



Electronic Workstation with Instrument Panel

Model No : IES-EW-46



Technical specifications

General Requirements

- Integrated electronics workbench with working table and instrument panel.
- Suitable for electronics/electrical engineering laboratories for testing, measurement, soldering, and signal analysis.
- Mobile workstation mounted on wheels with locking mechanism.
- MCB protection on AC input supply for electrical safety.
- All instruments internally wired and front-mounted for safe, ergonomic operation.
- Proper grounding of all instruments.
- Design ensures durability, safety, and ease of use in academic labs.

Mechanical Structure

Material	CRC steel pipes, 38×38×1.5 mm, powder-coated.
Dimensions	W ≥ 1200 mm, D ≥ 750 mm, H ≥ 1150 mm.
Table Top	19 mm plywood, laminated with 1.8 mm off-white mica.
Antistatic Protection	2 mm antistatic mat covering entire work area.
Drawers	3 MS drawers (275×375×100 mm, 1.2 mm sheet), each with lock and handle.



Panel Structure	Raised back panel, total height 1200 mm, depth 500 mm, side supports for rigidity.
Socket Strip	MS panel strip with electrical sockets/switches for external use.
Electrical Specifications & Safety	
Input Supply	230 V AC, 50 Hz.
Protection	Two-pole MCB, 16 A, Havells/Siemens or equivalent.
Internal Wiring	Copper wires, properly terminated, labelled, routed in ducts/sleeves.
A. Function / Pulse Generator	
Bandwidth	10 MHz max.
Minimum Frequency	$\leq 1 \mu\text{Hz}$.
Waveforms	Sine, Square, Triangle, Ramp, Pulse, Noise, DC.
Arbitrary Waveforms	Sinc, Staircase, Staircase Up/Down.
Amplitude Range	$\sim 2 \text{ mVpp}$ to 12 Vpp into 50Ω .
Impedance	50Ω .
Accuracy	$\sim 1 \text{ mVpp}$.
Modulation	AM, FM, PM, FSK, PWM, Sweep & Burst (built-in).
DC Offset	$\pm 6.25 \text{ V}$, accuracy $\sim 2 \text{ mV}$.
Support Lifecycle	Free firmware/software updates during warranty; nominal cost during AMC.
B. Digital Storage Oscilloscope (DSO) with Component Tester	
Bandwidth	DC to 50 MHz or better.
Channels	≥ 4 .
Sample Rate	$\geq 1 \text{ GSa/s}$.
Memory Depth	$\geq 24 \text{ Mpts}$.
Vertical Scale	$1 \text{ mV/div} - 10 \text{ V/div}$.
Time Base	$5 \text{ ns/div} - 50 \text{ s/div}$.
Math Functions	A+B, A-B, A×B, A/B, FFT, logic ops, integration, differentiation, log/exp, filters.
Trigger Types	Edge, Pulse Width, Runt, Window, Nth Edge, Slope, Video, Pattern, Delay, Timeout, Duration, Setup/Hold, RS232/UART, I2C, SPI.
Bus Decoding	I2C, SPI, UART/RS232.



Measurements	≥ 33 automatic functions.
Display	≥ 7-inch color.
Waveform Update Rate	≥ 30,000 wfms/s.
Recording	Real-time, up to 60,000 frames.
Interfaces	USB 2.0 (Host & Device), LAN.
Component Tester	Short/open circuit, diode polarity, transistor comparative testing.

C. Dual Tracking DC Power Supply

Main Output	0 to ±30 V, 0–2 A, CV/CC modes.
Auxiliary Output	5 V, 2 A fixed.
Resolution	Voltage 100 mV, Current 10 mA.
Regulation	Load ±(0.05%+10 mV), Line ±(0.05%+10 mV).
Ripple & Noise	≤ 1 mVrms (0–30 V), ≤ 5 mVrms (5 V).
Transient Response	≤ 50 μs (±30 V), ≤ 100 μs (5 V).
Display	3-digit digital for V/I, switchable.
Protection	Overload, over-voltage, over-temperature, short-circuit.
Dimensions	285×410×88 mm, ~4.75 kg.

D. Soldering / Desoldering Station

Soldering	60 W, 170–270 V input, 180–480 °C range.
Desoldering	70 W, diaphragm pump, 170–270 V input, 180–480 °C range.

E. Digital Multimeter – Functions

DC Voltage	0.1 mV – 1000 V
AC Voltage	0.1 mV – 750 V
DC/AC Current	0.1 μA – 20 A
Resistance	0.1 Ω – 40 MΩ
Capacitance	10 pF – 200 μF
Frequency	0.1 Hz – 30 MHz
Temperature	–40 °C – 1000 °C
Transistor hFE	up to 1000

- Diode test, continuity buzzer (<30 Ω).



E. Digital Multimeter

Features	Auto/manual ranging, data hold, max/min hold, low battery indication.
Safety	Overload protection, 10 M Ω input impedance.
Power	3 V (AAA batteries).

Images are for illustration only; actual product may vary



Verification of Malus' Law

Model No : ML- 2020R/024



Apparatus designed for the study and verification of Malus' law

Technical specifications

Photodetector	
Type	silicon photocell
Aperture	~0.8–1.2 mm
Connection	4 mm safety socket
Mounting rod diameter	~9–11 mm
Polariser and Analyser	
Angular range	approx. -90° to $+90^{\circ}$
Least count	$\sim 1^{\circ}$
Aperture	~19–23 mm
Frame diameter	~125–135 mm
Mounting rod diameter	~9–11 mm

Images are for illustration only; actual product may vary



Energy Gap of a Semiconductor Experiment

Model No : SEG-201



Technical specifications

A. Semiconductor Instrumentation and Measurement Unit

- The apparatus shall be a laboratory-grade semiconductor instrumentation and measurement unit suitable for determining the energy gap of a semiconductor using the temperature dependence of the reverse saturation current of a p-n junction diode. The unit shall conform to the following minimum requirements:

Constant Current Source	High-stability, low-noise, solid-state constant-current source with continuously variable current control up to 200 mA minimum.
Digital Current Measurement	Built-in digital panel meter for current measurement with a range of at least 0–200 mA, resolution of 0.1 mA or better, and accuracy of $\pm 0.5\%$ or better.
Digital Voltage Measurement	Built-in digital panel meter with a voltage measurement range of at least 0–2 V, resolution of 1 mV or better, and accuracy of $\pm 0.5\%$ or better.
Semiconductor Sample	Semiconductor p-n junction diode suitable for energy-gap determination, using Silicon (Si) or Gallium Arsenide (GaAs) or equivalent semiconductor material. The diode shall be pre-mounted in a sealed, heat-resistant probe/test housing with suitable electrical terminals for safe and reliable connection.



Construction	The unit shall be suitable for repeated laboratory use and shall incorporate appropriate electrical protection and clearly identified input/output terminals.
Application	The instrument shall facilitate measurement of the relevant electrical parameters of the semiconductor sample over the required temperature range for determination of the semiconductor energy gap.

B. Digital Thermometer with Temperature Probe

Instrument Type	Digital thermometer with a suitable wired temperature probe, suitable for laboratory measurement of semiconductor sample temperature.
Temperature Range	Capable of measuring temperatures up to at least 300°C.
Display	Digital LCD or equivalent display providing clear temperature indication.
Sensor Probe	Durable stainless-steel temperature sensor probe suitable for the specified temperature range.
Functions	The thermometer shall include Auto-OFF or equivalent power-saving function.
Operation	Suitable for continuous temperature monitoring during the experiment.

C. Electric Heating Kettle

Type	Electric heating kettle/container suitable for controlled heating of the semiconductor sample assembly during the experiment.
Capacity	Minimum 1 litre.
Heating Power	Integrated electric heating element rated at minimum 1000 W.
Construction	Heat-resistant construction suitable for repeated laboratory use.
Heating Arrangement	Suitable for accommodating the semiconductor probe/sample assembly and temperature probe as required for the experiment.
Safety	The kettle shall incorporate appropriate electrical insulation and basic safety features suitable for laboratory operation.

Images are for illustration only; actual product may vary



Paramagnetic Susceptibility of Given Salt Using Quincke's Method

Model No : QU-201/124



Laboratory training setup for measurement, analysis, and study of magnetic fields using Gauss/Tesla meters, electromagnets, and paramagnetic materials

Microcontroller-based instrumentation with PC interface and dashboard software for data capture and visualization

Technical specifications

Quincke's Tube

- Provided with measuring scale and magnifying lens

Gauss/Tesla Meter

- Microcontroller-based LCD display
- Measurement in Gauss and Tesla units
- PC interface facility for data acquisition
- Dashboard software for data capturing

Sensor InAs probe for enhanced sensitivity

Range 0–20 kG

Special feature indication of magnetic field direction

Electromagnet

Pole diameter 50–55 mm

Coils 2 nos.

