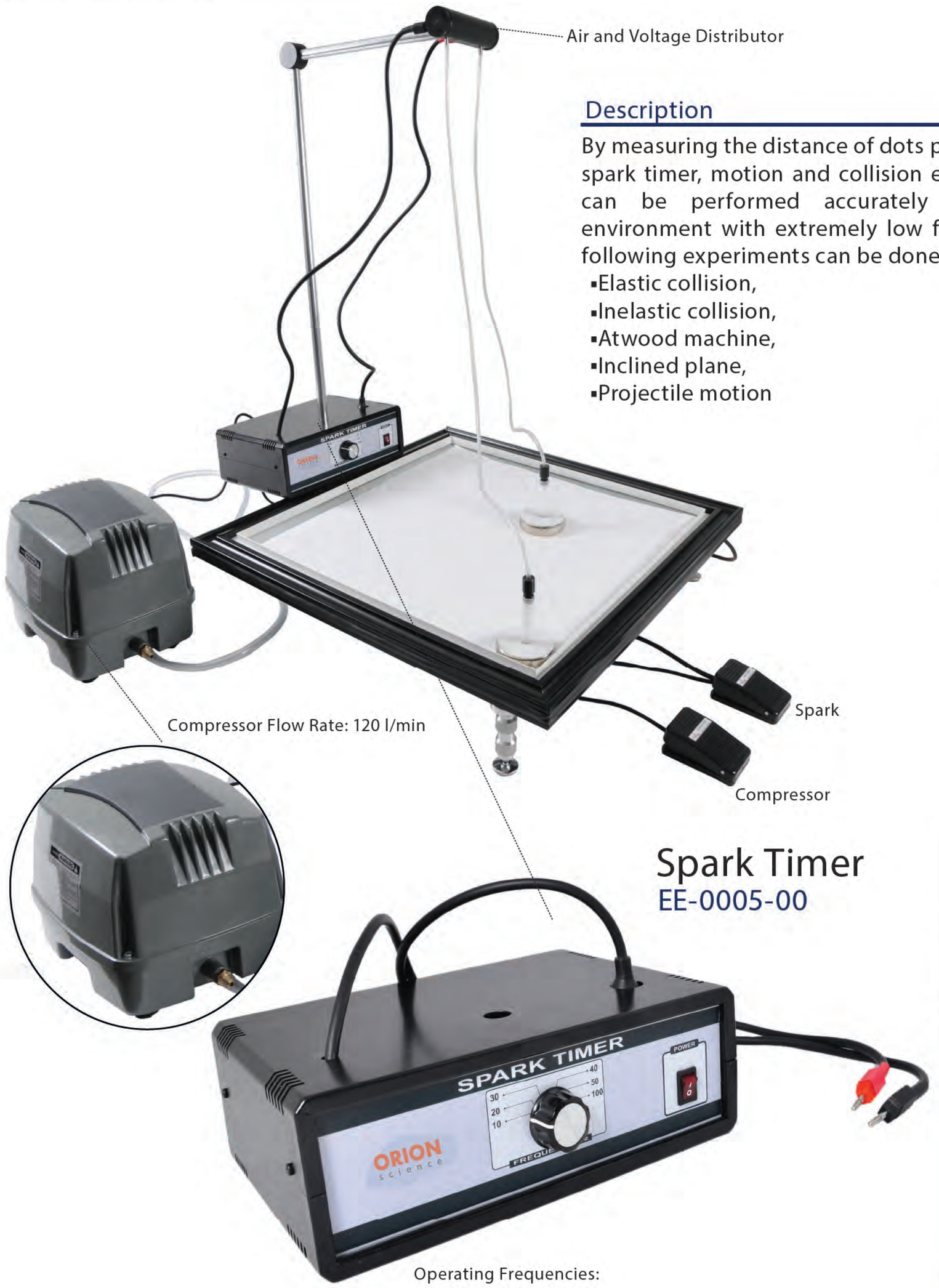
LabQuest® 3
LABQ3



Vernier Magnetic Field Sensor
MG- BTA

ORION science

AIR TABLE
REME02



Description

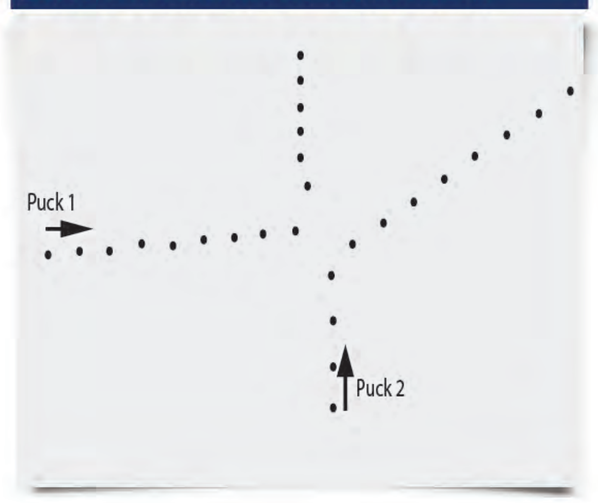
By measuring the distance of dots produced by spark timer, motion and collision experiments can be performed accurately in a 2D environment with extremely low friction. The following experiments can be done:

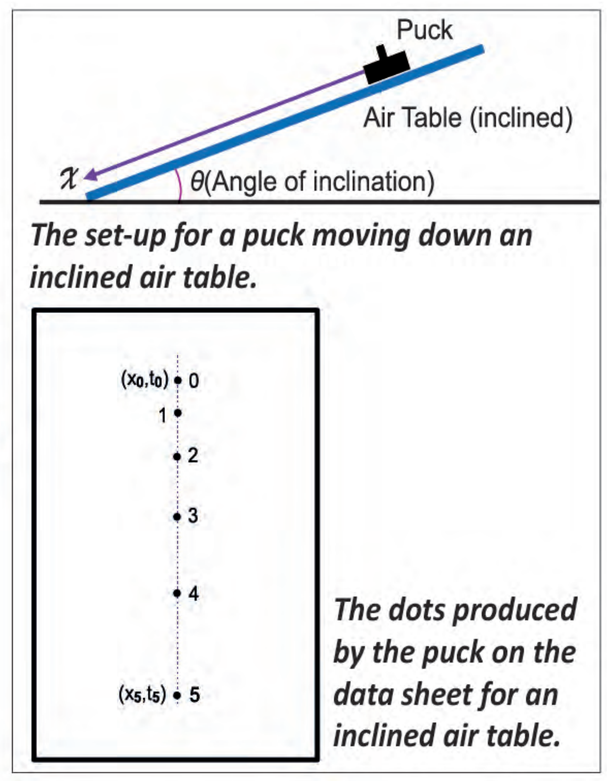
- Elastic collision,
- Inelastic collision,
- Atwood machine,
- Inclined plane,
- Projectile motion

Spark Timer
EE-0005-00

Operating Frequencies:
10 Hz, 20 Hz, 30 Hz,
40 Hz, 50 Hz, 100 Hz

Elastic Collision of Two Pucks





The set-up for a puck moving down an inclined air table.

The dots produced by the puck on the data sheet for an inclined air table.

Order Information

Item Code	Item Name
ST-0003-00	Air Table Glass Base
EE-0004-01	Compressor
EE-0005-00	Spark Timer
ST-0004-00	Air and Voltage Distributor
ST-0005-00	Test White Data Paper (500 Pcs)
ST-0006-00	Conductive Carbon Paper (2 Pcs)
ME-0003-00	Pulley Set (2 Pcs)
ME-0015-00	Rotation Apparatus (with Rope)
ST-0034-00	Hose
ST-0010-00	Height Block
ME-0016-00	Launcher
ST-0014-00	Metal Disc Weights (2 Pcs)
ST-0015-00	Experiment Puck
ST-0035-00	Velcro
EE-0031-00	Pedals (2 Pcs)
ST-0047-00	75cm String with Two Loops
MA-0061-00	Teacher and Student Guideline

Included Accessories

Pucks

Additional Weights

142 g,2 Pcs

Pulley Set

2 pcs for Atwood Machine experiment

Rotation Apparatus

angular velocity and momentum aparatus

Launcher

for projectile motion experiment

White and Carbon Paper

ORION science

AIR TRACK

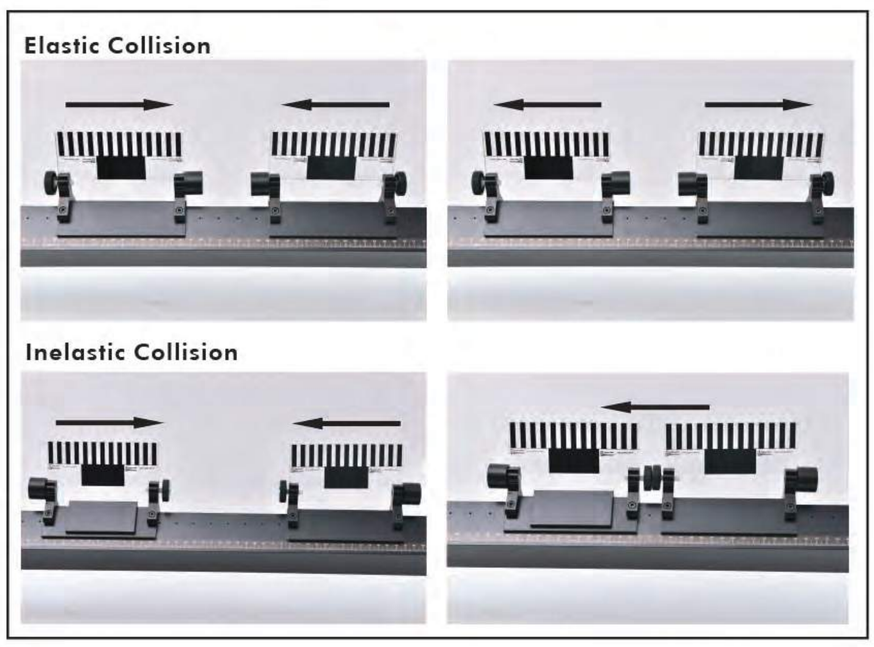
REME03-V

Description

Nearly frictionless air track allows you to investigate the laws of motion and collisions in one dimension using photogates and ORION Timer. With this experiment we can do:

Uniform Constant Velocity in one dimension

- Uniform Constant Acceleration in one
- dimension
- Motion in inclined plane
- Conservation of momentum



Order Information

Item Code	Item Name
ST-0101-00	Air Track
ST-0104-00	Mass Set
ME-0021-00	Low Frictionless Pulley
ST-0102-00	Carts (2 pcs)
ST-0102-01	Collision Components (2 Pcs)
ST-0102-03	Screws for Carts (4 Pcs)
ST-0102-04	Additional Mass for Gliders
ST-0010-00	Height Block
ST-0103-00	Bumpers (2 Pcs)
ST-0183-00	Photogate Holders (2 Pcs)
ST-0110-00	Adjustable Legs (2 Pcs, with 3 Screws)
ST-0102-05	Tack
EE-0004-00	Compressor
ST-0207-00	Hose for Compressor
SN-0004-00	ORION Photogate
EE-0025-00	ORION Timer
EE-0084-00	Communication Cables (2 Pcs)
MA-0031-00	Teacher and Student Guideline

AIR TRACK WITH VERNIER VERSION

Additional Units

Vernier Photogate VPG-BTD	Vernier Cart Picket Fence PF-CART	LabQuest® 3 LABQ3
		

In this model, Vernier Go Direct Version is also available.

Included Accessories

Height Block	Collision Components
 for inclined plane experiment	 has same pole of magnet for elastic collision experiment (2 pieces)
Low Frictionless Pulley	**Tack**
 used to transfer force from mass to gliders	 cling carts together (for inelastic collisions)

AIR TRACK WITH VERNIER MOTION DETECTORS

Additional Units

Detector Plates	Vernier Motion Detector Holder	Vernier Motion Detector
		

In this model, Vernier Go Direct Version is also available.

