FOUR PROBE SET UP

Model No: DTFP01

DETECH Model DTFP01 Set Up has been designed for measuring the resistivity of semiconductors at different temperatures and determining the Band Gap by Four Probe Method.

The set up is complete in all respects and needs no other apparatus. This product is suitable for Science and Engineering Students

OBJECTIVE

01. To measure resistivity of semiconductors at different temperatures by Four Probe Method.
02. To plot a graph of resistivity as a function of inverse temperature for a semiconductor.
03. To determine Band Gap of the semiconductor.

SPECIFICATIONS :

The Experimental Set-up consists of the following :

- Four Probes Arrangement : It has four imported spring loaded probes. The probes are collinear and equally spaced.
- Sample : Germanium Crystal in the form of a chip.
- Oven : For variation of temperature from room temperature to about 200°C (max.)
- Thermometer (0-200°C) : For measuring temperature.
- Four probe Set-up : Consisting of (a)Constant current power Supply.Open circuit Voltage 18V Current range : 0-20mA, Resolution : 10mA, Accuracy : ± 0.25% of the reading ± 1 digit, Load Vregulation : 0.03% for 0 to full load, Line Regulation : 0.05% for 10% changes Oven power supply : Suitable voltage for the oven is obtained through a step down transformer with a provision for low & high rates of heating. LED indicator. Two digital meter (for measuring voltage & current) Voltmeter : 0-2000mV, Resolution :1 mV ; Ammeter: 0-20mA, Resolution : 0.01 mA. Mains ON/OFF switch & Fuse.
- Weight : 6.8 Kg. (Approx.)
- Dimension : W 340 x H 160 x D 230

Manufactured by:

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PLANCK'S CONSTANT BY BLACK BODY RADIATION

MODEL: DT-PCBBR

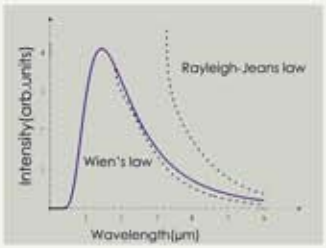
DETECH Model DT-PCBBR Set Up has been designed to determine Planck's Constant using Black Body Radiation. An energized tungsten-filament lamp (with temperature T) is treated as a black-body source of radiation whose emission spectrum peaks in intensity at a frequency determined by the temperature T.
If measurements of intensity are restricted to the visible part of the spectrum, the intensity at any one frequency is a linear function of 1/T. The value for Planck's constant can be found from the gradient.

AIM:

To determine Planck's Constant using Black Body Radiation.

Planck's Radiation Law

Around the year 1900, attempts were made to find a simple formula that can fit the experimental curves of black body radiation. For example, Rayleigh and Jeans derived a relationship based on classical physics and his formula fits the curves in the limit of very long wavelengths (low frequencies) much larger than 50 μm. Wien's theoretical expression, though a 'guess' fits the experimental curves at short wavelengths but departed at longer wavelengths. A comparison is displayed in Figure.



APPARATUS:

- A commercially available tungsten filament incandescent light bulb rated at 60W,220V
- High precision different coloured optical filters(Blue, Green, Yellow)
- Aperture / Intensity control to modulate power density incident on the detector
- An AC voltage regulator to control input intensity of light bulb
- Digital AC ammeter(0-2000mA)to measure current & AC voltmeter(0-200V) to measure voltage of the bulb
- Selenium photocell used as photodetector duly mounted
- DC microammeter (0-20μA/0-200μA) to measure current through the photocell
- Black box containing intensity control, filter holder & output detector.

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PLANCK's CONSTANT USING PHOTO CELL

Model No: DTPC-PC

DETECH Model DTPC-PC Experimental Set-up has been designed for determination of Planck's Constant by Photo Electric Effiect using Vacuum type Photo Cell. Three different filters are provided for wavelength selection. The experimental set-up is self contained and require no other apparatus.

OBJECTIVE

To determine Planck's Constant by Photoelectric Effect using Vacuum Type Photo Cell with three filters

SPECIFICATIONS :

The Experimental Set-up consists of following:

- Planck's Constant Apparatus fitted with 0.1% class 3½ digits Digital Millivoltmeter & Micro Ammeter.
- Light Source : 40W Bulb with stand
- Vacuum Type Photo Cell with position adjustable arrangement. Mounted in black MS box.
- Three different colour optical filters with mounting arrangement.
- Aperture control in front of black box to control light intensity.
- Mains ON/OFF switch & fuse.
- Dimension : W 10"x D 8"x H 4"
- Weight : 5.5 Kg. (Approx.)
- Adequate no. of 4mm cords.
- Sturdy terminal/sockets are provided at appropriate places on panel for connections.
- Detailed Operating Instructions, giving details of Object, Theory, Design procedures, Report & Suggestions.

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E/M BY THOMSON (BAR MAGNET) METHOD

MODEL: DT-E/M

DETECH Model DT-E/M Experimental set-up has been designed specifically for determination of Specific Charge ("e/m") of an Electron by Magnetic Focusing method. The experimental set-up is complete in all respect & require no other instruments. This experiment is suitable for Science and Engineering Students

OBJECTIVE

Determination of the Specific Charge ("e/m") of an Electron by Magnetic Focussing method

FEATURES

The apparatus consists of the following :

- Cathode Ray Tube (C.R.T.) Fitted on a stand with a scale for measuring the position of magnetic coil.
- A deflection magnetometer with wooden mounting arrangement which allows it to be placed on CRT
- A power supply unit which consists of :
  High voltage power supply to operate the CRT : accelerating voltage varied from 200 to 1500V & Digital voltmeter to read the voltage.
  Power supply to operate the magnetic coil : DC supply of 30V at 0 - 1.5 Amp current.
  Two potentiometers to control the intensity and Accelerating voltage of CRT.
  Two potentiometers to control X - Shift & Y- Shift with a selector knob.
  Mains ON/OFF switch, and Fuse.
  Superior quality, reliable terminal/sockets are provided on panel for connections/ observation of waveforms.
- An operating manual, having details of Object,Theory,experimental procedures.
- Dimension : W 10"x H 4" x D 8"
- Weight : 6 Kg. (Approx.)

