

PHYSICS INSTRUMENT

801. MSI 6001 'MSI' POLARI METER

The well known MSI Polari meter forms a suitable companion instrument for the Refractometer; indeed, they should be side by side in the laboratory whereas the Refractometer gives the total solids present in a sugar solution. The Polari meter discriminates between right-handed Sugars, such as sucrose and left-handed sugars such as levulose etc. The Polari meter essentially Consist of a pair of Polarizer arranged in line, one of which can be rotated with respect to the other and the rotation measured upon a divided circle. When these are crossed- that is to say when their Polarizing planes are mutually perpendicular no light is transmitted, but light may be partially or Wholly restored by the introduction between the polarizer at a tube containing optically active liquid Such as sugar solution. In its design the instrument is fitted with a 10 cm diameter glass circle divided in degrees, decimals being read by means of a drum to 0.05° . Since each drum division of 0.05° . Is equal to 3 minutes decimal readings are readily converted into minutes. The boldly figured drum divisions are approximately 3mm apart, allowing sub-divisions to be estimated with certainty. Circle and drum are fully illuminated and the difficulty of reading Vernier is eliminated. The circle, is normally divided to read angular degrees and also carries the sugar scale, and with the corresponding additional scale on the drum reads direct to 0.1 sugar degree. The instrument takes tubes up to 220mm in length. The sodium lamp outfit is supplied separately wooden housing with sodium lamp 35 Watt and Solid state transformer for the same. Polari meter 220 mm is an improved optical system in which the half shadow system is in front, at the circle end of the instrument. The following additional advantages are then available. Permanent focus that is to say once the dividing line is focused to suit the eye this focus is never disturbed by inserting tubes of sugar or other solutions, regardless the fact that they may not be completely homogeneous, or of the length of the tube. Permanent good definition even with difficult liquids. The half shadow system rotated with the circle thus affording immediate indication of the direction of rotation of the material being examined.

SPECIFICATIONS: Angular $0-360^\circ$ Sub div to 1° Micrometer drum enable direct reading to 0.5° and by estimation to 0.2° .

- A. Instrument supplied as above with one 200mm Borosilicate glass tube w/o sodium lamp.
- B. -do- But Bi-quartz model w/o sodium lamp.
- C. -do- But research Polari meter $+130^\circ$ to 30° ISS sub divided into 0.1° by micrometer drum enable to read up to 0.005° by estimation W/o sodium lamp.

Essential Accessories

- (i) Sodium Lamp 35 Watt with wooden housing and Transformer.
- (ii) Polari meter tube Borosilicate glass with screw cap. 100mm.
- (iii) -do- cap. 200mm.

802. MSI 6003 'MSI' OPTICAL BENCH

- A. Optical Bench. S.S. 1mtr: long with 3 rods heavy duty. Complete with riders and optical pins & lens Holder complete.
- B. -do- But M.S. N.P.

803. 'MSI' SONOMETER

Box type complete with wire and wedge in teakwood finish.

Cat. No.

MSI-6006

Optional at Extra cost

- A. Slotted weights for above 5 kg. set.

804. MSI 6009 'MSI' VOLTMETER ON STAND ANY RANGE

805. MSI 6012 'MSI' AMMETER ON STAND ANY RANGE

806. MSI 6015 'MSI' GALVANOMETER ON STAND ANY RANGE

807. 'MSI' RESONANCE APP.

Resonance App. all metal brass pipe 1" Dia, heavy stand.

Cat. No.

MSI-6018

808. MSI 6021 'MSI' SIMPLE PENDULUM WITH WALL BRACKET

809. MSI 6024 'MSI' WALL BRACKET FOR SIMPLE PENDULUM



Polari Meter



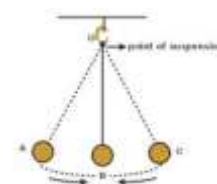
Optical Bench



Sonometer



Ammeter



Simple Pendulum

810. 'MSI' LACHLENCE CELL

Cat. No.	Description
MSI-6027	Lachlenche Cell Complete
MSI-6028	Porous pot for above
MSI-6029	Zinc rod heavy for above