ORION science

ANGULAR VELOCITY AND ACCELERATION

REME12

Description

Angular Velocity and Acceleration experiment is designed for a complete study of the rotational motion laws.It allows the teacher perform a variety of experiments in rotational mechanics including:

- Angular velocity,
- Angular acceleration,
- Torque,
- Moment of inertia,
- Conservation of angular momentum

ST-0056-00 Metal base
with leveling screws (3 Pcs) to balance base

Optical Detector

EE-0061-00 Pulse Counter
Pulse counter (digital display) counts the numbers of bars of each disk at the same time

ME-0007-00 Frictionless Wheel
The force in the string over the frictionless wheel causes a torque on the disks and they start to rotate

Metal Disks

ST-0057-00 Stainless Steel Disks
- 1360 g, 2 Pieces, with 200 bar strip

ST-0058-00 Aluminium Disk
- 466 g , 1 Piece, with 200 bar strip

Under applied air flow, the disks can rotate together or independently from each other.

Mass Set with Torque Pulley

Torque Pulleys

for moment of inertia experiment

Spirit Level

to balance the base correctly

Plugs

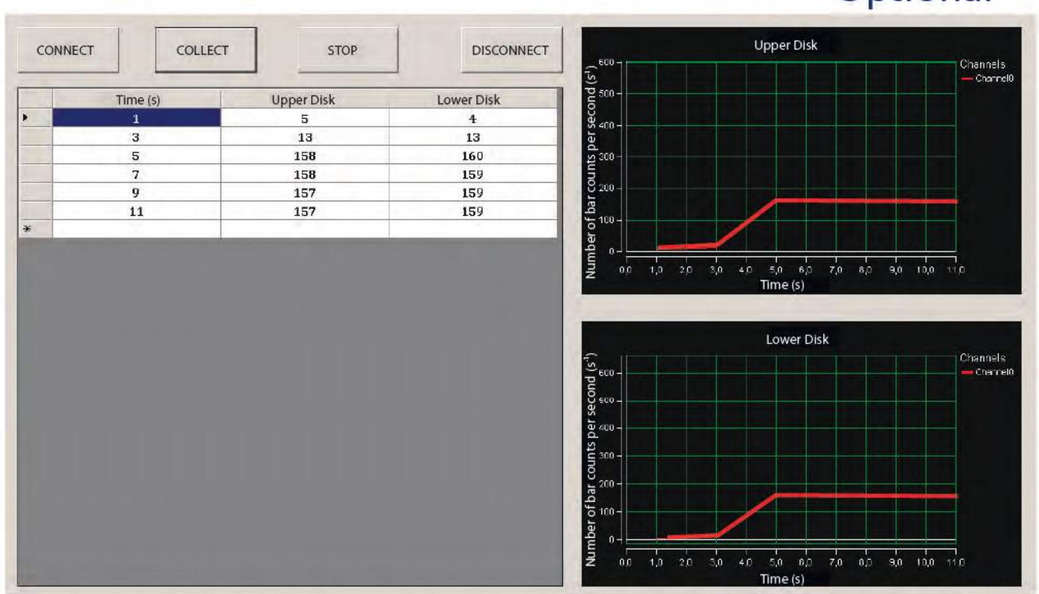
to control air flow

Order Information

Item Code	Item Name
ST-0056-00	Experiment Base
ST-0057-00	Stainless Steel Disks (2 Pcs)
ST-0058-00	Aluminium Disk
EE-0061-00	Pulse Counter
ME-0007-00	Frictionless Wheel
ME-0012-00	54.2 mm diameter Torque Pulley
ME-0006-00	28.5 mm diameter Torque Pulley
ME-0007-00	Frictionless Wheel
ST-0060-00	Plug (51 mm)
ST-0061-00	Plug (38.5 mm)
ST-0026-00	Plug (28 mm, Aluminium)
ST-0027-00	Plug (28 mm, Brass)
ST-0033-00	Plug (19.5 mm)
ST-0104-01	Mass Set (with Torque Pulley)
ST-0059-00	Spirit Level
EE-0004-01	Compressor
MA-0062-00	Teacher and Student Guideline

COMPUTER AIDED

Optional



The moment of inertia of two disks experiment

ORION science

SPRINGS

REME10

Description

With this experiment students can perform springs experiments by measuring and calculating springs consntants and periods. The datas are transfered to computer/tablet/mobile phone wireless with Vernier GoDirect Motion Detector.
Constants of different types of springs can be calculated by using height measurement apparatus.

ST-0140-00
Mass Set
3 pieces 200 g
3 pieces 100 g
3 pieces 50 g

ST-0138-00
Springs Set
5 pieces (2 pieces with same constant ,
4 pieces with different constants)

ST-0141-00
Height Measurement Rod

ST-0139-00
Pulley Set
2 pieces single puleys
2 pieces double pulleys
2 pieces triple pulleys

REME10 SIPRINGS AND PULLEYS GO DIRECT VERSION

(WIRELESS DATA SHARE)

Required and not included vernier sensor

GDX-FOR
Go Direct® Force and Acceleration Sensor

GDX-MD
Go Direct® Motion Detector

Description

In addition to springs varios types of pulleys are given and hooked to same metal platform. Using Vernier Godirect Dual Range Force Sensor the forces applied to strings depending to number of pulleys and mass are measured.

Order Information

Item Code		Item Name
ST-0137-00	.....	Metal Platform
ST-0138-00	.....	Spring Set
ST-0139-00	.....	Pulley Set
ST-0140-00	.....	Mass Set
ST-0142-00	.....	Apparatus for parallel connection of Springs
ST-0141-00	.....	Height Measurement Rod
GDX-MD	.....	Go Direct Motion Detector
GDX-FOR	.....	Go Direct Force and Acceleration Sensor
MA-0023-00	.....	Experiment Guide

Orion Timer
EE-0025-00

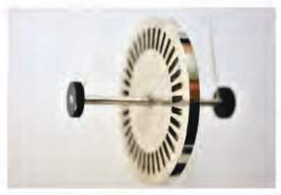
- 4.3 inch digital screen
- TFT touch screen
- 0.001 accuracy
- 10 experiments memory
- Adaptable to Air Track and Projectile Motion - Ballistic Pendulum experiments

In this model, Vernier Version and Vernier Go Direct Version is also available.

MAXWELL DISC
REME21

Description

This experiment is designed to verify the law of conservation of mechanical energy in a system with gravitational potential energy, translational kinetic energy and rotational kinetic energy.



ME-0035-00 Maxwell Disc
- Weight: 1000 g
- Diameter: 150 mm
- Number of Holes: 36

SN-0004-00 Photogate
While Maxwell Disc rotating, the time interval between two unblocked case is measured with photogate and the angular velocity is calculated.

Period of Maxwell Disc is seen from the Orion Timer screen

Order Information

Item Code	Item Name
ST-0223-00	Maxwell Experiment Platform
ME-0035-00	Maxwell Disc
EE-0025-00	Orion Timer
SN-0004-00	Photogate
ST-0224-00	Ropes (2 Pcs)
EE-0135-00	Communication Cable
MA-0065-00	Teacher and Student Guideline

REME21-V MAXWELL DISC VERNIER VERSION

Required and not included vernier sensor

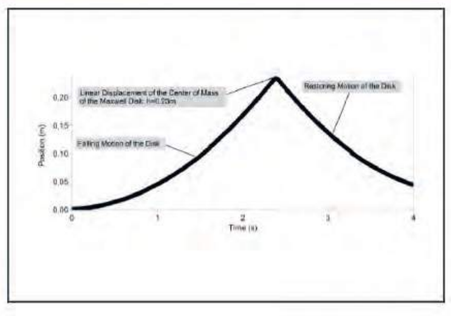
VPG-BTDVernier Photogate

LABQ3 LabQuest® 3

REME21-GDX MAXWELL DISC GO DIRECT VERSION
(WIRELESS DATA SHARE)

Required and not included vernier sensor

Vernier GO Direct Photogate
GDX-VPG



ORION science

GYROSCOPE

REME25-V

Description

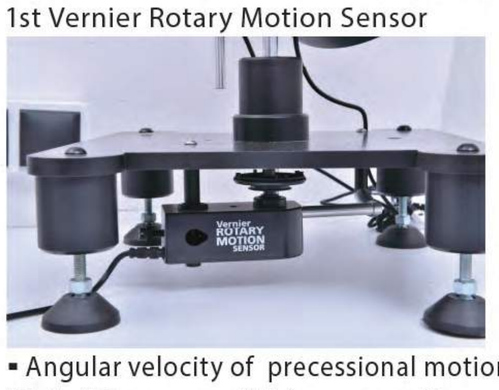
This apparatus allows students to explore rotational, precession and nutation motions experimentally. The gyroscope consists of a disk which can be rotated by hand. The angular speed of the disk, the precession rate of the gyroscope and gyroscope's nutation angle are measured by using Vernier Rotary Motion Sensors.

ST-0200-00 Gyroscope Disk

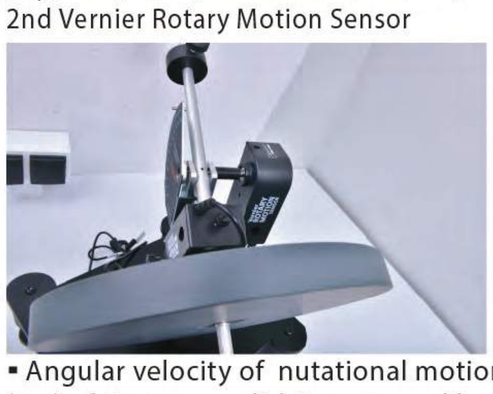
- Can rotate in two direction
- Mass: 2 kg
- Diameter: 26 cm

Rotational Motion

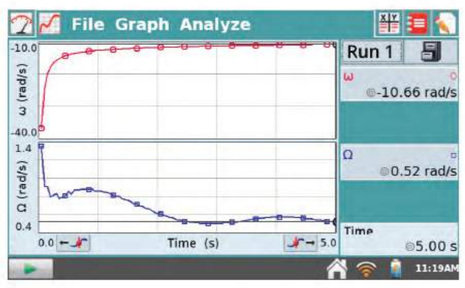
- Angular velocity of rotational motion (ω_R) of Gyroscope disk is measured by 1st Vernier Rotary Motion Sensor



- Angular velocity of precessional motion (ω_P) of Gyroscope disk is measured by 2nd Vernier Rotary Motion Sensor



- Angular velocity of nutational motion (ω_N) of Gyroscope disk is measured by 3rd Vernier Rotary Motion Sensor



Angular velocity of the disk and precession rate of gyroscope

ST-0198-00 Balance Mass Set

- 2 Pcs
- 40 g, 900 g

Order Information

Item Code	Item Name
ST-0195-00	Metal Base
ST-0200-00	Gyroscope Disk
ST-0198-00	Balance Mass Set (2 pcs)
ST-0196-00	Angle Scale
ST-0197-00	Sensor Holder
ST-0104-02	Mass Set
MA-0063-00	Teacher and Student Guideline
RMV-BTD	Vernier Rotary Motion Sensor (3 pcs) (assembled to set)
LABQ3	LabQuest®3 (required, not included)

GYROSCOPE WITH VERNIER GO DIRECT ROTARY MOTİON SENSOR

Vernier Go Direct Rotary Motion Sensor (3pcs)
GDX-RMS
Computer Based

PROJECTILE MOTION AND BALLISTIC PENDULUM

REME06

Description

Study projectile motion and conservation of momentum and kinetic energy loss through the ballistic pendulum.