Resistance approx. 6 Ω (3 Ω per coil)

Input current 3.5–4 A at 20 V

Field generation capacity 9–10 kG



Constant Current Source

- LCD display for current monitoring

Current range	0–3.5 A
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Output voltage	20 V
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Mains input	230 V AC $\pm 10\%$, 50 Hz
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Paramagnetic Materials

- Ferric Chloride (FeCl_3)
- Manganese Sulphate (MnSO_4)

Images are for illustration only; actual product may vary



Photoconductive Cell Experimental Setup

Model No : PTC-201/120



Experimental setup for conducting experiments using a photoconductive cell

Technical specifications

Photo Detector

Type	CdS LDR
Aperture	~8–10 mm
Mounting rod	~10 mm diameter
<ul style="list-style-type: none">Connections via 4 mm safety terminals	
Working voltage	0–20 V DC

Polarizer / Analyzer

Angle range	$0^\circ \pm 90^\circ$
Aperture	~21 mm diameter
Frame size	~130 mm diameter
Mounting rod	~10 mm diameter

Adjustable Slit

Width	0–2 mm
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Images are for illustration only; actual product may vary



Fermi Energy of Copper – Experimental Setup

Model No : FE-501/110



Technical specifications

Fermi Energy Kit

- Constant current source

Digital milli-ammeter 0–20 mA

Digital milli-voltmeter 0–200 mV

- Copper coil with glass enclosure

Digital Thermostat

- Battery-operated probe type digital thermometer
- Auto OFF function

Maximum temperature up to 300 °C

Electric Kettle

Capacity 1 L

Power rating 1000 W

Test Tube Stand

- Heavy base stand for sample

Images are for illustration only; actual product may vary



Hall Effect Apparatus

Model No : HE-201



Laboratory apparatus for observation of Hall effect in doped semiconductors.

Enables determination of Hall coefficient, carrier concentration, and carrier velocity.

Suitable for postgraduate physics laboratory use.

Key features

Observation of Hall effect in doped semiconductors.

Determination of

Hall coefficient; Carrier concentration; Carrier velocity

Adjustable current and magnetic field for controlled experimentation.

Self-contained, easy-to-operate design.

Durable construction for repeated laboratory use.

Supported with instructional material or tutorial for experiment procedure.

Technical specifications

Equipment Components – Hall Effect Kit

- Constant current source with adjustable current output.
- Integrated digital milli-voltmeter for voltage measurement.
- Integrated digital milli-ammeter for current measurement.
- Magnet assembly included.

Equipment Components – Electromagnet

- Flat pole design with adjustable pole gaps.
- Capable of producing maximum magnetic field of 10 k Gauss.

Equipment Components – Constant Current Power Supply

Output rating 32 V / 4 A.

- Equipped with digital current meter for monitoring.



Equipment Components – Gauss Meter & Probe

- Auto-ranging functionality.
- Measurement capability up to 20 k Gauss.

Equipment Components – Hall Probes

- Both n-type and p-type probes supplied.

Equipment Components – Set of Patch Cords

- Insulated, durable, suitable for repeated laboratory connections.

Electrical Requirements

- Stable regulated power supply for electromagnet and Hall kit.
- Digital instruments for precise measurement of voltage, current, and magnetic field.

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Temperature Variation of Reverse Saturation Current in a P–N Junction

Model No : DZD-202



Designed with necessary safety precautions

Easy-to-understand circuit arrangement for learners

Onboard voltage, current, and temperature measurement facilities

PC interfacing for data acquisition and analysis

Supported with user manuals, experiment manuals, installation documentation, and training materials in either printed or electronic format

Key features

Determination of energy bandgap of semiconductor materials

Study of energy bandgap measurement software window

Observation of voltage, current, and temperature variations during experiment

Technical specifications

DC Power Supply

- +12–15 V, 2–2.5 A
- +5–6 V, 2–2.6 A

Diode

- PN-junction Germanium diode

Switch

- 1-pole, 2-way switch for circuit selection

Display

- 16 × 2 LCD display for measurement readouts

Measurement Ranges

Voltage	0–15 V
Current	0–50 μ A (approx.)
Temperature	0–60 °C



Oven Assembly

Height ~77 mm

Width ~74 mm

Heating coil Nichrome wire

Mechanical Specifications

Dimensions ~W 345 × D 110 × H 24 mm

- Weight suitable for laboratory bench-top use

Power Requirements

Mains supply 90–275 V AC, 50 Hz

Images are for illustration only; actual product may vary



Material Constant of an Intrinsic Semiconductor

Model No : UJT-201/131



Key features

Measurement of energy band gap in forward bias

Technical specifications

Sample

- Gallium Arsenide sample

Images are for illustration only; actual product may vary



Experimental setup for determination of Magnetic susceptibility of Ferrous ammonium sulphate by Gouy's balance method

Model No : DMS-201



Technical specifications

- Experimental Setup for Determination of Magnetic Susceptibility of Ferrous Ammonium Sulphate by Gouy's Balance Method

Electromagnet	
Pole piece	75 mm tapered to 25 mm
Magnetic field	20 kG at 6 mm air gap
Energising coils	Two of approximately 13 W each
Power Supply	
Output	0–40 V, 10 A
Range	2 k gauss & 20 k gauss
Resolution	1 gauss at 2 k gauss, 10 gauss at 20 k gauss
Input power	220 V, 50 Hz AC
Measurement	Hall probe
Digital Balance	
Capacity	230 g
Accuracy	0.0001 g
Safety	
<ul style="list-style-type: none">High current safety wire (red and black)	



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Numerical Aperture & Acceptance Angle Setup

Model No : NA-201/028



Laboratory apparatus for studying numerical aperture (NA) and acceptance angle of optical fiber cables.

Suitable for physics and communication laboratory experiments.

Key features

Enables measurement of numerical aperture of optical fiber.

Facilitates determination of acceptance angle.

Provides accurate alignment and measurement using X-Y bed and graduated screen.

Self-contained, easy-to-operate design.

Durable construction for repeated laboratory use.

Supported with instructional material or tutorial for experiment procedure.

Technical specifications

Equipment Components – X-Y Bed

- Graduated screen with pitch of 2 mm.
- Optical Fiber Cable (OFC) chuck to firmly lock cable end.
- Slider with scale to vary distance between screen and OFC.

Equipment Components – Semiconductor Diode Laser

Model LAS-301 (or equivalent).

Output power 3 mW.

Wavelength 625 nm.

- Supplied with regulated power supply.

Equipment Components – OFC Cable

Type Multimode.

Length 1.5 m.



Electrical Requirements

- Stable regulated power supply for laser diode.
- Safe operation with laboratory-grade connectors and insulation.

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Study of Eddy Currents and Lenz's Law Kit

Model No : EDD-226



Technical specifications

Instrument

- Experimental kit for study of eddy currents and Lenz's law

Images are for illustration only; actual product may vary



Measurement of Velocity using Electromagnetic Induction

Model No : EMI-226



Key features

High-speed data logger with sampling capability up to ~100 k samples/s

Coil sets with different turns and wire gauges for comparative analysis

Software support for data acquisition and analysis

Multifunction digital timer with navigation keys for time, velocity, acceleration, masking, and counter modes

Technical specifications

- Experimental Setup for Measurement of Velocity using Electromagnetic Induction and Verification of Faraday's Law

General Requirements

- Designed for measurement of velocity using electromagnetic induction
- Verification of Faraday's law using software and data acquisition and analysis system
- Includes high-speed data logger, coil sets, software support, multifunction digital timer, and sensors

Data Logger

Sampling rate	up to ~100 kS/s
Memory capacity	~800 k samples
Built-in sensor support	~6 channels
External sensor ports	~4, compatible with multiple sensor types
Connectivity	micro USB interface
Dimensions	~85–95 mm × 85–95 mm × 18–25 mm
Weight	~100–150 g

Voltage Sensor

Measurement range	~±2.5 V AC/DC
Accuracy	~±3%



Resolution	~1–2 mV
Input resistance	>1 MΩ
Digital Timer	
<ul style="list-style-type: none">Dual-line LCD display	
Time resolution	~0.1 ms
Operating modes	time, speed, acceleration measurement
<ul style="list-style-type: none">USB interface support	
Operating voltage	~5 V DC
Photogate	
<ul style="list-style-type: none">Infrared detector-based arrangement	
<ul style="list-style-type: none">RJ11 connector interface	
Coil Set	
Wire gauges	SWG 26–30
Coil lengths	~75–100 mm
Number of turns	~700–1150
Resistance	~10–20 Ω
Inductance	~8–15 mH
Maximum current capacity	~0.3–0.7 A
Magnet	
<ul style="list-style-type: none">Cylindrical Alnico magnet	
Dimensions	~45–55 mm length × 8–12 mm diameter

Images are for illustration only; actual product may vary



Magnetic Field Measurement using Helmholtz Coils

Model No : SG-201/411



Technical specifications

Helmholtz Coil Set

Material	Copper
Coil diameter	150 mm
Number of turns	390
Maximum current	1 A
Connection	4 mm safety socket

Coil Base

Material	Aluminium
U-channel dimensions	350 × 210 × 25 mm (L × W × H)
Scale	0–22 cm
Least count	1 mm

Deflection Compass

Material	Aluminium
Compass diameter	100 mm
Rider dimensions	150 × 60 mm (L × W)



U Rail with Rider	
Material	Aluminium
Dimensions	725 × 60 × 15 mm (L × W × H)
Scale	0–50 cm
Least count	1 mm
Rider dimensions	60 × 60 mm (L × W)
Digital Gauss Meter	
Range	200 G and 2 kG
Sensor	InAs type
Display	3½ digit LED
Resolution	0.1 G at 0–200 G
Offset adjustment	Potentiometer for zero setting
Power Supply	
Output	0–20 V, 5 A
Input voltage	220 V AC ±5%, 50 Hz

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To study the I-V characteristics of solar cell