Lachlenche Cell

811. 'MSI' BAR MAGNET

Cat. No.	Size
MSI-6032	2"
MSI-6033	3"
MSI-6034	4"
MSI-6035	Horse Shoe



Bar Magnet

812. MSI 6038 'MSI' IRON FILLING

813. MSI 6041 'MSI' MIRROR CONCAVE 15 cm F.L.

814. MSI 6044 'MSI' MIRROR CONVEX 15 cm F.L.

815. MSI 6047 'MSI' LENS DOUBLE CONCAVE 10/15 cm F.L.

816. MSI 6050 'MSI' LENS DOUBLE CONVEX 10/15 cm F.L.

817. MSI 6053 'MSI' METER SCALE

818. MSI 6056 'MSI' RESISTANCE 2 OHM TO 5 OHM FIXED

819. MSI 6057 'MSI' RHEOSTAT SMALL 50 ~ OR 100 ~ 6"

820. MSI 6060 'MSI' CONNECTING WIRE DCC COPPER

821. MSI 6063 'MSI' MILLI AMMETER 0-500 mA

822. MSI 6067 'MSI' ONE WAY KEY BRASS

823. MSI 6070 'MSI' TWO WAY KEY BRASS

824. MSI 6073 'MSI' THREE WAY KEY BRASS

825. MSI 6076 'MSI' FOUR WAY KEY BRASS

826. MSI 6079 'MSI' 6 VOLT BATTERY BOX

827. MSI 6082 'MSI' BATTERY 1.5 V 45 AH. CHARGEABLE

828. MSI 6085 'MSI' DRY BATTERY CELL 1.5 V BIG

829. MSI 6088 'MSI' GLASS SLAB

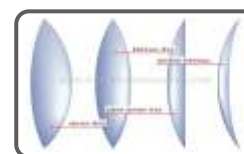
830. MSI 6091 'MSI' MAGNETIC COMPASS BOTH SIDE GLASS

831. MSI 6094 'MSI' e/m BY MILLIKEN'S OIL DROP METHOD

832. 'MSI' e/m THOMSON METHOD

To study charge of an electron using Thomson method. Features—High voltage Power supply (P-580) with one meter provided to measure the deflection voltage. Complete with intensity, focus & Deflection controls. Standard Acc.—Compass box & set of Strong Alnico Magnets. Teak wood stand with CRT mounted (W-580A). Teak wood Stand for compass box W-580B) & Teak wood U stand with scale on both the arms for placing Magnet (W-580C). Complete as above.

Cat. No.
MSI-6097



Lens



Rheostat



Keys Brass

833. 'MSI' e/m BY LONG SOLENOID/HELICAL METHOD

To Study charge of an electron using Helical Method. Features—Kit comprises of High voltage Power supply Unit (P-581) with intensity, focus, X,Y deflection & Solenoid current controls. Two meters are provided in power supply for Acceleration Voltage control & for solenoid current controls. One Solenoid Unit S-581). Comprises of one solenoid mounted on wooden stand & 3" CRT is kept in the solenoid pipe

Cat. No.
MSI-6100



e/m Thomson



e/m Long Solenoid

834. 'MSI' e/m BY SHORT SOLENOID METHOD

To study charge of an electron using Short Solenoid method. Features—Kit comprises of Low voltage DC Power supply Unit with filament voltage & solenoid current controls. Two meters are provided for anode voltage controls. One solenoid unit comprises of one solenoid mounted on wooden stand & valve 41 is kept in the solenoid pipe

Cat. No.

MSI-6103

835. 'MSI' e/m BY MAGNETIC FOCUSING METHOD

To study charge of an electron by using Magnetic focusing method. Features---Kit comprises of High voltage power supply with intensity, focus X,Y deflection & solenoid current controls. Two meters are provided for Acceleration Voltage control & for solenoid current controls. One solenoid unit comprises of 3" CRT mounted on teak wood stand & one ring type solenoid slides over the CRT.

Cat. No.

MSI-6106

836. 'MSI' ENERGY BAND GAP BY APPARATUS

Cat. No.

MSI-6109

837. 'MSI' PLANK'S CONSTANT APPARATUS

To plot forward & Reverse Characteristics of a Vacuum Photocell & to calculate its stopping Potential. Features---Dual Range Power supply 0-1 V DC/0-50 V DC with one dual range voltmeter & one sensitive center zero Galvanometer of 25 μ A movement, Photo cell mounted in wooden box, having window for injecting light & also for sliding the various filters. One wooden plank with $\frac{1}{2}$ meter scale, light source with 100 W lamp & set of filters. Complete.

Cat. No.