EE-0024-00 Photogate

ME-0009-01 Projectile Motion Unit
(with metal base)

EE-0025-00 Orion Timer
Shows flight time and initial velocity of steel ball

ME-0009-02 Ballistic Pendulum Unit

EE-0027-00 Sensor Plate

Order Information

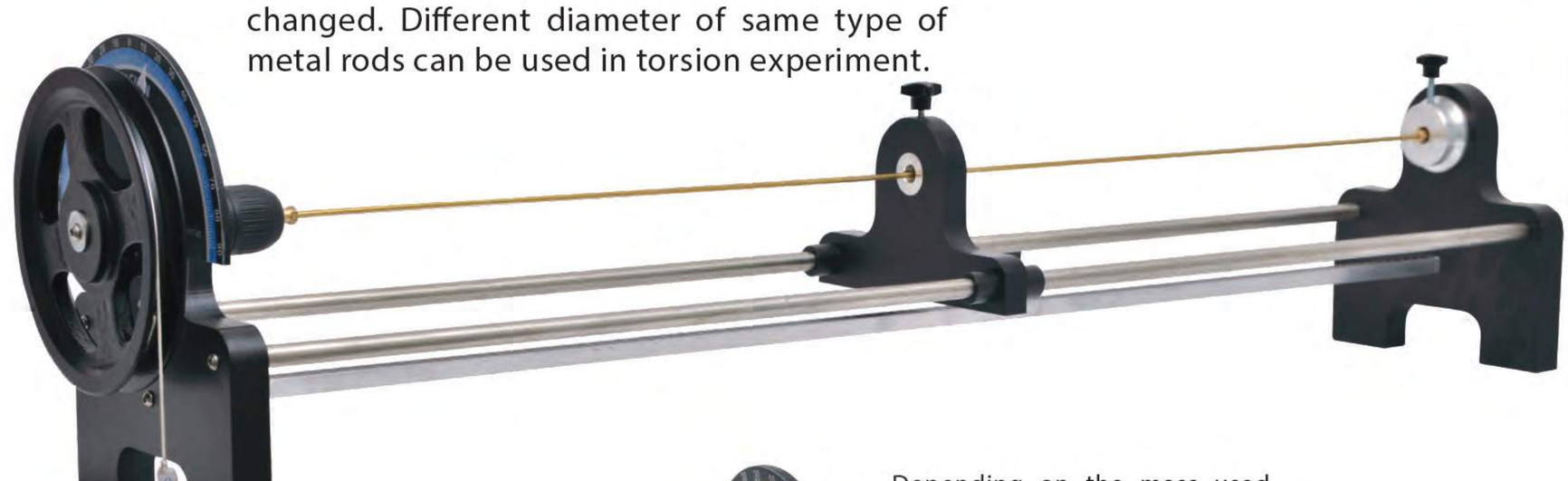
Item Code	Item Name
ME-0009-01	Projectile Motion Unit (Launcher with Metal Base)
ME-0009-02	Ballistic Pendulum Unit (with Support Rod , Pendulum Rod with Magnetic Ball Trapper, Angle Scale and Indicator)
EE-0027-00	Sensor Plate
EE-0025-00	Orion Timer
EE-0024-00	Photogate
ST-0187-00	Pendulum Rod Holder
ST-0028-00	Steel Balls (3 pcs)
ST-0029-00	Copy Papers (10 Pcs)
ST-0030-00	White Papers (10 Pcs)
ST-0186-00	Ball Trapper
EE-0029-00	Communication Cables (2 Pcs)
MA-0052-00	Teacher and Student Guideline
GGL-VPL	Vernier Googles (required, not included)

TORSION

REME14

Description

Torsion constant for different metal rods can be determined. Length of the rods can be changed. Different diameter of same type of metal rods can be used in torsion experiment.



ST-0188-00 Mass Set

- 7 Pcs
- 500 g x3, 200 g x2, 100 g, 50 g

Depending on the mass used, rod attachment rotates the metal rod. The torsion angle is observed from the angle scale.

ST-0189-00 Metal Rods

- 4 Pcs
- Material Type: Brass and Stainless Steel
- Diameter: 3 mm, 4 mm

Length Adjustment Mechanism

Torsion angle of half length of metal rods can also be calculated by fixing the screw on length adjustment mechanism.

Torsion angle of brass and stainless steel rods

Order Information

Item Code	Item Name
ME-0017-00	Torsion Apparatus (with Angle scale, Angle Indicator Rod Attachment, Length Adjustment Mechanism, Support Bars)
ST-0188-00	Mass Set for Torsion (7 Pcs)
ST-0189-00	Metal Rods (4 Pcs)
MA-0064-00	Teacher and Student Guideline

ELASTICITY

REME11

Description

This experiment allows the students to mesaure the elasticity constants of rods with different materials .The parameters which the elasticity depends on are examined and determined.

ST-0174-00 Spherometer

Order Information

Item Code	Item Name
ST-0095-00	Platform
ST-0094-00	Height adjusting holders
ST-0093	Metal rods
ST-0274-00	Mass set
ST-0174-00	Sephrometer
MA-0053-00	Teacher and Student Guideline

ST-0093 Metal Rods

- 6 Pcs
- Material Type: Brass, aluminium and Stainless Steel

FREE FALL & ATWOOD'S MACHINE

REME05

Description

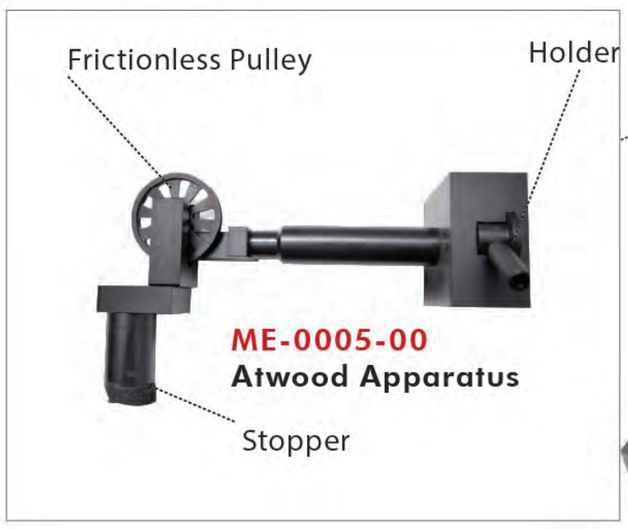
The Free Fall and Atwood Machine experiment is designed to determine the acceleration of a mass system in an Atwood Machine by applying Newton's 2nd Law of motion and measure the acceleration due gravity of a free falling object using photogates and timer.

EE-0025-00
Timer
The time falling between the photogates of the ball is given

Free Fall Experiment

Order Information

Item Code	Item Name
ST-0020-00	Metal Base
ST-0020-01	Ball Catcher
ST-0021-00	Support Rod (with Adjustable Legs and Ball Holder Pot)
ST-0043-00	Mass Set
ST-0039-00	Steel Balls
SN-0004-00	ORION Photogate
EE-0025-00	ORION Timer
EE-0023-00	Starting Button
ME-0005-00	Atwood Apparatus
EE-0020-00	Photogate and Electromagnetic Mass Release Mech.
ST-0204-00	String
ST-0059-00	Spirit Level
EE-0135-00	Communication Cables (3 Pcs)



ME-0005-00
Atwood Apparatus

EE-0020-00
Photogate and Electromagnet (Mass Release Mechanism)

Atwood's Machine Experiment

FREE FALL AND ATWOOD'S MACHINE VERNIER VERSION

Vernier Photogate
Sensor with Holder
Vernier LabQuest® 3

FREE FALL AND ATWOOD'S MACHINE GO DIRECT VERSION

Vernier GO Direct Photogate
GDX-VPG
Computer Based.
Connections: Wireless (Bluetooth), Wired (USB)

UNIVERSAL FORCE TABLE

REME15

Description

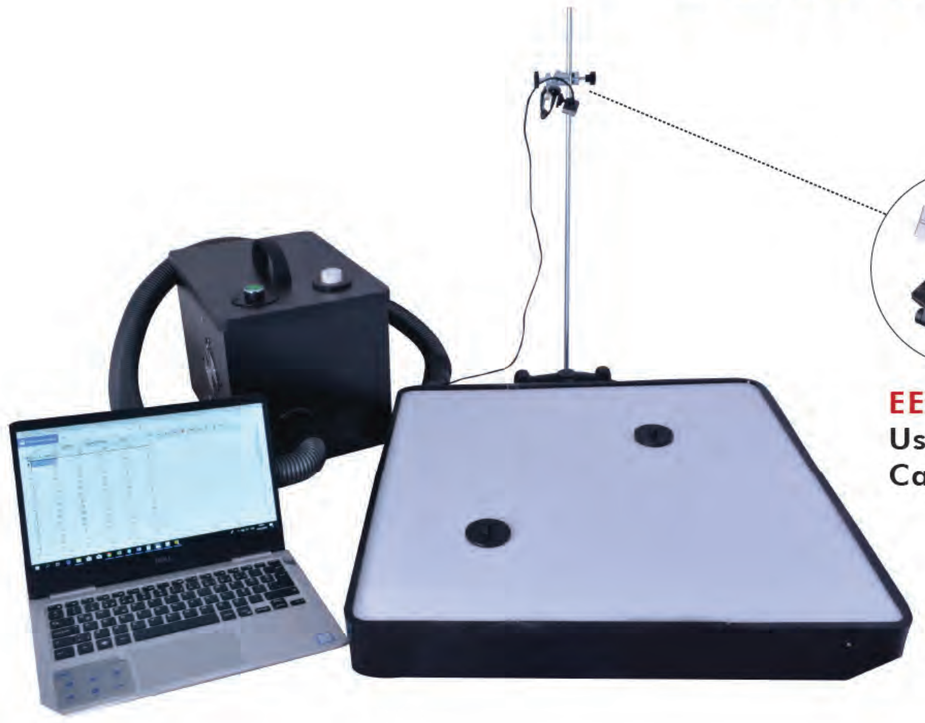
Description: Lami's theorem is verified with a universal force table experiment. Move the pulleys and change the weights to get equilibrium and read the angle between pulleys on angle scaled plate.

Order Information

Item Code	Item Name
ST-0089-00	Adjustable Tripod
ST-0090-00	Angle Scaled Plate
ST-0104-03	Triple Mass Set (with hangers and ring)
ST-0091-00	Frictionless Pulleys (3 Pcs)
MA-0065-00	Teacher and Student Guideline

AIR TABLE COMPUTER BASED

REME02CA



EE-0080-00
Usb Camera and Camera Holder

Description

By using computer interface, motion and collision experiments can be performed accurately in a 2D environment with extremely low friction. With Air Table the following experiments can be done:

- Elastic and inelastic collision
- Free-fall and Atwood Machine
- Projectile Motion
- Gravitational Acceleration
- Simple Harmonic Motion
- Conservation of Momentum and Energy

Order Information

Item Code	Item Name
ST-0100-00	Air Table
ST-0210-00	Pucks(2) for Compouter Based Air Table
ST-0211-00	Additional weights
ME0031-00	Springs(2 Pieces) for Computer aid. Air Table
ME-0032-00	Launching Appartus for Comp.B. Air table
ME-0033-00	Rotational Motion Pulley For C.B: Air Table
ST-0212-00	Holders for Comp. B. Air Table
EE-0080-00	USB Camera-(50fps)
SW-0001-00	Software for Air Table with bottom air blower
ST-0213-00	Velcro for C.B: Air Table Pucks
EE-0081-00	Camera Holder and Support Rod
MA-0016-00	Teacher and Student Guideline

ST-0100-00
Air Table

EE-0004-01
Compressor

SIMPLE PENDULUM

REME07

Description

Simple Pendulum experiment is designed for examining variables of a period in the system such as mass, angle and length of rod as well as calculating period of the system by using photogate and timer. With Simple Pendulum the following experiments can be done:
Conservation of Energy in Simple Pendulum.
Calculation for maximum and minimum of velocity in the system.
Conversion between kinetic energy and potential energy.

Order Information

Item Code	Item Name
ST-0048-00	Simple Pendulum Rod
ST-0049-00	Pendulum Weight
ST-0050-00	Pendulum Weight (2 Pcs)
ST-0051-00	Angle Board
ST-0052-00	Spirit Level
SN-0004-00	Orion Mini Photogate with Holder
ST-0023-00	Metal Base
ST-0024-00	Simple Pendulum Main Bar
EE-0053-00	ORION Timer
MA-0008-00	Teacher and Student Guideline

REME07-V SIMPLE PENDULUM VERNIER VERSION

Required and not included vernier sensor

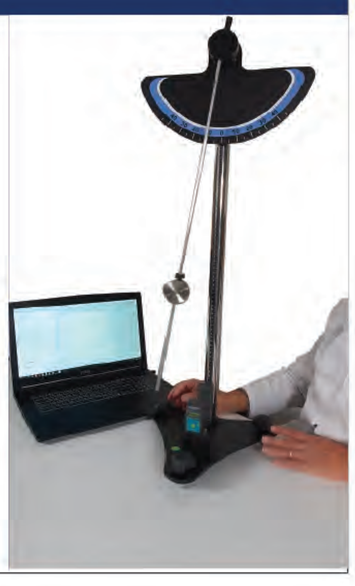
VPG-BTDVernier Photogate

LABQ3 LabQuest® 3

REME07-GDX SIMPLE PENDULUM GO DIRECT VERSION
(WIRELESS DATA SHARE)

Required and not included vernier sensor

Vernier GO Direct Photogate GDX-VPG



ORION science

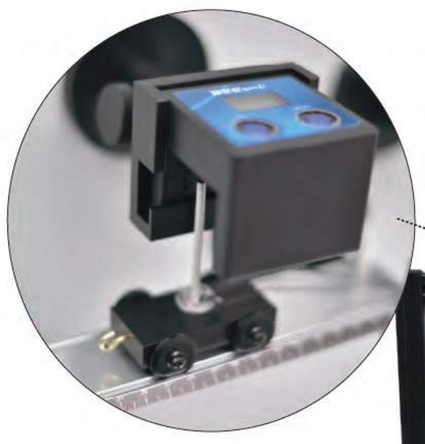
MULTIPLE MECHANICAL EXPERIMENT SET

REMEKIT01

Description

Build your own set up and make 19 different experiments by mounting the components on a metal board with magnetic holders. Multiple Mechanical Set allows you to study the Basic Mechanics laws by performing:

- Length , Depth and Diameter Measurements
- Measurements and Error Calculations
- Mass and Weight Measurements
- Force Table (Lami's Theorem)
- Moment and Balance,
- Hooke's Law
- Harmonic Oscillation of Springs
- Harmonic Motion of Simple Pendulum
- Energy Conservation of Simple Pendulum,
- Avarage and Instantenous Velocity
- Spring Constant in Serial and Parallel Connections
- Newton's Laws (accelerated motion on vertical plane)
- Determination of Friction Force and Friction Coefficient
- Force and Road Gain of Pulleys
- Pulleys and Gears
- Archimede's Princible
- Freefall Experiment
- Atwood's Machine Experiment
- Motion of Inclined Plane Experiments.