Model No : SOL-301/128



Key features

VI analysis of solar cells using onboard measurement system

Study of solar panel characteristics under varying load conditions

Integration with microcontroller for automated data acquisition and analysis

Technical specifications

- Experimental Setup for Study of I–V Characteristics of Solar Cell

General Requirements

- Provided with solar panel (6 cells or more)
- Onboard voltmeter and ammeter
- STM32 microcontroller-based dual channel I–V measurement system with PC interface
- GUI support for VI analysis
- Designed for classroom and laboratory use with durable construction and clear labelling

Solar Panel

Number of cells	6 or more
V _{max} per cell	1–1.5 V
I _{max} per cell	125–150 mA

Measurement Instruments

Voltmeter range	0–10 V
Ammeter range	0–500 mA
Potentiometer	5 K



Components

Rechargeable NiCd battery 1 × AA, 1.2 V

Bulb 1.2 V, 270 mA

Fan 1.5 V, 400 mA

Microcontroller Measurement System

- Dual channel STM32-based I–V measurement system with PC interface

Voltage measurement range 0–36 V DC

Current measurement range 0–2.5 A

Power supply 5 V / 12 V DC

Power Supply

Mains supply 230 V ±10%, 50 Hz

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Thermoelectric Power of Metal

Model No : TEA- 1212/311



Technical specifications

- Experimental Setup for Determination of Thermoelectric Power of Metal

Experiments

- Determination of temperature
- Sensitivity of thermocouple
- Calibration of thermocouple

Setup Components

Thermo EMF Amplifier	Fixed gain amplifier with digital voltmeter, bi-junction thermocouple
Digital Thermometer	Battery operated, up to 300 °C, resolution 0.1 °C
Electric Kettle	1 L capacity, mains operated
Beakers	250 ml × 2

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Thermoelectric power of a semiconductor

Model No : PSE- 1708/304



Technical specifications

- Experimental Setup for Thermoelectric Power of a Semiconductor

Peltier & Seebeck Effect Kit

- Digital voltmeter
- Digital ammeter
- Regulated power supply with voltage variable up to 12 V
- Digital dual channel temperature indicator

Peltier Module

- Sandwiched between two heat sinks of same mass and dimensions
- Insulated with thermal wool
- Holes provided for thermometers

Thermocouple

- Digital temperature probes (2 nos.)

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Verification of Stefan's Law by Electrical Method

Model No : BBR301/126



Technical specifications

Black Body Radiator Kit

- Variable regulated power supply
- Digital voltmeter
- Digital ammeter

Black Body Module

- Solid spherical black body
- Heater and thermocouple assembly

Digital Temperature Indicator

- Temperature display up to 200 °C

Resolution 0.1 °C

Patch Cords

- Set provided for connections

Images are for illustration only; actual product may vary



Biprism – Determination of Wavelength of Light

Model No : WB501/008



Technical specifications

Fresnel's Biprism	
Dimensions	50 × 40 mm (L × H)
Angle	179°
Refractive index	1.52
Slit	
Range	0 – 2.5 mm
Opening	6 mm
Lens	
Focal length	100 mm
Diameter	50 mm
Optics Holder	
Dimensions	Ø130 × 3 mm (Ø × T)
Height	230 mm
Universal Holder	
3-point clamp (0	90 – 180)
Rotation	0–360°



Micrometer	
Range	30–0–30 mm
<ul style="list-style-type: none">• ½ least MSD	
Eye Piece	
<ul style="list-style-type: none">• 10× zoom	
Dimensions	31 × 23 mm (L × Ø)
Least Count	
<ul style="list-style-type: none">• 0.005 mm	

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Measurement of Numerical Aperture of an Optical Fiber

Model No : NA-201/028



Fiber Optic Digital Link training system designed to study optical communication in a digital link

Demonstrates conversion of electrical signal into modulated light beam, transmission through fiber optic cable, and reconnection into electrical signal at receiver end

Includes study of losses during transmission

Inbuilt square wave generator for digital modulation experiments

Key features

Study of 650 nm fiber optic digital link by analyzing input and received signals

Intensity modulation of digital signal, transmission over fiber optic cable, and demodulation at receiver

Study of Electro-Optic (EO) characteristics

Measurement of Numerical Aperture (NA) of the fiber

Technical specifications

Transmitter

Peak wavelength ~660 nm

Receiver

- Fiber Optic photodetector

Driver

- Digital driver circuitry

Fiber Optic Cable

- Step-indexed multimode PMMA plastic fiber

Length 0.5 m

Connector type SMA



Bandwidth

Analog bandwidth ~340 kHz

Digital bandwidth ~2.5 MHz

Fiber Characteristics

Diameter 1000 microns

Refractive index Core 1.492, Cladding 1.406

Numerical Aperture (NA) better than 0.5

Power Requirements

- Operates on +12 V DC (via adaptor)

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Thermistor Energy Gap

Model No : TRV1101/129



A laboratory training setup designed to study the energy gap of thermistors and other temperature transducers. The system is modular, includes onboard signal conditioning, regulated DC power supply, mimic diagrams, and supports switching/alarm demonstrations.

Key features

Four different temperature transducers included

Supports study of transducer-controlled switching and alarm systems

Onboard signal conditioning circuitry

Built-in regulated DC power supply

Functional block representation via onboard mimic diagrams

Modular layout for experimentation and learning

Practical study and characterization of

IC Temperature Sensor; NTC Thermistor; NTC Bridge Circuit; Platinum RTD; K Type Thermocouple

Study of temperature-controlled alarm and switching systems

Technical specifications

Transducers (4 Nos.)

- NTC Thermistor
- Platinum RTD
- K Type Thermocouple
- IC Temperature Sensor



Heating Element

- Wire wound type

Power ratings	47 W and 10 W
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Signal Conditioning Circuitry

- Instrumentation amplifier
- X100 gain amplifier
- DC amplifier
- Comparator
- Electronic switch

Input & Output Circuits

- Input circuits for transducer interfacing
- Output circuits with relay and buzzer for alarm demonstration
- Interconnections via 2 mm banana sockets

Electrical Requirements

Mains supply	100–240 V AC, 50/60 Hz
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Power consumption	~2 VA
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Mechanical Specifications

Dimensions	W 326 × D 252 × H 52 mm
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Weight	~1.5 kg
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Operating Conditions

Operating temperature	0–40 °C
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Relative humidity	up to 85% RH (non-condensing)
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Images are for illustration only; actual product may vary



Particle Size Determination of Solids (Specific Heat of Solid by Electrical Method)

Model No : SH-201/306



A laboratory training setup designed to determine the specific heat of solids using the electrical method.

Technical specifications

U-shaped Glass Tube

- With wooden handle

Digital Stop Clock

- Mains operated
- Start/Stop switch and Reset button on front face

Range 999.9 sec

Resolution 0.1 sec

Digital Thermometer

- Battery operated
- Measurement up to 300 °C

Resolution 0.1 °C

Electric Kettle

Capacity 1 L

- Mains operated

Digital Balance

- Compact size

Resolution 0.01 g



Range	200 g
<ul style="list-style-type: none">Battery operated	
Steel Balls Set	
Diameter	5 mm
Quantity	100 nos

Images are for illustration only; actual product may vary



Photo-Diode Characteristics Setup

Model No : PD501/119



Laboratory apparatus for studying photo-diode characteristics.

Enables determination of responsivity, quantum efficiency, I-V characteristics, and verification of the inverse square law.

Suitable for physics and electronics laboratory experiments.

Key features

Determination of

Responsivity; Quantum efficiency; I-V characteristics

Verification of inverse square law using optional slidable track arrangement.

Self-contained, easy-to-operate design.

Durable construction for repeated laboratory use.

Supported with instructional material or tutorial for experiment procedure.

Technical specifications

Equipment Components – Photo-Diode Characteristics Kit

- Variable regulated power supply.
- Integrated digital voltmeter for voltage measurement.
- Integrated digital milliammeter for current measurement.

Equipment Components – Illumination Chamber

- Independent variable output power supply.
- LED power displayed in milliwatts (mW).
- Photo-diode slot at marked distances for controlled measurements.

Equipment Components – Set of Patch Cords

- Insulated, durable, suitable for repeated laboratory connections.



Equipment Components – Optional Provision

- Arrangement for inverse square law verification.
- Photo-diode mounted on a slidable track for distance variation.

Electrical Requirements

- Stable regulated power supply for photo-diode kit and illumination chamber.
- Digital instruments for precise measurement of voltage, current, and LED power.

Images are for illustration only; actual product may vary



Determination of Coupling Coefficient of Piezo-Electric Crystal

Model No : FSEL-315



A laboratory training setup designed to determine the coupling coefficient of a piezo-electric crystal. The system includes required measuring instruments, component boxes, and the crystal unit for experimental study.

Technical specifications

Signal Generator

1 Hz – 1 MHz

- Wideband AC Ammeter
- Wideband AC Voltmeter
- Decade Inductor Box
- Decade Resistance Box
- Decade Capacitance Box
- Piezo-electric crystal in a box
- Connecting wires

Images are for illustration only; actual product may vary



Calibration of Thermistor for Temperature Measurement

Model No : TCT-2202



System includes four different temperature transducers
Supports study of transducer-controlled switching and alarm systems

On-board signal-conditioning circuitry provided

Built-in regulated DC power supply included

Functional block representation through on-board mimic diagrams

Modular layout to facilitate experimentation and learning

Key features

Practical study and characterization of

IC Temperature Sensor; NTC Thermistor; NTC Bridge Circuit; Platinum RTD; K-Type Thermocouple; Temperature-controlled alarm and switching systems; Bi-junction Thermocouple (Copper and Constantan)

Technical specifications

Transducers (5 Nos.)