MSI-6112



Plank's Constant

838. 'MSI' PLANK'S CONSTANT APPARATUS

Plank's Constant by Photo electric Effect PC-101 complete in all respect Scientific make.

Cat. No.

MSI-6115

839. 'MSI' DETERMINATION PLANK'S CONSTANT APPARATUS

Determination of Planck's constant by means of LED's PCA-01. The method is based on well known expression of diode current of $V < V_0$. The dependence of current with temperature is measured, keeping the V slightly below V_0 and material constant n is obtained from V - I characteristics of the diode. Complete in all respect Scientific make.

Cat. No.

MSI-6118



Ohm's Law

840. 'MSI' OHM'S LAW APPARATUS

Ohm's Law Apparatus with 2 round meters but w/o Power supply.

Cat. No.

MSI-6121

841. 'MSI' NETWORK THEOREMS

Network Theorems (Super position, Norton's, Thevinin's, Maximum Power Transfer) all in one kit.

Cat. No.

MSI-6124



Network Theorems

842. MSI 6127 'MSI' PHOTO CELL CHARACTERISTICS APP.

843. MSI 6130 'MSI' PUT CHARACTERISTICS APP.

844. MSI 6133 'MSI' PHOTO DIODE CHARACTERISTICS APP.

845. MSI 6136 'MSI' PHOTO TRANSISTOR CHARACTERISTICS APP.

846. MSI 6139 'MSI' BH CURVE APP.

847. MSI 6142 'MSI' RECIPROCITY THEOREM

848. MSI 6145 'MSI' TELLEGAN'S THEOREM

849. MSI 6148 'MSI' MILLMAN'S THEOREM

850. MSI 6152 'MSI' STEFAN CONSTANT APPARATUS

851. 'MSI' DETERMINATION OF BALLISTIC CONSTANT

Determination of Ballistic Constant of a Ballistic Galvanometer.

Cat. No.

MSI-6158

852. 'MSI' DETERMINATION THE ECE OF COPPER

Determination the ECE of Copper using Tangent Galovanometer.

Cat. No.

MSI-6162

853. MSI 6165 'MSI' DETERMINE THE WAVELENGTH OF SODIUM LIGHT BY FRESNEL'S BIPRISM KIT

854. 'MSI' DETERMINATION THE FOCAL LENGTH OF TWO LENSES BY NODAL SLIDE

Determination the Focal length of two lenses by Nodal Slide and Locate the position of cardinal points.

Cat. No.

MSI-6168

855. 'MSI' DETERMINATION THE WAVELENGTH OF SPECTRAL LINES

Determination the Wavelength of Spectral lines by using Plane Transmission grating.

Cat. No.

MSI-6171

856. 'MSI' DETERMINING THE VISCOSITY

Determining the Viscosity of Liquid by Stroke's Method.

Cat. No.

MSI-6174

857. 'MSI' DETERMINE THE FREQUENCY

Determine the Frequency of Ac mains by electrical Vibrator.

Cat. No.

MSI-6177

858. 'MSI' DETERMINE THE WAVE LENGTH OF SODIUM LAMP BY NEWTON RING MFTHOD

Determine the wave length of Sodium Lamp by Newton Ring Method.

Cat. No.

MSI-6180

859. 'MSI' DETERMINE MAGNETIC FIELD

Determine Magnetic Field Using Stewart and Gee's Apparatus.

Cat. No.

MSI-6183



860. 'MSI' TO DETERMINE THE VELOCITY OF ULTRASONIC WAVES

To determine the velocity of ultrasonic waves by using a Crystal.

Cat. No.

MSI-6186

861. 'MSI' CALIBRATION OF VOLTMETER

Calibration of Voltmeter using Potentiometer.

Cat. No.

MSI-6189



862. 'MSI' THERMO ELECTRIC E.M.F.

Thermo Electric e.m.f. with temperature for a copper iron thermo couple, by means of a potentiometer.

Cat. No.

MSI-6192

863. 'MSI' TO DETERMINE YOUNG'S MODULUS

To determine young's modulus of rigidity and Poisson's ratio of the material of a given wire by Searle's dynamical method.

Cat. No.

MSI-6195

864. 'MSI' TO STUDY THE FREQUENCY OF A TUNING FORK

To study the frequency of a tuning fork with the help of Sonometer.

Cat. No.

MSI-6198

865. 'MSI' TO DETERMINE THE FREQUENCY OF AC MAINS

To determine the frequency of Ac mains by means of a Sonometer.