Determination of Friction Force and Friction Coefficient

Upper Set

Lower Set

Storage Box

Mass and Weight Measurements

Archimede's Princible

Spring Constant in Serial and Parallel Connections

ORION science

MULTIPLE MECHANICAL EXPERIMENT SET

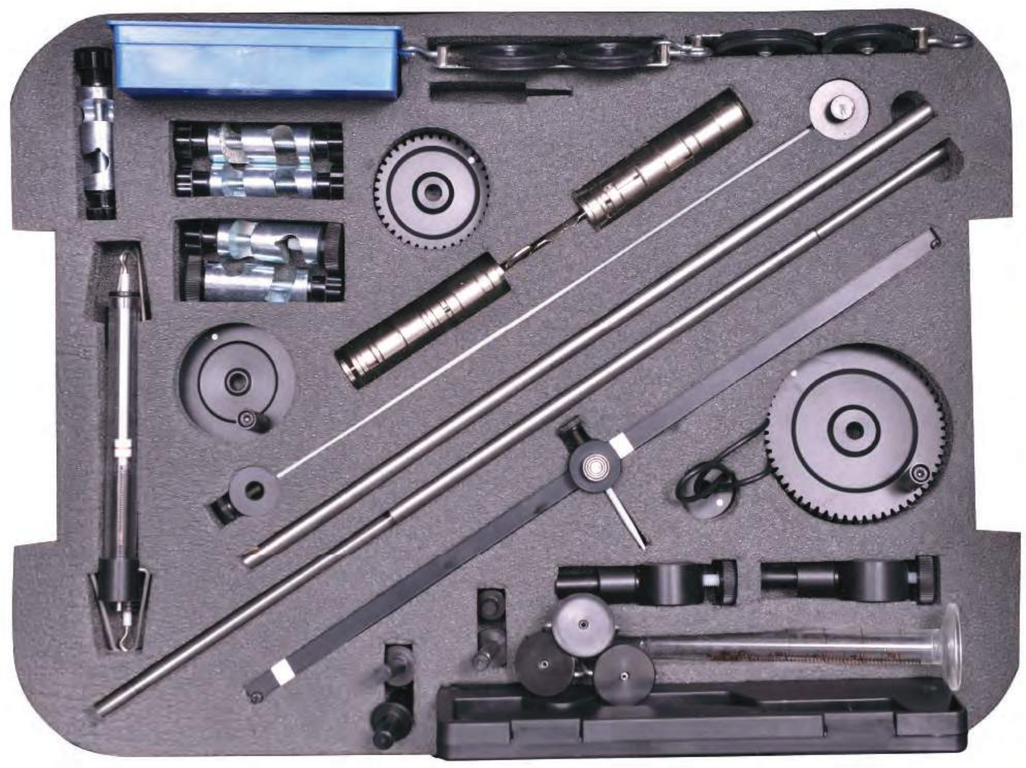
REMEKIT01

Upper Set

Order Information

Item Code	Item Name
ST-0240-00	Experiment Board
ST-0241-00	Legs
ST-0242-00	Force Table
ST-0244-00	Magnetic Support Base
ST-0246-00	Pan for Scale Bar
ME-0247-00	Cart
ST-0248-00	Friction Apparatus
ME-0241-00	Force Pulleys (3 Pcs)
ST-0256-00	Motion Experiment Bench
ST-0257-00	Different Shaped Objects
ST-0264-00	Beaker Set
ST-0265-00	Digital Balance
EE-0241-00	Chronometer
EE-0242-00	Photogate
ST-0268-00	Standing Ruler
ST-0107-00	Balance Rod
ST-0271-00	Angle Scale for Simple Pendulum
ST-0272-00	Photogate Holder
ST-0243-00	Rope Set
ST-0266-00	Springs
ST-0269-00	Star Shaped Apparatus (for Springs)

Lower Set



Order Information

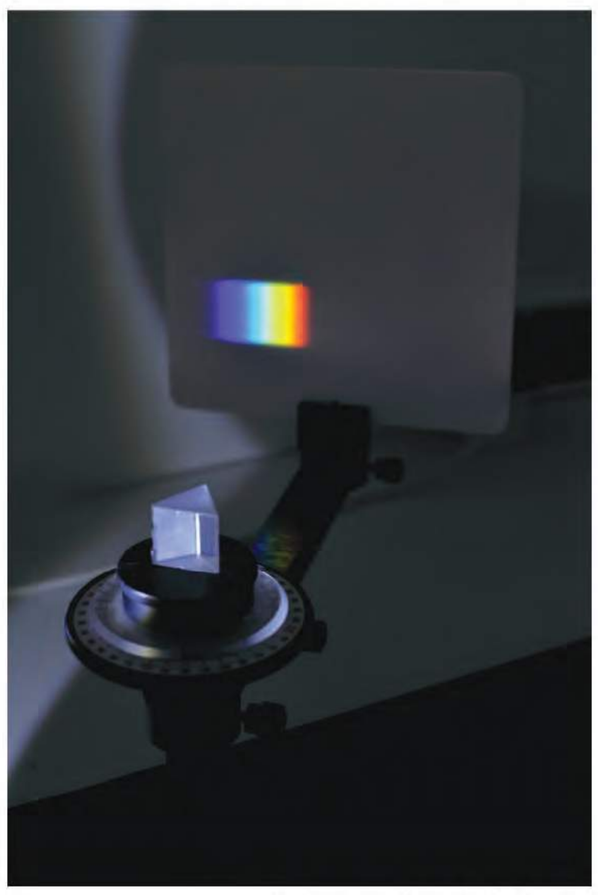
Item Code	Item Name
ME-0022-00	Dynamometer
ST-0272-00	Dynamometer Holder
ST-0267-00	Clamps
ST-0085-00	Set of Precision Weights
ST-0249-00	Gear Set
ST-0250-00	Wheel Set
ST-0251-00	Pulley Set
ST-0252-00	Single Pulley
ST-0273-00	Mass Hanger
ST-0274-00	Slotted Mass Set
ST-0245-00	Scale Bar with Angle Indicator
ST-0082-00	Calliper
ST-0081-00	Ruler
ST-0253-00	Balance Rod Holder
ST-0254-00	Multiple Material Holder
ST-0255-00	Support Rods
ST-0270-00	Pendulum Rod

ADVANCED OPTICS with BREWSTER

REOP15

Description

Advanced Optics allows experiments in:
Reflection, Refraction, Polarization, Brewster's Angle, Dispersion in Prisms, Snell Law, Focal Lengths of Convex and Concave Lenses and mirrors

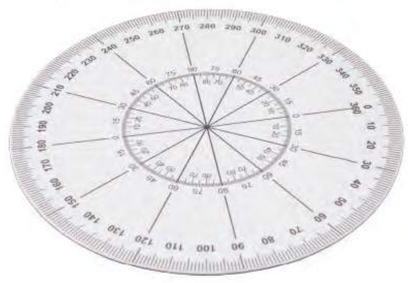


Dispersion of light

EE-0093-00
Laser Ray Light Source

EE-0092-00
White LED Light Source

ST-0134-00
Rotating Table Large



ST-0133-00
Rotating Table Small

Polarizer Set

- Can be rotated 0° to 180°
- Used in Brewster's Angle and polarization experiment

Lens and Mirror Set (Mounted)

Order Information

Item Code	Item Name
ME-0036-00	Rotating Arm for Brewster Experiment
ST-0122-00	Lens Set (5 Pcs, Mounted)
ST-0123-00	Concave and Convex Mirror (2 Pcs, Mounted)
ST-0123-01	Plane Mirror
ST-0123-02	Optical Mirror Set (6 Pcs)
ST-0124-00	Holders for Mirror and Lens Kit (2 pcs)
ST-0125-00	Polarizer Set (2 pcs)
ST-0127-00	Screen (Mounted)
ST-0127-01	Viewing Screen (Large)
EE-0092-00	White LED Source
ST-0129-00	Triangular Prisms (2 Pcs)
ST-0130-00	Optics Bench with Metric Scale
EE-0093-00	Laser Ray Source
ST-0131-00	Refracting Surfaces with Different Shapes
ST-0132-00	Objects (Slit Plate with Arrow and F-Shape)
ST-0133-00	Rotating Table with Angle Scale (Small)
ST-0134-00	Rotating Table with Angle Scale (Large)
ST-0128-00	Bench Holders for Compounds (4pcs)
ST-0135-00	Optical Lens Set (6 Lenses in Storage Box)
ST-0136-00	Multiple narrow slits(1, 3, or 4)
ST-0191-00	Glass Material with Parallel Surfaces
ST-0192-00	Single Slits (Different Slit Widths)
ST-0193-00	Light Collimating Slit (Wide Slit)
EE-0125-00	Luxmeter (Required, not included)
MA-0067-00	Teacher and Student Guideline

VERNIER GO DIRECT VERSION

Vernier Go Direct® SpectroVis® Plus Spectrophotometer GDX-SVISPL
Computer Based

VERNIER VERSION

Vernier Spectrometer V-SPEC
Wavelength Range: 380 nm–950 nm
Power: from computer via USB cable

Additional Mirror and Lens Set

- Double Convex
- Concave/Convex
- Plano-Concave
- Double Concave
- Plano -Convex
- Convex/Concave