- NTC Thermistor
- Platinum RTD
- K-Type Thermocouple
- IC Temperature Sensor
- Bi-junction Thermocouple (Copper and Constantan)

Heating Element

- Wire-wound type

Power ratings 47 W and 10 W

Signal Conditioning Circuitry

- Instrumentation amplifier
- X100 gain amplifier
- DC amplifier
- Comparator



Input & Output Circuits

- Input circuits for transducer interfacing
- Output circuits include relay and buzzer for alarm demonstration
- Interconnections via 2 mm banana sockets

Electrical Requirements

Mains supply 100–240 V AC, 50/60 Hz

Power consumption approx. 2 VA

Mechanical Specifications

Dimensions approx. W 326 × D 252 × H 52 mm

Weight approx. 1.5 kg

Operating Conditions

Operating temperature 0–40°C

Relative humidity up to 85% RH (non-condensing)

Same specification as PhyUGEx-15. Images are for illustration only; actual product may vary



Helmholtz Resonator Using Electrical Signal Generator

Model No : DHR201/200



Technical specifications

Experiment Setup – Helmholtz Resonator on Stand

- Speaker and microphone arrangement in a box
- Helmholtz funnel mounted on heavy metal stand

Experiment Setup – Digital Tuning Fork

- Sine wave output
- Fixed amplitude
- Variable frequency

Experiment Setup – Relative Sound Intensity Meter

- Sound level measuring instrument
- Displays relative intensity

Experiment Setup

- Connecting Wires

Images are for illustration only; actual product may vary



Variation of Electrical Conductivity with Temperature in Metals

Model No : TDE-226



Technical specifications

Scope

Experimental setup for studying thermal and electrical conductivity of metals (Aluminium or Copper rods) under controlled heating conditions.

Specifications

- Digital Micro Voltmeter
- Digital Ammeter
- Regulated DC Power Supply
- Two-Channel Thermometer
- Aluminium or Copper rod arrangement with ceramic heater and power supply

Images are for illustration only; actual product may vary



Variation of Electrical Conductivity with Temperature in Semiconductors

Model No : STS501/127



Designed with necessary safety precautions

Easy-to-understand circuit arrangement for learners

Onboard voltage, current, and temperature measurement facilities

PC interfacing for data acquisition and analysis

Supported with user manuals, experiment manuals, installation documentation, and training materials in either printed or electronic format

Key features

Determination of Energy Bandgap of semiconductor materials

Study of Energy Bandgap Measurement Software Window

Observation of voltage, current, and temperature variations during experiments

Technical specifications

DC Power Supply

- +12–15 V, 2–2.5 A
- +5–6 V, 2–2.6 A

Specifications

Diode	PN junction Germanium diode
Switch	1 pole, 2 way switch for circuit selection
Display	16 × 2 LCD display

Measurement Ranges

Voltage	0–15 V
Current	0–50 µA (approx.)
Temperature	0–60°C



Oven Assembly	
Height	~77 mm
Width	~74 mm
Heating coil	Nichrome wire
Mechanical Specifications	
Dimensions	~345 × 110 × 24 mm
Weight	Suitable for laboratory bench-top use
Specifications	
Power Requirements	Operates from mains supply 90–275 V AC, 50 Hz

Images are for illustration only; actual product may vary



Fixed Frequency Oscillators – 1 kHz / 5 V

Model No : FFO-201



Fixed frequency oscillators suitable for laboratory and electronic applications

Technical specifications

Frequency	1 kHz
Output Voltage	5 V

Images are for illustration only; actual product may vary



Verification of Principle of Conservation of Energy

Model No : SL1047



Technical specifications

Car Assembly

- Wireless dynamic car assembly with spring-loaded independent wheels
- Power ON/OFF switch with LED indicators for forward, reverse, and battery status

Data transmission capability secondary-to-primary car communication

- Neodymium magnets at front and back for attachment

Motion encoding dual-channel encoder

- Communication between cars via infrared transmission

Distance resolution 2 mm (based on wheel diameter)

Time resolution 100 microseconds

Operating voltage 9 V

- Compatible with Windows operating system via Bluetooth interface

Track System

- Linear stainless-steel track, length 1.5 m
- Tracks designed for unrestricted motion of cars
- Hook attachments and inclination feet provided for experimental variations



Accessories & Attachments

- Additional weight mass
- Wireless Dynamic Car (Primary)
- Dynamic Car (Secondary)
- Dynamic linear track (1.5 m)
- Cotton thread (white)
- Rubber bands (size 2.5")
- Screwdriver
- Double-sided tape (1 m)
- Barrier (large)
- Weight hanger
- Slotted weights
- Velcro pad
- Hook attachment for track

Images are for illustration only; actual product may vary



Determination of Surface Tension of Water and Interfacial Tension Between Two Immiscible Liquids Using Drop Weight Method

Model No : DP-226



Technical specifications

- 50 ml Burette with flow controller with suitable rubber tube and glass tube , Beaker 250ml

Images are for illustration only; actual product may vary



Calibration of Thermistor for Temperature Measurement

Model No : TRV1101/129



System includes four different temperature transducers
Supports study of transducer-controlled switching and alarm systems

On-board signal-conditioning circuitry provided

Built-in regulated DC power supply included

Functional block representation through on-board mimic diagrams

Modular layout to facilitate experimentation and learning

Key features

Practical study and characterization of

IC Temperature Sensor; NTC Thermistor; NTC Bridge Circuit; Platinum RTD; K-Type Thermocouple; Temperature-controlled alarm and switching systems; Bi-junction Thermocouple (Copper and Constantan)

Technical specifications

Transducers (5 Nos.)

- NTC Thermistor
- Platinum RTD
- K-Type Thermocouple
- IC Temperature Sensor
- Bi-junction Thermocouple (Copper and Constantan)

Heating Element

- Wire-wound type

Power ratings 47 W and 10 W

Signal Conditioning Circuitry

- Instrumentation amplifier
- X100 gain amplifier
- DC amplifier
- Comparator



Input & Output Circuits

- Input circuits for transducer interfacing
- Output circuits include relay and buzzer for alarm demonstration
- Interconnections via 2 mm banana sockets

Electrical Requirements

Mains supply	100–240 V AC, 50/60 Hz
Power consumption	approx. 2 VA

Mechanical Specifications

Dimensions	approx. W 326 × D 252 × H 52 mm
Weight	approx. 1.5 kg

Operating Conditions

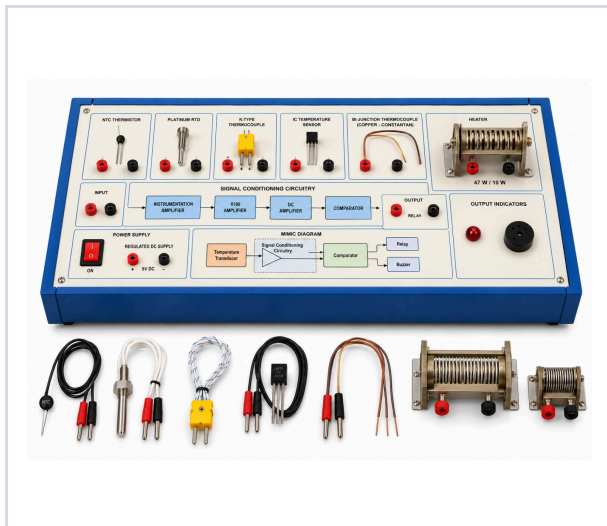
Operating temperature	0–40°C
Relative humidity	up to 85% RH (non-condensing)

Images are for illustration only; actual product may vary



Calibration of Thermistor for Temperature Measurement

Model No : TEA1212/311



System includes four different temperature transducers

Supports study of transducer-controlled switching and alarm systems

On-board signal-conditioning circuitry provided

Built-in regulated DC power supply included

Functional block representation through on-board mimic diagrams

Modular layout to facilitate experimentation and learning

Key features

Practical study and characterization of

IC Temperature Sensor; NTC Thermistor; NTC Bridge Circuit; Platinum RTD; K-Type Thermocouple; Temperature-controlled alarm and switching systems; Bi-junction Thermocouple (Copper and Constantan)

Technical specifications

Transducers (5 Nos.)

- NTC Thermistor
- Platinum RTD
- K-Type Thermocouple
- IC Temperature Sensor
- Bi-junction Thermocouple (Copper and Constantan)

Heating Element

- Wire-wound type

Power ratings 47 W and 10 W

Signal Conditioning Circuitry

- Instrumentation amplifier
- X100 gain amplifier
- DC amplifier
- Comparator



Input & Output Circuits

- Input circuits for transducer interfacing
- Output circuits include relay and buzzer for alarm demonstration
- Interconnections via 2 mm banana sockets

Electrical Requirements

Mains supply	100–240 V AC, 50/60 Hz
Power consumption	approx. 2 VA

Mechanical Specifications

Dimensions	approx. W 326 × D 252 × H 52 mm
Weight	approx. 1.5 kg

Operating Conditions

Operating temperature	0–40°C
Relative humidity	up to 85% RH (non-condensing)

Same specification as PhyUGEx-15.



Calibration of Thermistor for Temperature Measurement

Model No : TEA1212/312



System includes four different temperature transducers

Supports study of transducer-controlled switching and alarm systems

On-board signal-conditioning circuitry provided

Built-in regulated DC power supply included

Functional block representation through on-board mimic diagrams

Modular layout to facilitate experimentation and learning

Key features

Practical study and characterization of

IC Temperature Sensor; NTC Thermistor; NTC Bridge Circuit; Platinum RTD; K-Type Thermocouple; Temperature-controlled alarm and switching systems; Bi-junction Thermocouple (Copper and Constantan)

Technical specifications

Transducers (5 Nos.)