Cat. No.

MSI-6201

866. MSI 6204 'MSI' CRO

- A. Scientific Make dual trace. 20 MHz.
- B. Scientific Make Dual trace 30MHz.
- C. Aplab make dual trace oscilloscope 30 MHz.
- D. Aplab make dual trace Oscilloscope TRAINER MODEL. 20MHz. with inbuilt Multimeter.
- E. Scientific Makd 60 MHz Oscilloscope 2 ch- 1 mv with delayed sweep & alternate triggering.
- F. -do- same as above but alternate triggering.



867. 'MSI' BATTERY ELIMINATOR

Cat. No.	Description
MSI-6207	2-6 V DC / 2 Amp.
MSI-6208	2-12 V DC / 2 Amp.
MSI-6209	2-12 V DC / 3 Amp.
MSI-6210	2-12 V DC / 5 Amp.

868. 'MSI' ELECTRON SPIN RESONANCE SPECTROMETER

Electron Spin Resonance Spectrometer ESR-105 Complete in all respect, except a oscilloscope (optional) Scientific make.

Cat. No.

MSI-6213

869. MSI 6216 'MSI' ULTRASONIC INTERFEROMETER FOR LIQUID

- A. Model F-80 (single freq) acc. 0.3%
- B. Model F-80D Ultrasonic interferometer (Dual Freq.)(1&MHz) acc. 0.3%
- C. Model f-81(Single Freq.) acc.0.3%
- D. Model F 81D (Dual freq.) (2&5MHz) acc.0.03%

Essential Accessories

- (i) CRO 30 MHz 2 channel oscilloscope with alternate triggering & trigger band width of 60 MHz & component tester.
- (ii) Water BATH for above with digital temp indicator cum controller and acc. 0.1 °C.

870. MSI 6219 'MSI' GM COUNTING SYSTEM

- A. Geiger counting System Type GC-601A (Micro Controller based) Economy model.
- B. Geiger Counting System Type GC-602A (Micro controller based) Research Model.

Essential Accessories

- (i) End Window GM Detector Type GM-120 (LND712)
- (ii) Stand for end Window GM Detector Type SG-200
- (iii) GM Detector Sliding Bench.
- (iv) Radio Active Source Kit. Type SK-210. Contain one Gamma source (Cesium –Cs-137) & one Beta Source (Thallium –TI-204).
- (v) Aluminium absorber set Type AA-270 (consisting of 10 aluminium foils with different thickness).
- (vi) Lead/Copper absorber set. Type LA-271 (consisting of 5 Lead foils & 5 copper foils with different thickness).

Optional at Extra cost

- (a) Data Communication software CD & Rs 232 Cable (for downloading data into PC for model GC-602A only).
- (b) Lead Castle. Type LS-240
- (c) Installation charges if required.

871. 'MSI' GAMMA RAY SPECTROMETER SYSTEM (INTEGRAL MODEL)

Gamma Ray Spectrometer System (Integral Model) Type GR-612 consists of High Voltage PCB (0-2000V) Continuously adjustable by a Precision ten turn dial, Linear amplifier PCB, single Channel analyzer PCB & with microcontroller based Counter/Timer PCB with built in Serial & centronic parallel Port with firm ware support.

Cat. No.

MSI-6222

Optional at Extra cost

- (a) Lead shielding for 2"x2" Detector. Type LS-250.
- (b) Data Communication Software for downloading the Counter/Timer unit stored readings into PC. Type DS-100.
- (c) Dot Matrix printer with cable.

872. 'MSI' GAMMA RAY SPECTROMETER SYSTEM (MODULAR MODEL)

Gamma Ray spectrometer System (Modular Model) with accessories:- Minim Gamma Ray spectrometer System Type GR - 611M (Modular/Research Model) with micro controller based counter/timer consisting of Minimal Bin & Power supply Type MB-403, High Voltage Unit. Type HV-502, Linear amplifier Type LA-520, single Channel analyzer Type –SC -530, Counter timer Type CT-541A.

Cat. No.

MSI-6225

- A. 2"x2" flat type NaI Integral Assembly Detector with built in pre amplifier
Type SD -152F Resolution better than 8.5%.
- B. 2"x2" Well Type Na I Integral assembly Detector with built in Pre Amplifier
Type SD-152W Resolution better than 9.0%.
- C. Gamma Reference Standard Set type LS-250.