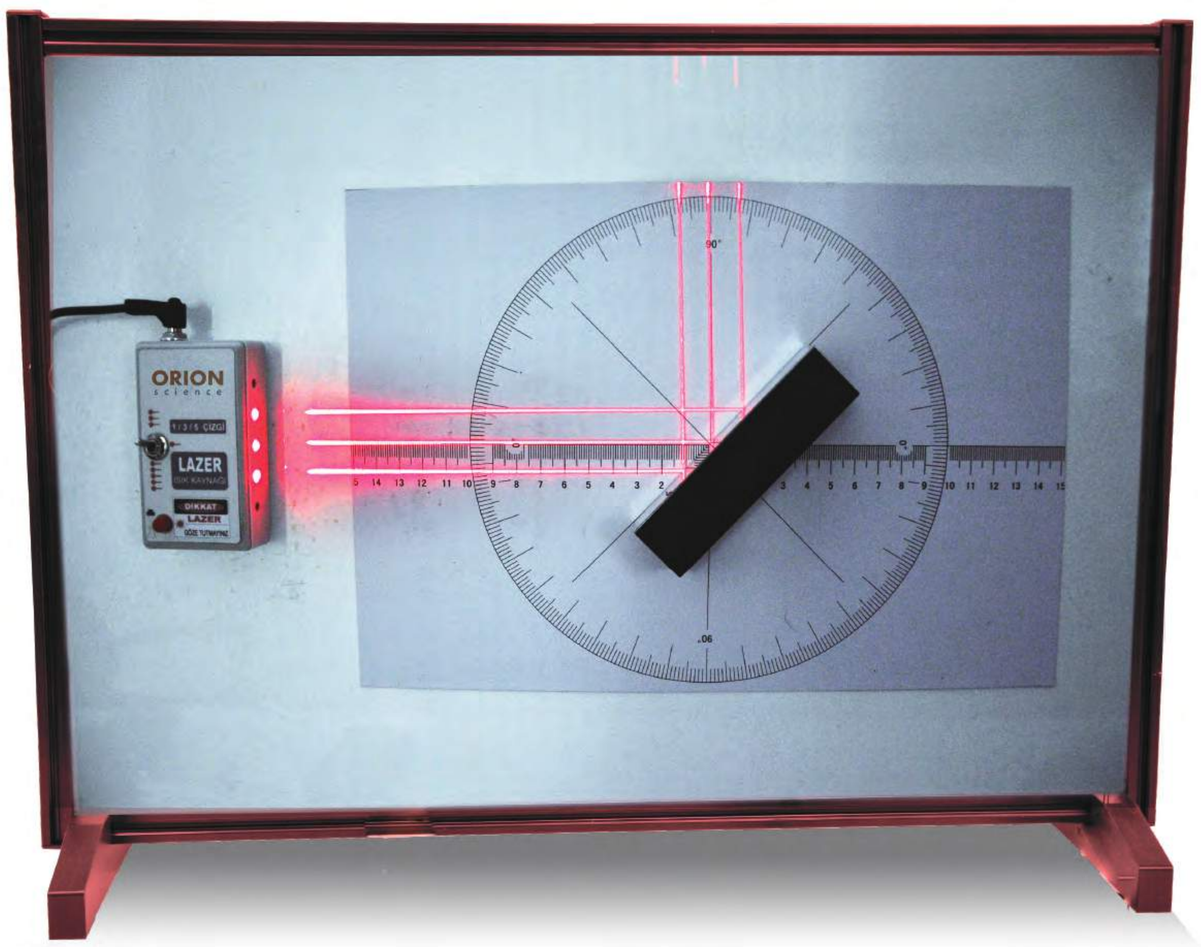
- f = 10 cm Convex
- f = 10 cm Concave
- f = 20 cm Concave
- f = 20cm Convex
- f = 50 cm Concave
- f = 50 cm Convex

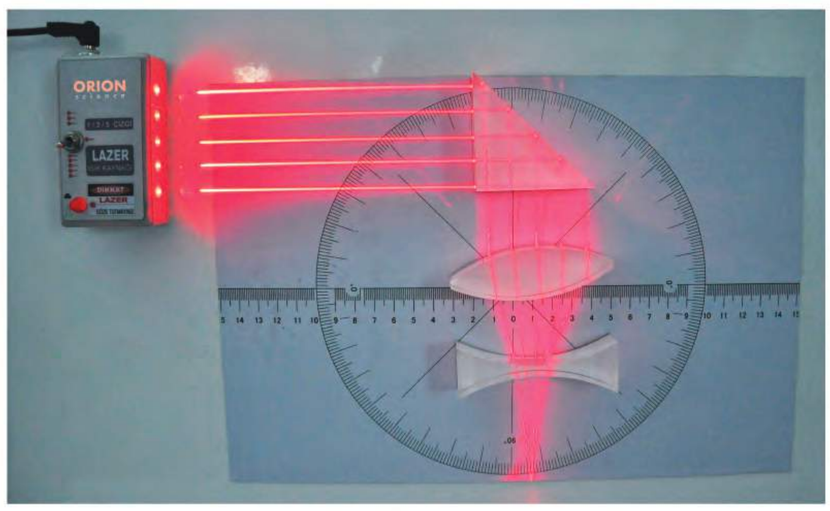
OPTIC SETS WITH MULTIPLE LASER

REOPKIT-02

Description

This experiment allows the student to investigate reflection and refraction of light in mirrors and lenses on a board where the light patterns are formed.The properties of a prism can also be examined.

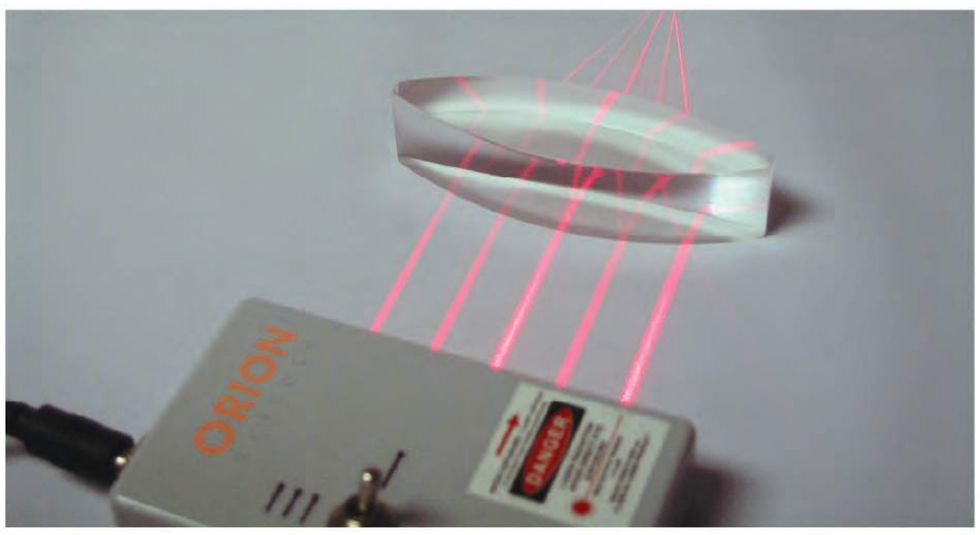




Order Information

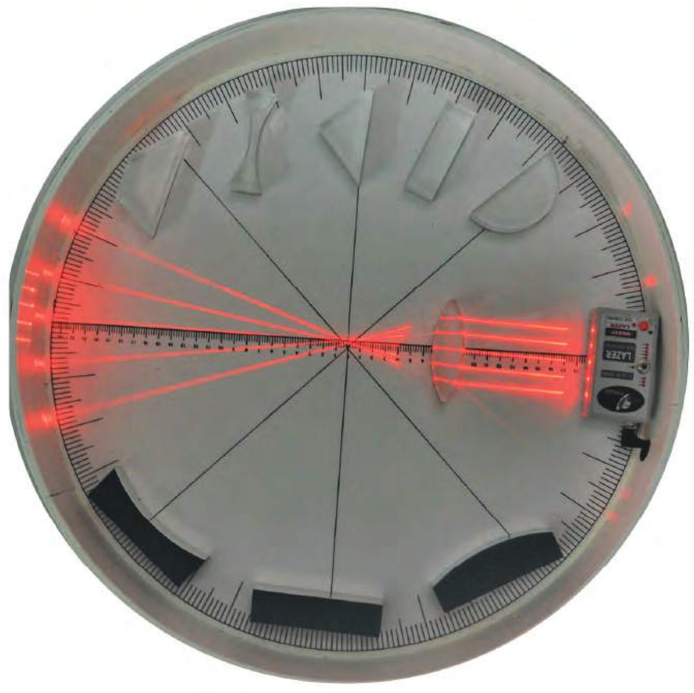
Item Code	Item Name
ST-0240-00	Vertical Stand Platform
ST-0275-00	Magnetic Lense Set (Converging and Diverging Lenses*; 6 pcs)
ST-0278-01	Magnetic Mirror Set (Convex and Concave Mirrors; 6 pcs)
ST-0275-04	Magnetic Prism
EE-0010-00	Magnetic Multiple Laser Light Source
ST-0280-00	Light Source with Different Colors (Red, Green, Blue)
MA-0052-00	Teacher and Student Guideline

* Converging Lenses: Double Convex, Plano- Convex, Concavo-Convex. Diverging Lenses: Double Concave, Plano- Concave, Convexo- Concave



EE-0010-00
Magnetic Multiple Laser Light Source

REOPKIT-02-D DESKTOP VERSION



ORION science

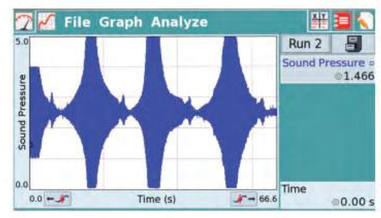
RESONANCE TUBE

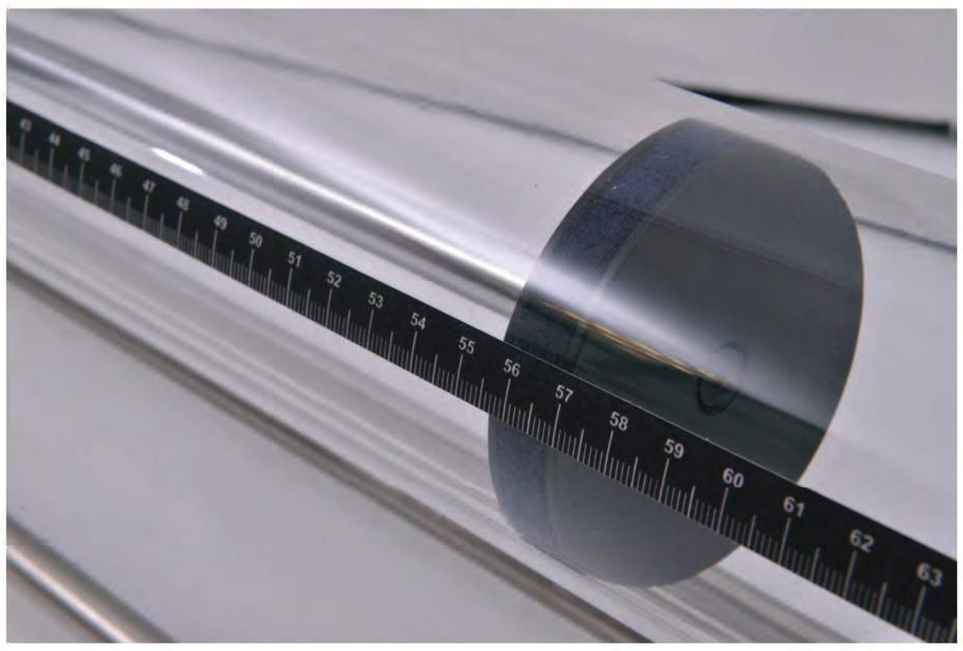
REDS01-V

Description

In this experiment, students can investigate standing sound waves in a column of air inside a resonance tube and measure the speed of sound in air by using the standing waves produced at the resonant frequencies.

The screenshot of LabQuest® 2 screen in resonance condition





The piston is moved slowly to obtain maximum acoustic amplitude (resonance). The distance between two adjacent anti-nodes is read from the ruler on the resonance tube. Thus, the acoustic wavelength within the tube can be measured and calculated..

The signal originated from the LabQuest® 2 signal generator is detected with the Vernier Microphone and amplified by the Vernier PAMP. Data is collected and processed in LabQuest® 2.