- NTC Thermistor
- Platinum RTD
- K-Type Thermocouple
- IC Temperature Sensor
- Bi-junction Thermocouple (Copper and Constantan)

Heating Element

- Wire-wound type

Power ratings 47 W and 10 W

Signal Conditioning Circuitry

- Instrumentation amplifier
- X100 gain amplifier
- DC amplifier
- Comparator



Input & Output Circuits

- Input circuits for transducer interfacing
- Output circuits include relay and buzzer for alarm demonstration
- Interconnections via 2 mm banana sockets

Electrical Requirements

Mains supply	100–240 V AC, 50/60 Hz
Power consumption	approx. 2 VA

Mechanical Specifications

Dimensions	approx. W 326 × D 252 × H 52 mm
Weight	approx. 1.5 kg

Operating Conditions

Operating temperature	0–40°C
Relative humidity	up to 85% RH (non-condensing)

Same specification as PhyUGEx-15.



Determination of Refractive Index of Glass and Liquid by Total Internal Reflection

Model No : RI-226



Technical specifications

Components

Glass Slab 75 × 50 × 20 mm

Glass Tank 60 × 30 × 50 mm

Green Laser Battery operated

- Digital Protractor

Images are for illustration only; actual product may vary



Determination of L and C by Equal Voltage Method

Model No : LC-1202



Laboratory setup for determination of inductance (L) and capacitance (C) using equal voltage method

Technical specifications

- Wide band AC voltmeter
- Set of inductance and capacitors
- AC power supply

Images are for illustration only; actual product may vary



Anderson's Bridge – Determination of Inductance

Model No : VI-305/501



On-board test points to observe signals

On-board schematic diagram for easy understanding

Flexible circuit connections

Lightweight and compact design

Supported with user manuals, experiment manuals, installation documentation, and training materials in either printed or electronic format

Key features

Measurement of unknown inductance using Anderson's Bridge

Technical specifications

DC Output Voltages (Fixed)

- ± 12 V, ± 5 V

Maximum Output Current

- 200 mA per output

Ripple

- Less than 2 mVrms

Power Supply Requirements

- Operates from 230 V AC $\pm 10\%$, 50/60 Hz mains supply

Connections

- 2 mm terminal sockets for all outputs
- Suitable for powering analog and digital electronic circuits in laboratory environments

Images are for illustration only; actual product may vary



Black Box – Identification and Determination of L, C, and R Values

Model No : BEE301/504



Key features

Identification of unknown components (inductor, capacitor, resistor)

Determination of values of L, C, and R components

Technical specifications

Experiment Setup

- Black box kit with built-in housing for unknown components (capacitor, inductor, resistor)

Digital voltmeter	0–20 V
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- Connecting wires
- Manual
- Cabinet made of acrylic

Images are for illustration only; actual product may vary



Projectile Launcher – For Study of Conservation of Energy and Momentum Using Projectile Motion

Model No : CKE201/403



Technical specifications

- The apparatus shall be a laboratory-grade projectile launching and measurement system suitable for conducting experiments to study projectile motion and the conservation of mechanical energy, including determination of launch velocity and analysis of the motion of the projectile.
- The system shall have, as a minimum, the following features and specifications:

Launch Angle	Adjustable through a range of 90° to 0° to 90° with respect to the vertical/plumb- line reference, with provision for secure locking at the selected angle.
Mounting Arrangement	The launcher shall be suitable for secure mounting on a laboratory bench or table using a U-clamp or equivalent robust clamping mechanism.
Clamping Capacity	The mounting arrangement shall accommodate bench/table thicknesses of up to 35 mm.
Launching Mechanism	Spring-loaded launching mechanism providing repeatable and consistent launch conditions, with provision for controlled adjustment of the launch/tension setting.
Projectile	Lightweight, durable plastic projectile ball of approximately 15 mm diameter, suitable for repeated laboratory experiments.
Photogate Measurement	The system shall incorporate two non-contact optical photogates using infrared or equivalent optical detection technology for accurate measurement of projectile transit time and determination of velocity-related parameters.



Digital Timer and Display Unit	<p>Microcontroller-based digital measurement unit with:</p> <p>Minimum two-line LCD or equivalent digital display.</p> <p>Measurement of time, speed and acceleration.</p> <p>Photogate timing resolution of 0.1 ms or better.</p> <p>Support for measurement using two photogates.</p> <p>USB interface for data communication and/or connection to a computer.</p> <p>Operating voltage of 5 V DC or equivalent safe low-voltage DC supply.</p> <p>Microcontroller-based operation.</p> <p>Built-in diagnostic/self-test functions to verify proper operation of the measurement system.</p>
Measurement and Analysis	<p>The system shall permit measurement of the time interval between the photogates and enable determination of projectile velocity and acceleration for comparison with theoretical values.</p>
Experimental Applications	<p>The complete apparatus shall be suitable for:</p> <p>Studying projectile motion at different launch angles.</p> <p>Determining initial/launch velocity of the projectile.</p> <p>Studying the relationship between launch angle, velocity, range and time of flight.</p> <p>Demonstrating and analysing conservation of mechanical energy during projectile motion.</p> <p>Supporting experiments involving linear momentum and its conservation, wherever applicable to the experimental arrangement.</p> <p>Comparing experimentally determined values with theoretical calculations.</p>
Construction	<p>The launcher, mounting assembly and associated components shall be robust, durable and suitable for frequent use in an undergraduate physics laboratory.</p>
Accessories	<p>The bidder shall supply all necessary photogates, projectile(s), mounting/clamping hardware, connecting cables, power adaptor/supply, and other standard accessories required for the complete and functional operation of the system.</p>
Documentation	<p>The equipment shall be supplied with an operating/instruction manual containing details of operation, precautions, experimental procedures and relevant technical specifications.</p>
Equivalence	<p>The offered equipment shall meet or exceed the above minimum functional and performance requirements. Brand name, manufacturer-specific model number, proprietary terminology or equivalent trade-specific designations shall not be considered as requirements for compliance. Equivalent or superior technology shall be acceptable.</p>



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Images are for illustration only; actual product may vary



Spectral Characteristics Study System – Photovoltaic Cell (Solar Cell)

Model No : SOL-301/A



Laboratory training system designed for optical experiments and electrical measurement analysis

Includes light source, optical bench, integrated measurement instruments, and microcontroller-based dual-channel voltage/current measurement system with PC interface and GUI support

Technical specifications

Filters	Blue, Yellow, Green, Red, Orange
Light Source	Provided
Solar Cell	Provided
Optical Bench	Length 50 cm
DC Voltmeter	LCD, 3½ digit, range 200 mV – 200 V
DC Ammeter	LCD, 3½ digit, range 2 µA – 200 mA
Power Supply	
Mains	230 V ±10%, 50 Hz
Fuse	0.5 A
Built-in regulated DC outputs	+5 V and +12 V
Microcontroller Measurement System	
<ul style="list-style-type: none">STM32-based dual-channel voltage and current measurement systemPC interface for data acquisition and analysis	
Voltage measurement range	0–36 V DC
Current measurement range	0–2.5 A



Software Interface

- GUI for voltage-current (VI) analysis
- Real-time visualization and data logging

Images are for illustration only; actual product may vary



Tunnel Diode Trainer – I–V Characteristics Study

Model No : TD-1023



Key features

Forward and reverse characteristics of diodes

Study of V–I characteristics of
Tunnel diode

Technical specifications

General Requirements

- Trainer with +12 V DC power supply

3½ digit ammeter (range) 1 μ A to 200 mA)

3½ digit voltmeter (range) 1 mV to 200 V)

- Multiple test points for measurement and observation
- Provided with tunnel diode
- Dual-channel STM32 microcontroller-based I–V measurement system with PC interface
- GUI for VI analysis

Voltage measurement range 0–36 V DC

Current measurement range 0–2.5 A

DC power supply 5 V / 12 V

- Digital display for voltage and current

Classroom / Laboratory Teaching Content

- Training setup to include modules on Analog Electronics

Classroom / Laboratory Teaching Content – Content coverage

- Electronic components
- Series and parallel circuits



- Voltage divider and current divider circuits
- Circuit analysis

Images are for illustration only; actual product may vary



Determination of Quantum Efficiency of Photodiode

Model No : PD501/119



Laboratory training system designed for optical experiments and electrical measurement analysis

Includes light source, optical bench, and integrated measurement instruments

Technical specifications

Filters

Colors Blue, Yellow, Green, Red, Orange

Light Source

- Provided with suitable illumination for optical experiments

Lux Sensor

- Integrated for measurement

Optical Bench

Length 50 cm

DC Voltmeter

Type LCD

Display 3½ digit

Range 200 mV – 200 V

DC Ammeter

Type LCD

Display 3½ digit

Range 2 μ A – 200 mA



Power Supply	
Mains	230 V $\pm$ 10%, 50 Hz
Fuse	0.5 A
Built-in regulated DC outputs	+5 V and +12 V

Images are for illustration only; actual product may vary



Determination of Planck's Constant Using LEDs

Model No : PLA301/122



A laboratory training setup designed to study electrical characteristics of LEDs and basic DC circuits. The system must include a regulated DC power supply, onboard measurement instruments, and multiple colored LEDs for experimentation.