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DIGITAL STOP WATCH 1/100TH SEC

MODEL: DT-SW100

DETECH Model DT-SW-01 Set Up has been designed for use in Laboratories for accurate measurement of time .

Microcontroller based Stop watch which can count upto 1/100th of a second. Features like LARGE LED DISPLAY, FEATHER TOUCH BUTTONS alongwith a rugged design makes it user friendly & effective for a longer lifespan.

FEATURES

- Microcontroller based precise timing circuit
- RESOLUTION : 1/100TH SEC
- START / STOP / RESTART / SET TO ZERO by feather touch buttons
- RANGE : 0.01 Sec to 59 Min 59.59 Sec
- MAINS OPERATED : 230V, 50Hz ± 10%
- DIMENSION : 12.5 X 8.5 X 5.5 cm
- WEIGHT : 490 gm
- POWER : 230V AC, 50 HZ ±10%

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CONSTANT CURRENT POWER SUPPLY

MODEL: DTCC4A

CONSTANT CURRENT POWER SUPPLY 4A

DETECH Model : DTCC4A is a high performance constant current source suitable for small and medium sized electromagnets.
The current regulation circuit is IC controlled, thus, resulting in the highest quality of performance. Matched power transistors are used to share the load current. The supply is protected against overload, short circuit and transient caused by the inductive load of the magnet.

SPECIFICATIONS

- Current Range: Smoothly adjustable from 0-4 Amp.
- Line Regulation: (For ±10% Mains Variation) : Better than ± 0.1% of the specified output current.
- Load Regulation: (No Load to Full Load) : Better than 0.2% of the highest specified output current.
- Ripple: Less than 1mV rms.
- Metering: Ammeter. 3½ digit 7 segment LED. 0.1% Class
- Stability: 0.2% plus 50mV (After initial warm up of 30 minutes under constant line load and temperature conditions).
- Temperature Co – Efficient (After initial warm up of 30 minutes) 0 : 0.05% plus 5mV/1 C.
- Transient Recovery Time: 100 nano second (Recovery with in regulation band for load changed from 10% to 90%)
- Protection: Automatic over load & short circuit protection.
- Power: 230V ± 10% at 50 Hz.
- Dimension in mm: W 255 x D 225 x H 135
- Weight: 8.5 Kg. (Approx.)

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DIELECTRIC CONSTANT SET

MODEL: DT-DCS

DETECH MODEL DT-DCS has been designed to measure dielectric constant of a solid. The solid, acting as a dielectric material, is placed between two adjustable metal plates. The dielectric constant is measured based on the property that, an electrical insulating material (a dielectric) is equal to the ratio of the capacitance of a capacitor filled with the given material to the capacitance of an identical capacitor in vacuum without the dielectric material. If 'C' is the value of the capacitance of a capacitor filled with a given dielectric and 'C_0' is the capacitance of an identical capacitor in vacuum, the dielectric constant, symbolized by the Greek letter kappa 'κ', is simply expressed as $\kappa = C/C_0$.
The dielectric constant is a number without dimensions.

SPECIFICATIONS

The apparatus consists of the following :

- Unit complete with in built 4 MHZ RF Oscillator, circut arrangement, highly sensitive large scale micro ammeter with sensitivity control knob
- External Test Capacitors
- External Variable capacitor
- Detailed Operating manual, giving details of Object,Theory & Experimental procedures
- Dimension : W 10"x D 8"H 4" x
- Weight : 2 Kg. (Approx.)
- Power : 230 V AC, 50 Hz +- 10%

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SPECTROMETER

Model No : DT S720 DELUX

Spectrometer is a versatile instrument for studying spectrum of different light sources as well as for characterization of components like prisms and gratings. It offers precise angle and refractive index measurements. Unlike common spectrometers, this model is designed in such a way that students get better understanding of the working principles of spectrometer. The well designed mechanics of the Spectrometer allows maintenance free operation over years.

SPECIFICATIONS.

7" dia circle reading 20 seconds. The objectives used in telescope and collimator are achromatic and provided with rack and pinion focussing arrangement. Telescope arm and prism table are provided with fine and coarse adjustments. The prism table is provided with three levelling screws and is engraved with concentric rings and lines. The scales and verniers are of stainless steel and are fine machine divided. Clamping devices are also provided to lock telescope and collimator after adjustment, with prism clamping device and diffraction grating stand. Provided with vertical adjusting screws to both the collimator & telescope.

Inspection Telescope Magnification	:	Premium grade 10X Ramsden eye piece fitted with collimator and a cross wire.
Variable Slit	:	Micrometer controlled, continuously variable 0-3mm

The scale is machine divided in 1/3 degrees on a life time stainless steel circle. The accuracy of calibration is 0.001%. Two verniers are provided reading to 20 Secs of the arc.

EXPERIMENT EXAMPLE :

1. Familiarization with : Schuster's focussing determination of angle of prism
2. To determine refractive index of the material of a prism using sodium source
3. To determine wavelength of (1) Na source and (2) spectral lines of Hg source using plane diffraction grating
4. To determine the wavelength of H-alpha emission line of Hydrogen atom.

Manufactured by :

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