Required Units

Vernier Microphone
MCA-BTA

Vernier Power Amplifier
PAMP

LabQuest® 3
LABQ3

Order Information

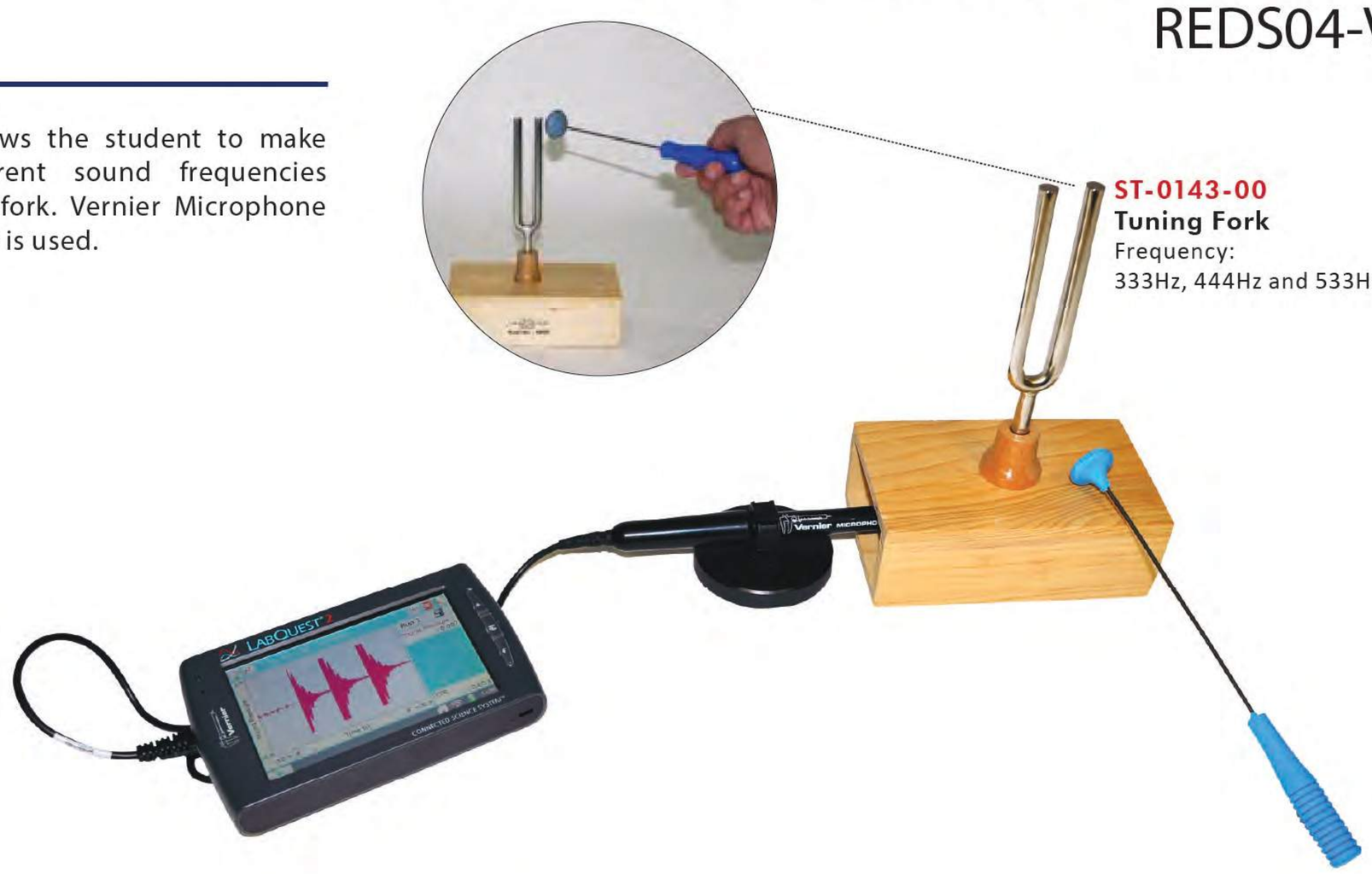
Item Code	Item Name
ME-0018-00	Resonance Acrylic Tube (with Speaker and Ruler, Piston, Rod, Support Bars)
MA-0068-00	Teacher and Student Guideline
MCA-BTA	Vernier Microphone (required, not included)
PAMP	Vernier Power Amplifier (required, not included)
LABQ3	LabQuest® 3 (required, not included)

SOUND FREQUENCIES

REDS04-V

Description

This experiment set allows the student to make measurements of different sound frequencies generated by a tunning fork. Vernier Microphone and Labquest 2 interafece is used.



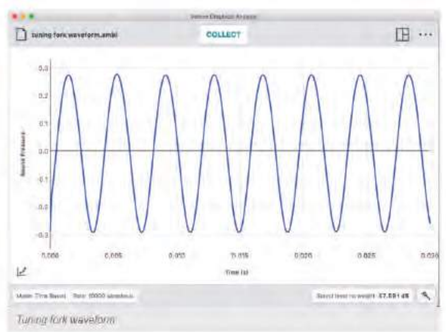
ST-0143-00
Tuning Fork
Frequency:
333Hz, 444Hz and 533Hz

Order Information

Item Code	Item Name
ST-0143-00	Tuning Fork Set with Different Frequencies.
ST-0144-00	Diapason Knob
ST-0145-00	Diapason Base
MA-0051-00	Teacher and Student Guideline
ST-0143-01	Microphone Holder
LABQ3	LabQuest® 3 (required,not included
MCA- BTA	Vernier Microphone (required,not included)

SOUND FREQUENCIES VERNIER GO DIRECT VERSION

Sound Sensor GDX-SND
Computer Based.



ORION science

IDEAL GAS LAW

RETE06-V

Description

The objective of this experiment is to measure the pressure of an ideal gas with respect to its temperature, analyze the relation between volume and pressure of the gas, investigate the change in volume of the gas depending on its temperature and calculate the universal gas constant experimentally.

By changing the volume and the temperature of gas in a glass tube, the student can explore can explore and verify:

- Gay-Lussac's Law
- Boyle's Law
- Charles Law

EE-0110-00 Heater and Pump Control Unit

- Temperature Control
- Maximum Temperature 70̊ C

This device is used to heat water in the Water Reservoir and pump water to the Cylindrical Water Jacket.

CH-0010-00 Cylindrical Water Jacket

- Material Type: Glass and Hard PLastic
- Diameter: 12 cm

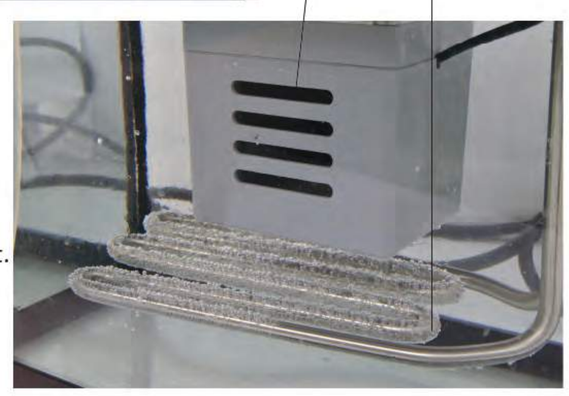
Hot water in Cylindrical Water Jacket heats the air in Gas Syringe

Gas Syringe

- Material: Glass
- 100 ml scaled

Water Pump

Heater Resistance



Required Units

LabQuest® 3
LABQ3

Vernier Gas Pressure Sensor
GPS-BTA

Vernier Temperature Sensor
TMP-BTA

Order Information

Item Code	Item Name
EE-0110-00	Heater and Pump Control Unit
CH-0009-00	Water Reservoir
CH-0010-00	Cylindrical Water Jacket
CH-0011-00	Volume Contolled Gas Syringe
CH-0012-00	Hose (3 pcs)
MA-0069-00	Teacher and Student Guideline
TMP-BTA	Venier Temperature Probe (assembled to set)
GPS-BTA	Vernier Pressure Sensor (assembled to set)
LABQ3	LabQuest® 3 (required,not included)

IDEAL GAS LAW VERNIER GO DIRECT VERSION

Vernier Go Direct® Gas Pressure Sensor GDX- GP
Range: 0 to 400 kPa
Maximum sampling rate: 50 samples/s
Connection: Bluethoot or USB

Vernier Go Direct® Temperature Probe GDX-TMP
Computer Based
Range: –40 to 125°C
Resolution: 0.01°C
Accuracy: ±0.25°C

ORION science

HEAT OF COMBUSTION

RETE09-V

Description

This apparatus allows you to calculate the heat of combustion of a material and the energy generated inside a calorimeter by measuring the change of temperature.

EE-0112-00 Ignition Unit
The chemical in the calorimetric bomb is burned with the aid of oxygen with one press button.

CH-0001-00
Combustion Apparatus
- Material Type: Stainless Stee
- 2 banana sockets for AC Power Supply

CH-0002-00
Calorimeter Container
- Material Type : Double Glass with Vacuum
- Height : 16 cm
- Internal Diameter : 10 cm
- External Diameter : 14 cm

Order Information

Item Code	Item Name
CH-0001-00	Combustion Apparatus
CH-0002-00	Calorimeter Container
CH-0003-00	Calorimeter Container Top Cover
EE-0112-00	Ignition Unit
ST-0157-00	Ignition Wire (Chromium-Nickel
EE-0120-05	Connection Cables (2 Pcs)
MA-0070-00	Teacher and Student Guideline
LABQ3	LabQuest® 3 (required, not included
TMP-BTA	Vernier Temperature Sensor (required, not included)

Required, not included
- Bel Digital Balance
- Magnetic Stirrer
- Oxygen Tube
- Oxygen Regulator
- Hose
- Clamp
- Micro Spoon
- Mortar Dish.
- Benzoic Acid
- Naphtalene

HEAT OF COMBUSTION VERNIER GO DIRECT VERSION

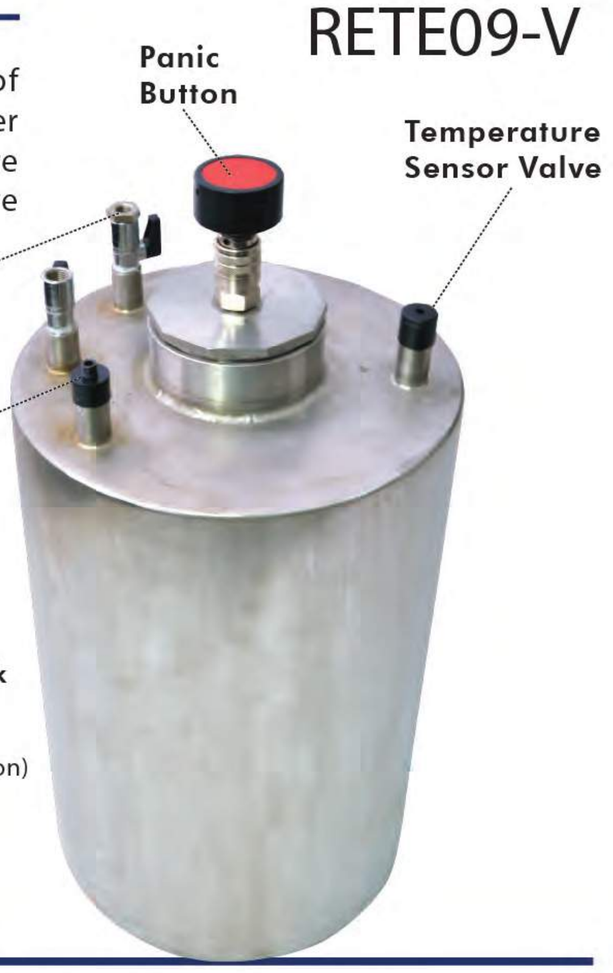
Computer Based

HEAT CAPACITY RATIO FOR GASSES (CLEMENT- DESORMES)

RETE09-V

Description

The purpose of this experiment is the calculation of heat capacity ratio for various gases by using Vernier Temperature sensor, LabQuest 2 and Gas pressure sensor. In the experiment the student can observe the change in heat during expansion of gasses.



ME-0040-00 Pressure Tank
- Material Type: Stainless Steel
- Diameter: 25cm
- Height= 40cm (with Panic Button)

VERNIER GO DIRECT VERSION

Vernier Go Direct® Gas Pressure Sensor GDX- GP
Range: 0 to 400 kPa
Maximum sampling rate: 50 samples/s
Connection: Bluethoot or USB

Vernier Go Direct® Temperature Probe GDX-TMP
Computer Based
Range: –40 to 125°C
Resolution: 0.01°C
Accuracy: ±0.25°C

The model with manometer and thermometer is also available.