Technical specifications

DC Power Supply

Output range 0–5 V DC

LEDs

Provided in multiple colors Blue, Green, Orange, Red, Yellow

Onboard Voltmeter

Type LCD

Display 3½ digit

Range 200 mV – 200 V

Onboard Ammeter

Type LCD

Display 3½ digit

Range 2 μ A – 200 mA

Images are for illustration only; actual product may vary



Determination of Energy Gap of Semiconductor (Diode/Transistor) by Reverse Saturation Method

Model No : SEG201/109



A laboratory training setup designed to determine the energy bandgap of semiconductor materials using the reverse saturation method. The system is designed with safety precautions, clear circuit arrangements for learners, onboard measurement facilities, PC interfacing, and guided learning support.

Key features

Safety-compliant design

Easy-to-understand circuit arrangement

Onboard voltage, current, and temperature measurement facilities

PC interfacing for data acquisition and analysis

Supported with user manuals, experiment manuals, installation documentation, and training materials in either printed or electronic format

Determination of energy bandgap of semiconductor materials

Study of energy bandgap measurement software window

Observation of voltage, current, and temperature variations during experiments

Technical specifications

DC Power Supply

- +12–15 V, 2–2.5 A
- +5–6 V, 2–2.6 A

Diode

- PN junction Germanium diode



Switch

- 1 pole, 2-way switch for circuit selection

Display

- 16 × 2 LCD display for measurement readouts

Measurement Ranges

Voltage 0–15 V

Current 0–50 μ A (approx.)

Temperature 0–60 °C

Oven Assembly

Height ~77 mm

Width ~74 mm

Heating coil Nichrome wire

Mechanical Specifications

Dimensions W 345 × D 110 × H 24 mm

Weight Suitable for laboratory bench-top use

Power Requirements

Mains supply 90–275 V AC, 50 Hz

Images are for illustration only; actual product may vary



Spectral Response of Photodiode and I-V Characteristics

Model No : PD501/119



A laboratory training system designed for optical experiments and electrical measurement analysis. The system includes a light source, optical bench, integrated measurement instruments, and a microcontroller-based dual-channel voltage/current measurement system with PC interface and GUI support.

Technical specifications

Filters

Colors Blue, Yellow, Green, Red, Orange

Light Source

- Suitable for photodiode spectral response experiments

Photodiode

- For optical detection and I-V characterization

Optical Bench

Length 50 cm

DC Voltmeter

- LCD type, 3½ digit display

Range 200 mV – 200 V

DC Ammeter

- LCD type, 3½ digit display

Range 2 μ A – 200 mA



Power Supply

Mains 230 V $\pm 10\%$, 50 Hz

Fuse 0.5 A

Built-in regulated DC outputs +5 V and +12 V

Microcontroller Measurement System

- STM32-based dual-channel voltage and current measurement system
- PC interface for data acquisition and analysis

Voltage measurement range 0–36 V DC

Current measurement range 0–2.5 A

Software Interface

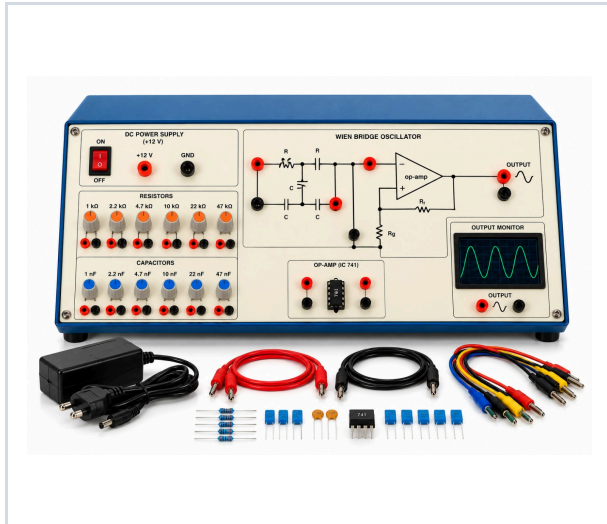
- Graphical User Interface (GUI) for VI analysis
- Real-time visualization and data logging

Images are for illustration only; actual product may vary



Design and Construction of Wien Bridge Oscillator

Model No : LIC-201/A-I



Setup provided for understanding the design and functioning of Wien Bridge Oscillators

Capable of demonstrating generation of sinusoidal waveforms

Provided with +12 V SMPS for DC biasing voltage

Oscillator design using passive elements with operational amplifier

Suitable for classroom and laboratory use with durable construction and clear labeling

Key features

Design of Wien Bridge Oscillator

Study of sinusoidal waveform generation

Analysis of oscillator stability using passive elements and operational amplifier

Technical specifications

DC Biasing Voltage

+12 V (SMPS)

Oscillator Design

Passive elements with operational amplifier

Output

Stable sinusoidal waveform generation

Images are for illustration only; actual product may vary



Square Wave Generator Using 741 Op Amp

Model No : LIC-201



Setup provided with inbuilt power supply, breadboard, and inbuilt function generator

Capable of demonstrating different configurations of operational amplifiers

Suitable for classroom and laboratory use with durable construction and clear labeling

Key features

Non-inverting amplifier

Inverting amplifier

Buffer amplifier

Comparator circuit

Adder circuit

Subtractor circuit

Square wave generator

Technical specifications

Study Modules

Configurations

Non-inverting, inverting, buffer, comparator, adder, subtractor

Fixed DC Power Supply

- +12 V regulated
- 12 V regulated
- +5 V regulated
- 5 V regulated

Variable DC Power Supply

- +1.5 V to +10 V regulated (LM317)
- 1.5 V to -10 V regulated (LM337)

**Function Generator****Waveforms** Sine, Square, Triangular**Frequency range** 1 kHz to 100 kHz**Output** 0–5 V_{pp}**Operational Amplifier IC****IC** uA741 (2 nos.)

- All pins terminated by 2 mm banana socket

Resistor Bank

- SMD Resistance 1 k Ω , 1% ¼ W (5 nos.)
- SMD Resistance 10 k Ω , 1% ¼ W (5 nos.)
- SMD Resistance 100 k Ω , 1% ¼ W (5 nos.)

Diode**Type** 1N4007**Capacitor Bank****Electrolytic Capacitor** 1 μ F / 63 V**Disc Capacitors** 1 nF / 63 V, 10 nF / 63 V, 100 nF / 63 V**Variable Resistance Bank**

- 1 k Ω single turn potentiometer (2 nos.)
- 10 k Ω single turn potentiometer (2 nos.)
- 100 k Ω single turn potentiometer (2 nos.)
- 1 M Ω single turn potentiometer (2 nos.)

Images are for illustration only; actual product may vary



Study of Illumination Intensity of Solar Cell Using Standard Photodetector

Model No : SOL-226



Setup provided with solar panel (6 cells or more)

Onboard voltmeter and ammeter included

STM32 microcontroller-based dual channel I–V measurement system with PC interface

GUI provided for VI analysis

Suitable for classroom and laboratory use with durable construction and clear labeling

Key features

VI analysis of solar cells using onboard measurement system

Study of solar panel characteristics under varying load conditions

Integration with microcontroller for automated data acquisition and analysis

Study of I–V characteristics of solar cell

Study of illumination intensity of solar cell using standard photodetector

Technical specifications

Solar Panel

Number of cells	6 or more
Vmax of each cell	1–1.5 V
Imax of each cell	125–150 mA

Measurement Instruments

Voltmeter range	0–10 V
Ammeter range	0–500 mA
Potentiometer	5 K

- Lux sensor



Components	
Rechargeable NiCd battery	1 × AA, 1.2 V
Bulb	1.2 V, 270 mA
Fan	1.5 V, 400 mA
FM band radio	12 V
Microcontroller Measurement System	
<ul style="list-style-type: none">Dual channel STM32-based I–V measurement system with PC interface	
Voltage measurement range	0–36 V DC
Current measurement range	0–2.5 A
Power supply	5 V / 12 V DC
Power Supply	
Mains supply	230 V ±10%, 50 Hz

Images are for illustration only; actual product may vary



Phase Shift Oscillator Using 741 Op Amp

Model No : LIC-201



Trainer provided with inbuilt power supply, breadboard, and inbuilt function generator

Capable of studying different configurations of operational amplifiers: non-inverting, inverting, buffer, comparator, adder, subtractor, Phase shift oscillator

Suitable for classroom and laboratory use with durable construction and clear labeling

Key features

Non-inverting amplifier

Inverting amplifier

Buffer (voltage follower)

Comparator

Adder (summing amplifier)

Subtractor (differential amplifier)

Phase Shift Oscillator

Technical specifications

Fixed DC Power Supply

- +12 V regulated
- 12 V regulated
- +5 V regulated
- 5 V regulated

Variable DC Power Supply

- +1.5 V to +10 V regulated (LM317)
- 1.5 V to -10 V regulated (LM337)

**Function Generator****Waveforms** sine, square, triangular**Frequency range** 1 kHz to 100 kHz**Output amplitude** 0–5 V_{pp} adjustable**Operational Amplifier IC**

- uA741 (2 nos.)
- All pins terminated by 2 mm banana sockets

Resistor Bank

- SMD resistance 1 k Ω , 1% $\frac{1}{4}$ W (5 nos.)
- SMD resistance 10 k Ω , 1% $\frac{1}{4}$ W (5 nos.)
- SMD resistance 100 k Ω , 1% $\frac{1}{4}$ W (5 nos.)