Optional at Extra cost

- (a) Lead shielding for 2"x2" Detector. Type LS-250.
- (b) Data Communication Software for downloading the Counter/Timer unit stored readings into PC. Type DS-100.
- (c) Dot Matrix printer with cable.

873. 'MSI' ZEEMAN EFFECT EXPERIMENT

Zeeman Effect Experiment complete in all respect including 14 monitor, etalon, mercury source, electromagnet & all related optics / electronics.

Cat. No.

MSI-6228



874. 'MSI' MILLIKAN'S OIL DROP EXPERIMENT

Measurement of electron charge by Millikan's experiment. The experiment comes complete with 14" monitor, timer, atomizer etc. The oil droplets can be seen on monitor ensuring convenience & acc.

Cat. No.

MSI-6231



875. 'MSI' Di ELECTRIC MEASUREMENT SET UP

Suitable for temperature upto 600 °C, including highly stable PID controllet and capacitance meter 1 pF to 20000 uF.

Cat. No.

MSI-6233

876. 'MSI' FOUR PROBE SET UP

Four probe set up for measuring the resistivity of very low to highly resistive samples at temp. upto 200 °C with PID controlled oven.

Cat. No.

MSI-6236



877. 'MSI' HALL EFFECT EXPERIMENT

Hall effect experiment complete set up in all respect.

Cat. No.

MSI-6239



878. 'MSI' MAGNETIC HYSTERESIS LOOP TRACER

Magnetic Hysteresis Loop Tracer complete in all respect but without Oscilloscope.

Cat. No.

MSI-6242

879. 'MSI' MANUAL SPIN COATER

Apex introduce this advanced series of compact, bench-top spin coaters which are in chemical compatibilities for precise deposition of metal-oxide, polymer and metal-organic thin film P-1.

Applications :-

- Basic and Applied material research.
- Non-destructive quality control of surfaces, thin films & castings.
- Thin film on Semiconductors, Metals and Glass.
- Casting of Organics Thin films, Optionals Coating and Magnetic films.
- Films at Liquid-Solid Interface.

Speed Range	100 R.P.M. to 10,000 R.P.M.
Acceleration	40-5000 R.P.M./ Sec
Duration	1-999 Sec/Step
Working Chamber	Telfon Coated Chamber of 8" Diameter
Substrate Holder	Delrin-made Circular Substrate Holder of Diameter ½", 1", 1 ½" 2" [Optional 3" & 4" (For Silicon Wafer Only)]

Cat. No.

MSI-6245

880. 'MSI' PROGRAMMABLE SPIN COATER

Apex introduce this advanced series of compact, bench-top spin coaters which are in chemical compatibilities for precise deposition of metal-oxide, polymer and metal-organic thin film P-2.

Applications :-

- Basic and Applied material research.
- Non-destructive quality control of surfaces, thin films & castings.
- Thin film on Semiconductors, Metals and Glass.
- Casting of Organics Thin films, Optionals Coating and Magnetic films.
- Films at Liquid-Solid Interface.

Speed Range	100 R.P.M. to 10,000 R.P.M.
P. Acceleration	5000 R.P.M./ Sec
P. Control Time	9999 in each step
Working Chamber	Telfon Coated Chamber of 10" Diameter
Substrate Holder	Delrin-made Circular Substrate Holder of Diameter ½", 1", 1 ½" 2" [Optional 3" & 4" (For Silicon Wafer Only)]



Cat. No.

MSI-6248

881. 'MSI' SINGLE DIP COATING UNIT XDIP-SV1

Apex introduce this advanced series of compact, bench-top Dip Coaters For controlled immersion and withdrawal of Substrate into solutions, ideal for sol-gel coatings. Monolayer self-assembly and layer-by-layer assemblies.

Field Applications :-

- Layer-by-layer assemblies.
- Self-Assembled Monolayer Sol-Gel Coatings.
- Glass Stainers for biomedical applications.

Dipping & Lifting Speed	0.5-450mm/min
Dipping & Lifting Length	150mm
Film Length	100mm
Deposition Cycles	Unlimited
Real-Time Display of Control Processes	In LCD Console

Cat. No.

MSI-6251

Optional Accessories for item no. 877, 878, 879

- A. Vacuum pump oil free capacity 30 ltr. per min., 1/4 HP Motor.
190W, 1 Amp., 730 mm Hg Vacuum.

882. MSI 6254 SI' QUARTZ PRISM 15 x 15 mm