Order Information

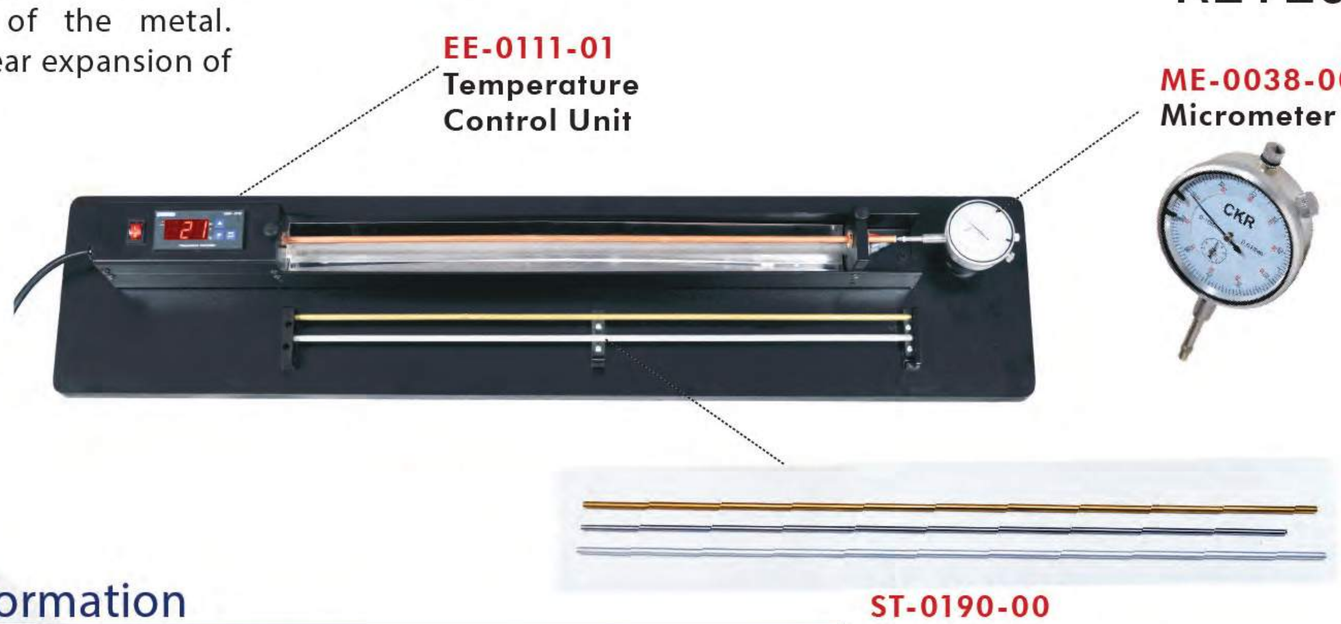
Item Code	Item Name
ME-0040-00	Pressure Tank...
ME-0041-00	Gas Pressure Regulator
ST-0301-00	Hose and Clamp
CH-0021-00	Various Type of Gasses (required, not included)
MA-0050-00	Teacher and Student Guideline.
LABQ3	LabQuest® 3 (required, not included)...
TMP-BTA	Vernier Temperature Sensor (required, not included)
GPS- BTA	Vernier Gas Pressure Probe (required, not included)

THERMAL LINEAR EXPANSION OF METALS

RETE02

Description

Thermal linear expansion of metals experiment is designed for examining variables such as temperature and different type of the metal. Moreover, coefficient of thermal linear expansion of metal can be calculated.



Order Information

Item Code	Item Name
EE-0111-00	Thermal Expansion Main Unit
EE-0111-01	Temperature Control Unit
ME-0038-00	Micrometer
ST-0190-00	Metal Rods For Thermal Expansion (3 Pcs)
MA-0034-00	Teacher and Student Guideline

ST-0190-00
Metal Rods For Thermal Expansion
Material Type: Brass, Aluminium, Cupper

DETERMINING THE SPECIFIC HEAT OF SOLIDS AND LIQUIDS

RETE04

Description

The purpose of this experiment is to investigate the concept of heat and specific heat, and also to determine the specific heat of solids and liquids. In this experiment, the student can investigate transformation between electrical energy and heat by using a calorimeter.

ST-0116-00

Calorimeter

- Outer Diameter: 143mm
- Inner Diameter: ~128mm
- Height: 150mm, ~133mm
- Mixer for liquid inside pot

Order Information

Item Code	Item Name
EE-0086-00	Rheostat
ST-0116-00	Calorimeter (2pcs)
EE-0006-00	Power Supply
ST-0265-00	Digital Balance
ST-0113-00	Copper Mass for Specific Heat of Metal
ST-0115-00	Aluminium Mass for Specific Heat of Metal
EE-0087-00	Connecting Cable (2pcs).
MA-0070-00	Teacher and Student Guideline

VERNIER GO DIRECT VERSION

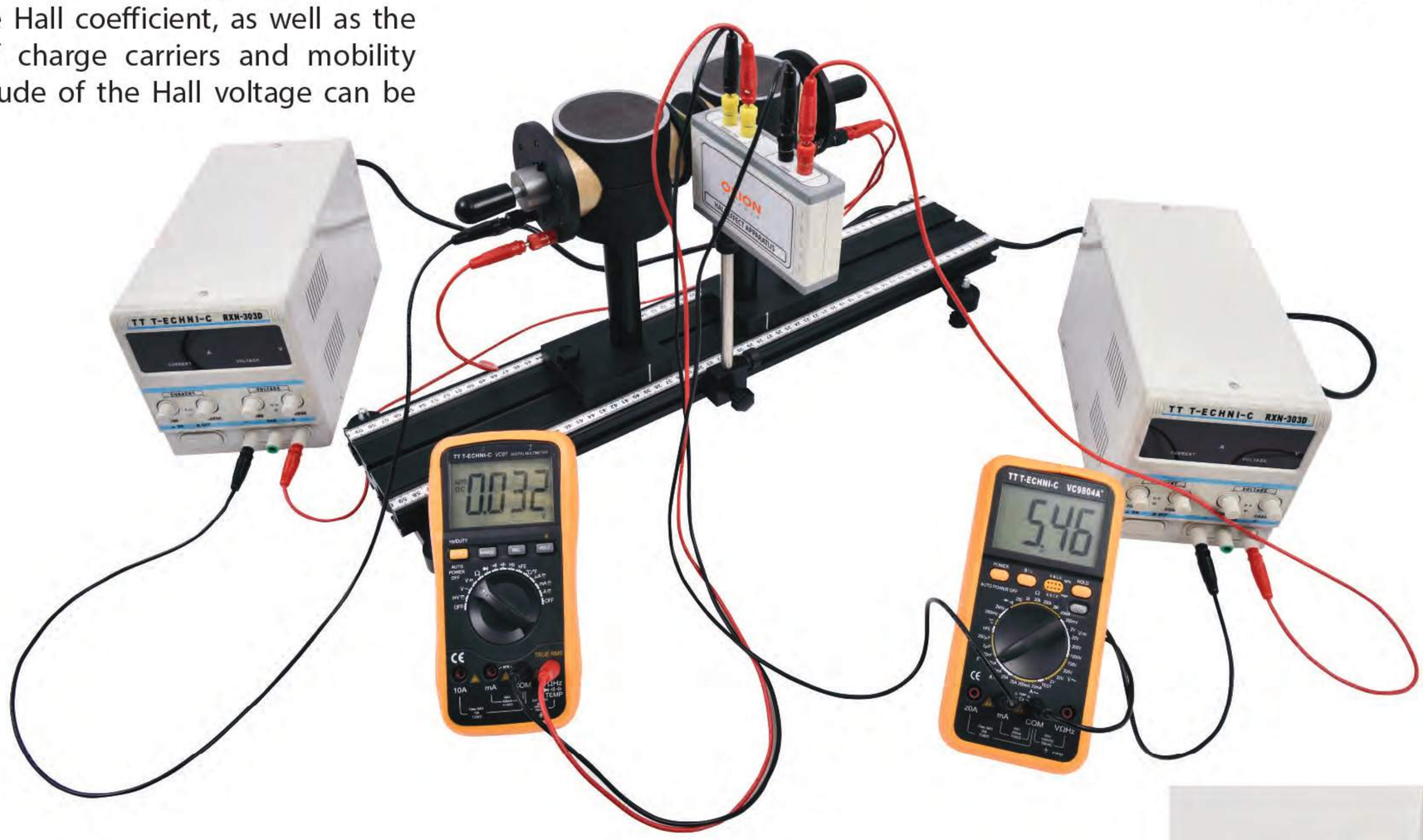
Vernier Go Direct® Temperature
Probe GDX-TMP
Computer Based
Range: –40 to 125°C
Resolution: 0.01°C
Accuracy: ±0.25°C

HALL EFFECT

REMA02

Description

This experiment is designed to explore the Hall Effect and Hall voltage of a n-type germanium sample. Also, the Hall coefficient, as well as the concentration of charge carriers and mobility from the magnitude of the Hall voltage can be determined.



Ge Crystal

EE-0160-00 Hall Effect Apparatus
Controlled voltage is applied to germanium crystal.
Hall voltage is measured by multimeter.

EE-0161-00 Solenoids
The magnetic field on the germanium semiconductor is changed by the current supplied to the solenoids.

Order Information

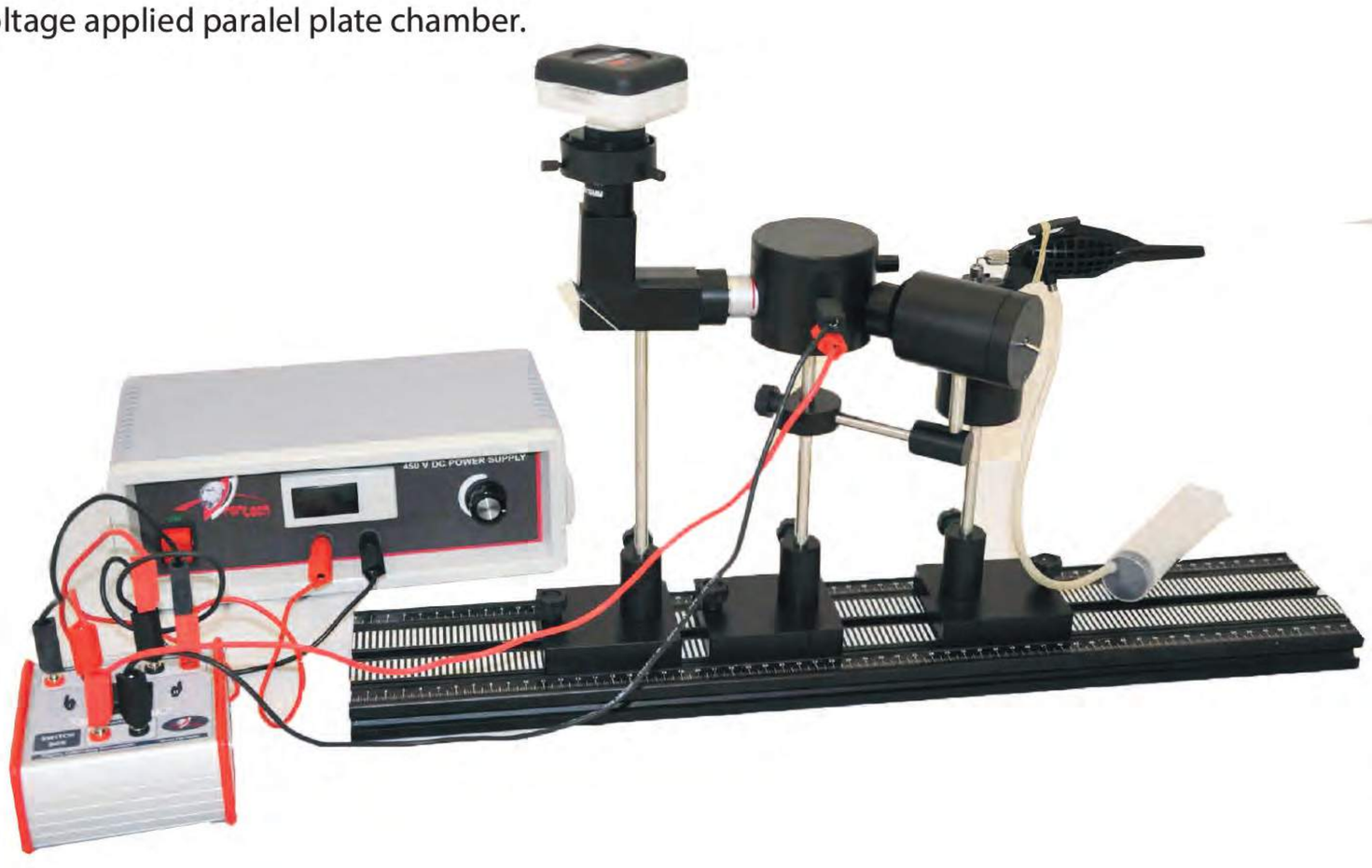
Item Code	Item Name
EE-0160-00	Hall Effect Apparatus (with Germanium Crystal)
EE-0161-00	Solenoids (2 Pcs) (with Solenoids, Iron Cores,Holders)
ST-0175-06	Bench (60 cm) (with Adjustable Legs).
EE-0033-00	Multimeter (2 pcs) (required, not included)
EE-0120-08	Connection Cables (80 cm, 8 Pcs)
MA-0052-00	Teacher and Student Guideline

MILICAN OIL DROP

REMA04

Description

The purpose of this experiment is to calculate spcific charge of electron by obsevring charged oil particles with microscpoe.camera inside a high voltage applied paralel plate chamber.