Diode

- 1N4007

Capacitor Bank**Electrolytic capacitor** 1 μ F / 63 V**Disc capacitors** 1 nF / 63 V, 10 nF / 63 V, 100 nF / 63 V**Variable Resistance Bank**

- 1 k Ω single-turn potentiometer (2 nos.)
- 10 k Ω single-turn potentiometer (2 nos.)
- 100 k Ω single-turn potentiometer (2 nos.)
- 1 M Ω single-turn potentiometer (2 nos.)

Classroom / Laboratory Teaching Content

- Training setup includes learning modules on Analog Electronics and Digital Electronics

Classroom / Laboratory Teaching Content – Content covers

- Electronic components
- Series and parallel circuits
- Voltage divider and current divider circuits
- Circuit analysis

Images are for illustration only; actual product may vary



Determination of Solar Constant

Model No : SC1506/305



A laboratory training setup designed to determine the solar constant using controlled exposure and precise temperature measurement. The system includes specimen arrangement, digital thermometer, and data acquisition system for experimental study.

Technical specifications

Aluminium Rod Arrangement

- Specific surface exposed
- Removable specimen

Digital Thermometer

- Battery operated

Measurement range up to 300°C

Resolution 0.1°C

Temperature Data Acquisition System

- MS Excel-based system

Interval setting 1 sec to 30 mins

- Plots temperature vs. system time

Images are for illustration only; actual product may vary



Study of PN Junction Diode Characteristics

Model No : DZD1908/105



Key features

Forward and reverse characteristics of diodes

Study of V-I characteristics of

Silicon diode; Germanium diode; Zener diode; Light Emitting Diode (LED)

Technical specifications

General Requirements

- Trainer with +12 V DC power supply

Includes 3½ digit ammeter (range 1 μ A to 200 mA)

Includes 3½ digit voltmeter (range 1 mV to 200 V)

- Provided with different test points for measurement and observation
- Supplied with silicon, germanium, zener, and light emitting diode (LED)
- Equipped with multiple (dual) channel STM32 microcontroller-based I-V measurement system with PC interface
- GUI provided for VI analysis

Voltage measurement range 0–36 V DC

Current measurement range 0–2.5 A

DC power supply 5 V / 12 V

- Digital display for voltage and current

Classroom / Laboratory Teaching Content

- Training setup includes modules on Analog Electronics and Digital Electronics



Classroom / Laboratory Teaching Content – Content covers

- Electronic components
- Series and parallel circuits
- Voltage divider and current divider circuits
- Circuit analysis

Images are for illustration only; actual product may vary



Study of Transistor Characteristics in CB Mode

Model No : TRC501/130



Trainer designed to study and analyze transistor characteristics in versatile configurations

Supports experiments with PNP and NPN transistors (e.g., BC547, BC557)

Allows plotting of input, output, and constant current transfer characteristics

Enables understanding of different regions of transistor operation

Key features

Modular design with clear labeling for transistor configurations

Patch cord connectivity for flexible experimentation

On-board measurement system integrated with PC interface for real-time plotting

GUI support for graphical analysis of transistor characteristics

Technical specifications

Power Supplies

- ± 5 V fixed supply
- ± 12 V fixed supply
- ± 1.5 V and 11 V variable supply

Measurement Instruments (On-board)

3½ digit voltmeter, range 1 mV to 200 V

Ammeter, range 1 μ A to 200 mA

Microcontroller-based Measurement System

- Dual-channel STM32-based I-V measurement system
- PC interface for data acquisition and analysis



Measurement Ranges	
Voltage	0–36 V DC
Current	0–2.5 A
Specifications	
Additional Power Supply	5 V / 12 V DC outputs
Software Interface	GUI provided for VI analysis
Educational Objectives – PNP Transistor Studies (Common Base)	
<ul style="list-style-type: none">• Input resistance	
<ul style="list-style-type: none">• Output resistance	
<ul style="list-style-type: none">• Current gain	
Educational Objectives – NPN Transistor Studies (Common Base)	
<ul style="list-style-type: none">• Input resistance	
<ul style="list-style-type: none">• Output resistance	
<ul style="list-style-type: none">• Current gain	

Images are for illustration only; actual product may vary



Study of Transistor Characteristics in CE Mode

Model No : TRC501/130



Trainer designed to study and analyze transistor characteristics in versatile configurations

Supports experiments with PNP and NPN transistors (e.g., BC547, BC557)

Allows plotting of input, output, and constant current transfer characteristics

Enables understanding of different regions of transistor operation

Key features

Modular design with clear labeling for transistor configurations

Patch cord connectivity for flexible experimentation

On-board measurement system integrated with PC interface for real-time plotting

GUI support for graphical analysis of transistor characteristics

Technical specifications

Power Supplies

- ± 5 V fixed supply
- ± 12 V fixed supply
- ± 1.5 V and 11 V variable supply

Measurement Instruments (On-board)

3½ digit voltmeter, range 1 mV to 200 V

Ammeter, range 1 μ A to 200 mA

Microcontroller-based Measurement System

- Dual-channel STM32-based I-V measurement system
- PC interface for data acquisition and analysis



Measurement Ranges

Voltage 0–36 V DC

Current 0–2.5 A

Specifications

Additional Power Supply 5 V / 12 V DC outputs

Software Interface GUI provided for VI analysis

Educational Objectives – PNP Transistor Studies (Common Emitter)

- Input resistance
- Output resistance
- Current gain

Educational Objectives – NPN Transistor Studies (Common Emitter)

- Input resistance
- Output resistance
- Current gain

Images are for illustration only; actual product may vary



Study of LDR Characteristics

Model No : PTC201/120



Trainer with onboard DC power supply of +12 V, -12 V, +5 V

Includes 2 voltmeters (0–12 V)

Equipped with dual-channel STM32 microcontroller-based I–V measurement system with PC interface

GUI provided for VI analysis

Key features

Study and plot characteristics of LDR using microcontroller-based measurement system

Real-time acquisition of voltage and current values via STM32 interface

Graphical plotting of VI curves on PC GUI

Technical specifications

Voltage Measurement Range	0–36 V DC
Current Measurement Range	0–2.5 A
DC Power Supply	5 V / 12 V
Mains Supply	230 V $\pm$ 10%, 50 Hz

Classroom / Laboratory Teaching Content

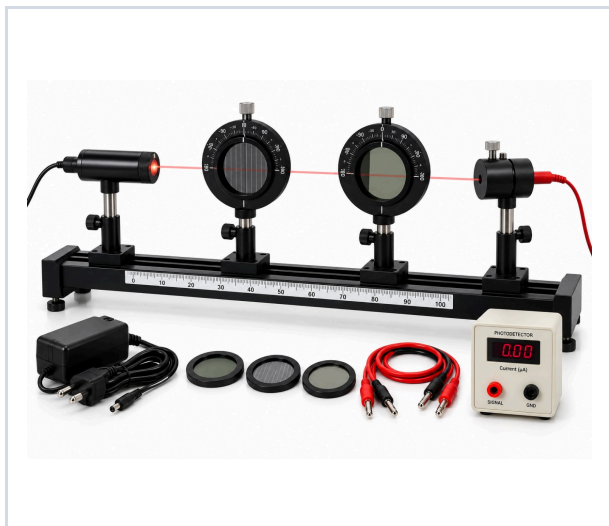
- Content explaining LDR characteristics and related semiconductor concepts with animations and simulations
- Learning support through videos, graphs, charts, theory, interactive learning objects, FAQ, MCQ, notes, and question bank
- Content supplied via digital online access or license protection supported through USB hardware dongle

Images are for illustration only; actual product may vary



Study of Malus Law

Model No : ML1908R/023A



Technical specifications

Photodetector	
Type	Silicon photocell
Aperture	~0.8–1.2 mm
Connection	4 mm safety socket
Mounting rod diameter	~9–11 mm
Polariser and Analyser	
Angular range	approx. -90° to $+90^{\circ}$
Least count	$\sim 1^{\circ}$
Aperture	~19–23 mm
Frame diameter	~125–135 mm
Mounting rod diameter	~9–11 mm

Images are for illustration only; actual product may vary



Use of Resistance Thermometer for Room Temperature and Boiling Point Measurement

Model No : TRV1101/129



Technical specifications

a) Thermistor Resistance Variation Kit

- Constant current source
- Digital milli-ammeter (0–20 mA)
- Digital milli-voltmeter (0–200 mV)
- Copper coil with glass enclosure

b) Digital Thermostat

- Battery-operated probe type digital thermometer
- Auto OFF function
- Maximum up to 300 °C

Resolution	0.1 °C
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c) Electric Kettle

Capacity	1 L
Power	1000 W

d) Test Tube Stand

- Heavy base stand for sample

e) Patch Cords

- Set provided



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Determination of Velocity of Light in Dielectric Medium (Glass)

Model No : VIS-226



Key features

Estimation of speed of light in glass medium using Snell's law

Technical specifications

Experiment Setup

Glass Slab	75 × 50 × 20 mm
Soft Wooden Board	450 × 300 mm
Optical Pins	Set of 50

Images are for illustration only; actual product may vary



Study of Frequency Response and Impedance in Series RC Circuit

Model No : RES-201



Key features

Determination of capacitance through study of frequency response and impedance in series RC circuit

Technical specifications

Experiment(s)

- Realization of series and parallel resonance
- Determination of L and Q variations

Experiment Setup

- RC Circuit kit with digital current meter (0–20 mA)
- Two unknown inductors
- Set of three resistors
- Set of three capacitors
- Set of patch cords
- Cabinet made of acrylic