Order Information

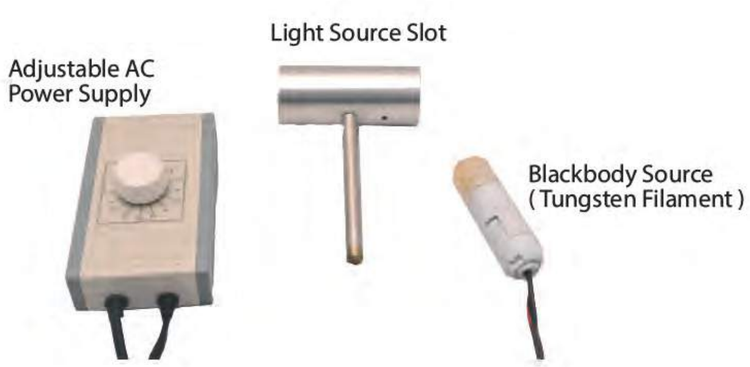
Item Code	Item Name
ME-0052-00	Microscope
ST-0276-00	Paralel Plates Chamber
ST-0284-00	Paralel Brass Plates Chamber
EE-0147-00	High Voltage Power Supply
ME-0053-00	Oil Injection Apparatus
EE-0138-00	LED Light Source
ST-0294-00	Microscope Display Adjustmen Track
EE-0120-05/15	Connection Cables
EE-0164-00	Switch Box
MA-0080-00	Experiment Manuel

BLACKBODY RADIATION

REMA20

Description

In this experiment radiation dependency to temperature and spctrum shift depending to temperature of tungsten filament is observed. Stephan Boltzmann's and Wien's displacement laws are proved



Order Information

Item Code		Item Name
EE-0180-00	.....	Blackbody Source (Tungsten Filament)
EE-0181-00	.....	Adjustable AC Power Supply
EE-0180-01	.....	Light Source Slot
GDX-SVISPL	.....	Vernier Spectrometer
PYR-BTA	.....	Pyranometer
		Vernier Surface Temperature Probe
ST-0175-06	.....	Bench (60 cm)
		LabQuest 3
VSP-FIBER	.....	Fiber Cable
ST-0286-00	.....	Fiber Cable Holder
MA-0074-00	.....	Deney Klavuzu-

Fiber Cable

Fiber Cable Holder

Required and not included vernier sensörs

Combination Track/Optics Bench

LabQuest® 3
LABQ3

STS-BTA

GDX-SVISPL

PYR-BTA

LABORATORY FURNISHINGS

Student Table

Teacher Table

Experiment Set Storage Cabinet

A VARIETY OF EXPERIMENTS IN A SINGLE KIT

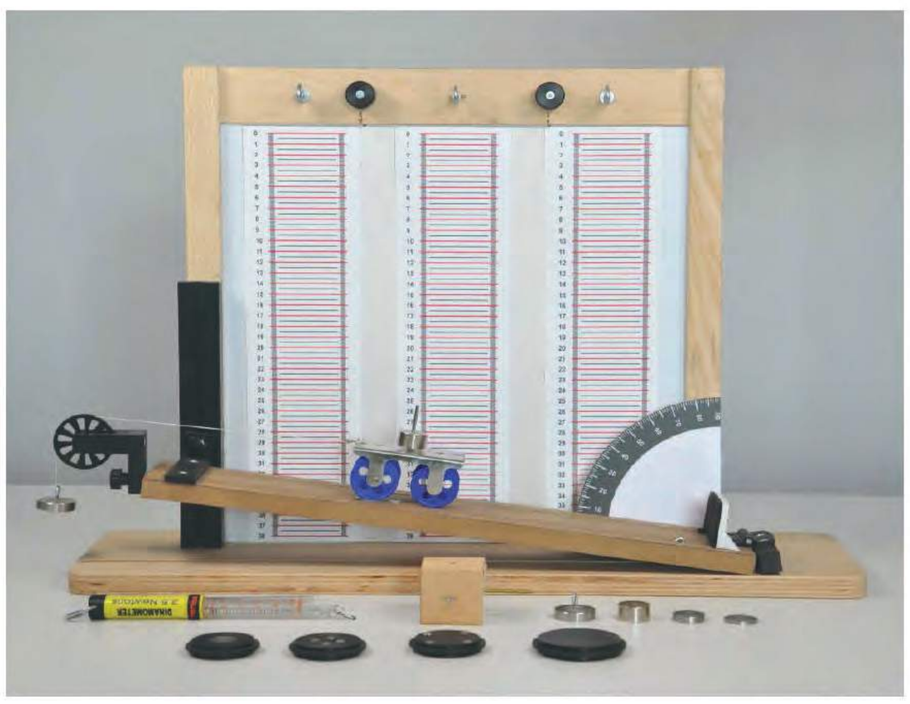
SIDE 1

MULTI-PHYSICS MECHANICS

Experiment Kit

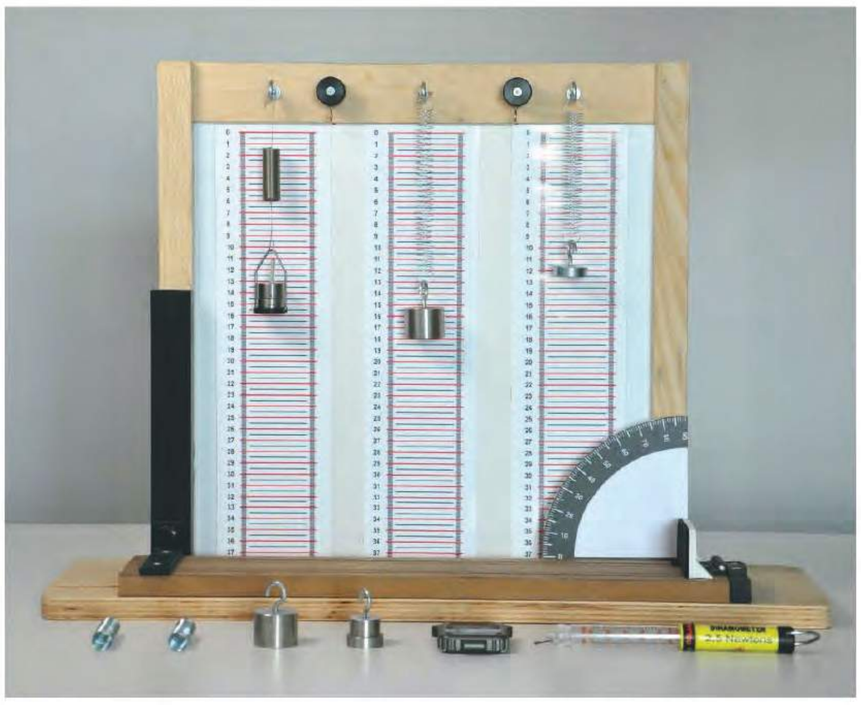
INCLINED PLANE and SPRING EXPERIMENTS

AN AFFORDABLE, PORTABLE, LIGHTWEIGHT, AND EASILY ASSEMBLED EXPERIMENT KIT



INCLINED PLANE EXPERIMENT EXPLORE

- The gravitational constant
- Forces on frictionless cart- dependence on angle and mass
- Motion under constant acceleration
- Conversion of potential to kinetic energy
- Static and kinetic friction
- Rotational motion with different inertia discs (demo)



SPRINGS EXPLORE

- Simple harmonic motion -amplitude,frequency
- Hookes Law
- Spring constant
- Use of force gauge (dynamometer)

A VARIETY OF EXPERIMENTS IN A SINGLE KIT

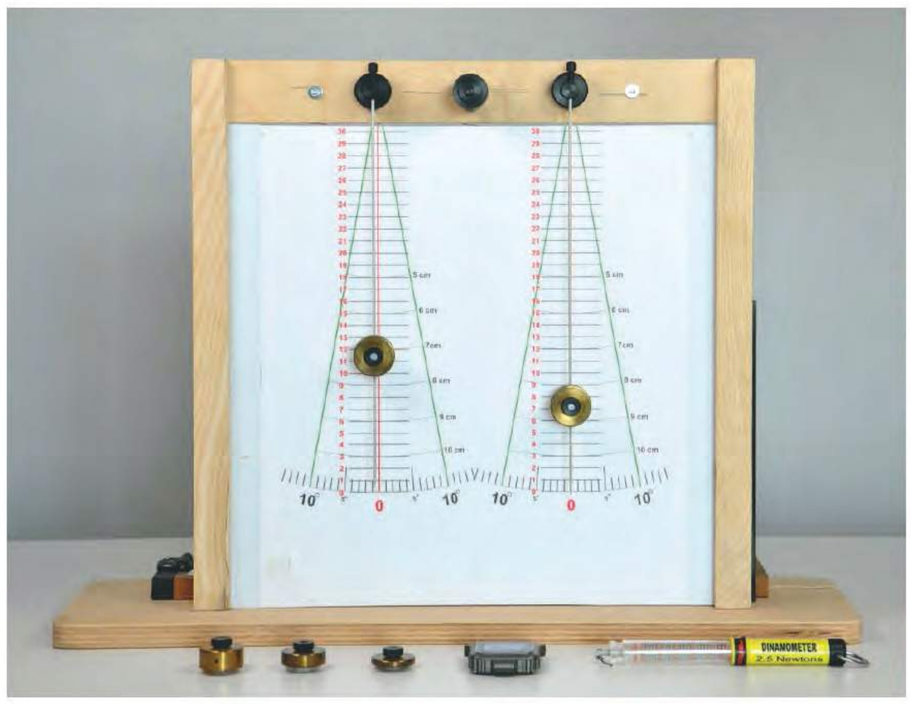
SIDE 2

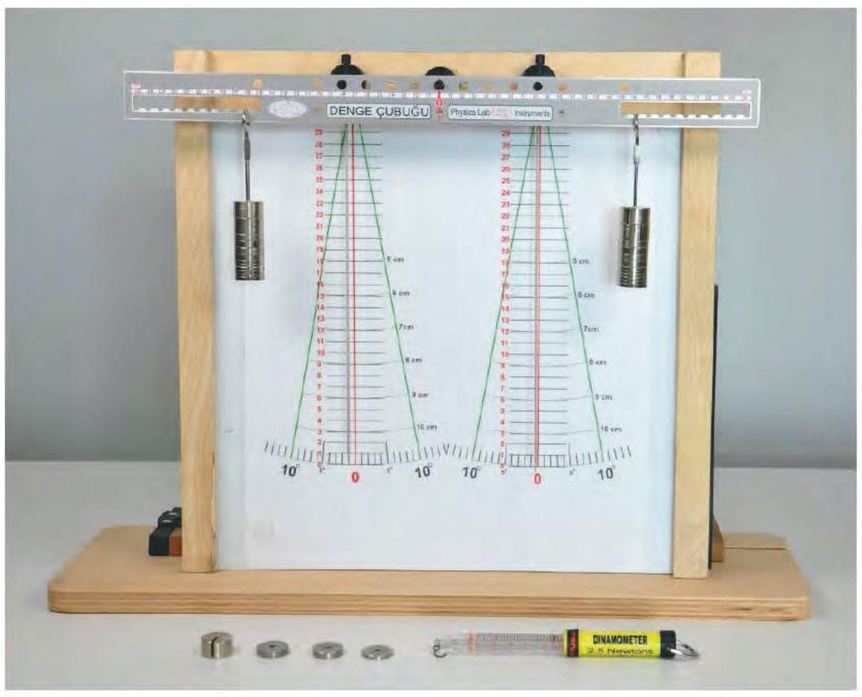
MULTI-PHYSICS MECHANICS

Experiment Kit

PENDULUM AND FORCE BALANCE EXPERIMENTS

AN AFFORDABLE, PORTABLE, LIGHTWEIGHT, AND EASILY ASSEMBLED EXPERIMENT KIT





PENDULUM EXPLORE:

- Laws of simple pendulum
- Harmonic Motion
- Conversion of Potential energy to Kinetic energy
- Effect of Pendulum length and mass
- Effect of air friction on motion and period

FORCE BALANCE EXPERIMENT EXPLORE:

- Study of balance and equilibrium
- Sum of vector forces and torque
- Effect of weight of lever
- Use of force gauge (dynamometer)

ORION science

www.orionscience.com

ORION

science

Unit 3, Templemichael Business Park Ballinalee Road, Longford.
N39 P296 | +353 43 334 1980 |
sales@orionscience.com