Images are for illustration only; actual product may vary



Numerical Aperture & Acceptance angle

Model No : NA201/028



Technical specifications

Experiment setup consists

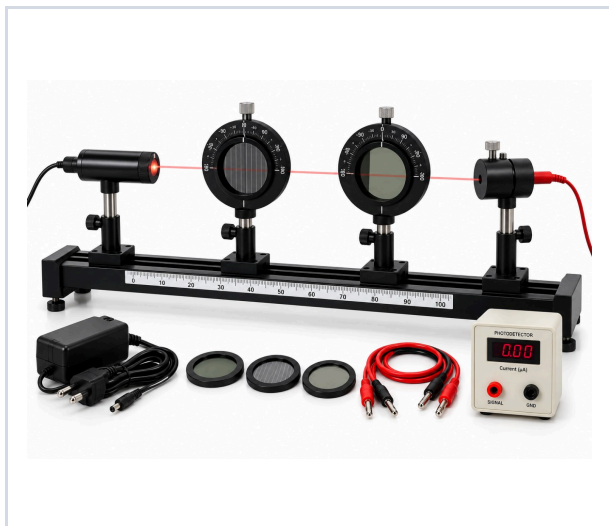
- | | |
|---|---|
| a) X-Y Bed | Graduated screen with pitch of 2mm, OFC chuck to firmly lock the OFC cable end, Slider with scale to vary distance between screen & OFC |
| <hr/> | |
| <ul style="list-style-type: none">b) Semiconductor diode Laser (LAS-301) with power supply, 3mW and 625nm wavelength output | |
| <hr/> | |
| c) OFC cable – Type | Multimode, Length of cable 1.5m |

Images are for illustration only; actual product may vary



Study of Malus Law

Model No : ML1908R/023A



Technical specifications

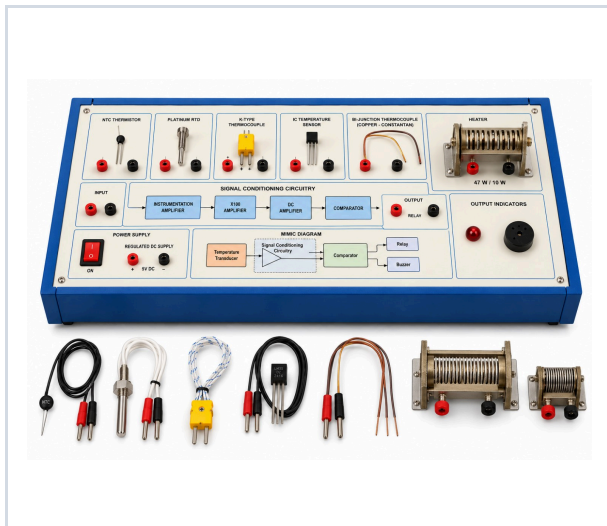
Photodetector	
Type	Silicon photocell
Aperture	~0.8–1.2 mm
Connection	4 mm safety socket
Mounting rod diameter	~9–11 mm
Polariser and Analyser	
Angular range	approx. -90° to $+90^\circ$
Least count	$\sim 1^\circ$
Aperture	~19–23 mm
Frame diameter	~125–135 mm
Mounting rod diameter	~9–11 mm

Same specification as PhyUGEx-157. Images are for illustration only; actual product may vary



Calibration of Thermistor for Temperature Measurement

Model No : TEA1212/311



System includes four different temperature transducers

Supports study of transducer-controlled switching and alarm systems

On-board signal-conditioning circuitry provided

Built-in regulated DC power supply included

Functional block representation through on-board mimic diagrams

Modular layout to facilitate experimentation and learning

Key features

Practical study and characterization of

IC Temperature Sensor; NTC Thermistor; NTC Bridge Circuit; Platinum RTD; K-Type Thermocouple; Temperature-controlled alarm and switching systems; Bi-junction Thermocouple (Copper and Constantan)

Technical specifications

Transducers (5 Nos.)

- NTC Thermistor
- Platinum RTD
- K-Type Thermocouple
- IC Temperature Sensor
- Bi-junction Thermocouple (Copper and Constantan)

Heating Element

- Wire-wound type

Power ratings 47 W and 10 W

Signal Conditioning Circuitry

- Instrumentation amplifier
- X100 gain amplifier
- DC amplifier
- Comparator



Input & Output Circuits

- Input circuits for transducer interfacing
- Output circuits include relay and buzzer for alarm demonstration
- Interconnections via 2 mm banana sockets

Electrical Requirements

Mains supply	100–240 V AC, 50/60 Hz
Power consumption	approx. 2 VA

Mechanical Specifications

Dimensions	approx. W 326 × D 252 × H 52 mm
Weight	approx. 1.5 kg

Operating Conditions

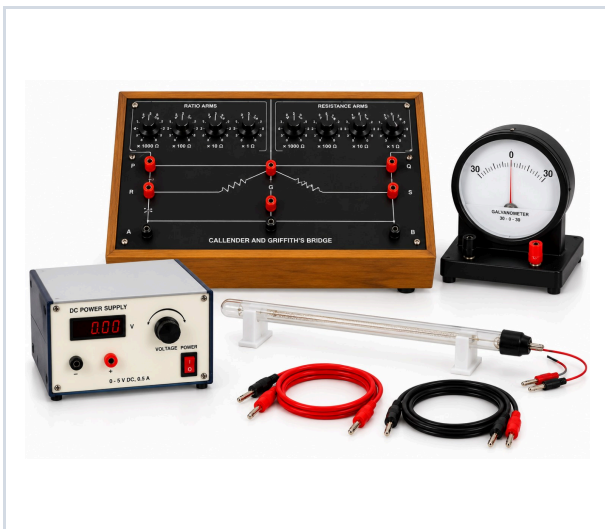
Operating temperature	0–40°C
Relative humidity	up to 85% RH (non-condensing)

Same specification as PhyUGEx-15. Images are for illustration only; actual product may vary



Determination of Temperature Coefficient of Resistance by Platinum Resistance Thermometer

Model No : PR-226



Technical specifications

Experiment Setup

- Callender and Griffith's Bridge

Experiment Setup – Platinum Resistance Thermometer

Enclosed in corning glass tube (length 50 cm, diameter: 2 cm)

- Fine platinum wire wound on mica frame

Approximate resistance 2.8 Ω

Experiment Setup – Galvanometer

- 30-0-30 scale
- 65 mm round dial
- Mounted on bakelite stand

Experiment Setup – Power Supply

- 0–5 V DC at 0.5 A
- Continuously variable, regulated, short-circuit protected

Experiment Setup

Patch Cords 50 cm length

Images are for illustration only; actual product may vary



Thermoelectric Power of Semiconductor

Model No : DZD1908/10



Designed with necessary safety precautions

Easy-to-understand circuit arrangement for learners

Onboard voltage, current, and temperature measurement facilities

PC interfacing for data acquisition and analysis

Supported with user manuals, experiment manuals, installation documentation, and training materials in either printed or electronic format

Key features

Determination of energy bandgap of semiconductor materials

Study of energy bandgap measurement software window

Observation of voltage, current, and temperature variations during experiments

Technical specifications

DC Power Supply

Outputs +12–15 V, 2–2.5 A; +5–6 V, 2–2.6 A

Diode

- PN junction Germanium diode

Switch

- 1 pole, 2 way switch for circuit selection

Display

- 16 × 2 LCD display for measurement readouts

Measurement Ranges

Voltage 0–15 V

Current 0–50 μ A (approx.)

Temperature 0–60 °C



Oven Assembly	
Height	~77 mm
Width	~74 mm
Heating coil	Nichrome wire
Mechanical Specifications	
Dimensions	~W 345 × D 110 × H 24 mm
<ul style="list-style-type: none">• Weight suitable for laboratory bench-top use	
Power Requirements	
Mains supply	90–275 V AC, 50 Hz

Images are for illustration only; actual product may vary



Thermal Conductivity of Copper by Angstrom's Method

Model No : AS-226



Technical specifications

Experiment Setup – Copper Rod Arrangement

Diameter	12.5 mm
Length	400 mm

- Heating probe fixed on one side
- Temperature sensors located at equally spaced points, distance 80 mm each

Experiment Setup – 4-Channel Thermometer

- Provision to fix 4 thermocouples
- Includes power supply unit

Images are for illustration only; actual product may vary



Determination of Quantum Efficiency of a Photodiode

Model No : PD501/119



Laboratory training system for optical experiments and electrical measurement analysis

Includes light source, optical bench, integrated measurement instruments

Microcontroller-based dual-channel voltage/current measurement system with PC interface and GUI support

Technical specifications

Filters

Blue, Yellow, Green, Red, Orange

- Light Source
- Photodiode

Optical Bench

Length 50 cm

DC Voltmeter

LCD, 3½ digit, range 200 mV – 200 V

DC Ammeter

LCD, 3½ digit, range 2 µA – 200 mA

Power Supply

Mains

230 V $\pm$ 10%, 50 Hz

Fuse

0.5 A

Built-in regulated DC outputs

+5 V and +12 V

Microcontroller Measurement System

- STM32-based dual-channel voltage and current measurement
- PC interface for data acquisition and analysis

Voltage measurement range

0–36 V DC

Current measurement range

0–2.5 A



Software Interface

- GUI for voltage-current (VI) analysis
- Real-time visualization and data logging

Images are for illustration only; actual product may vary