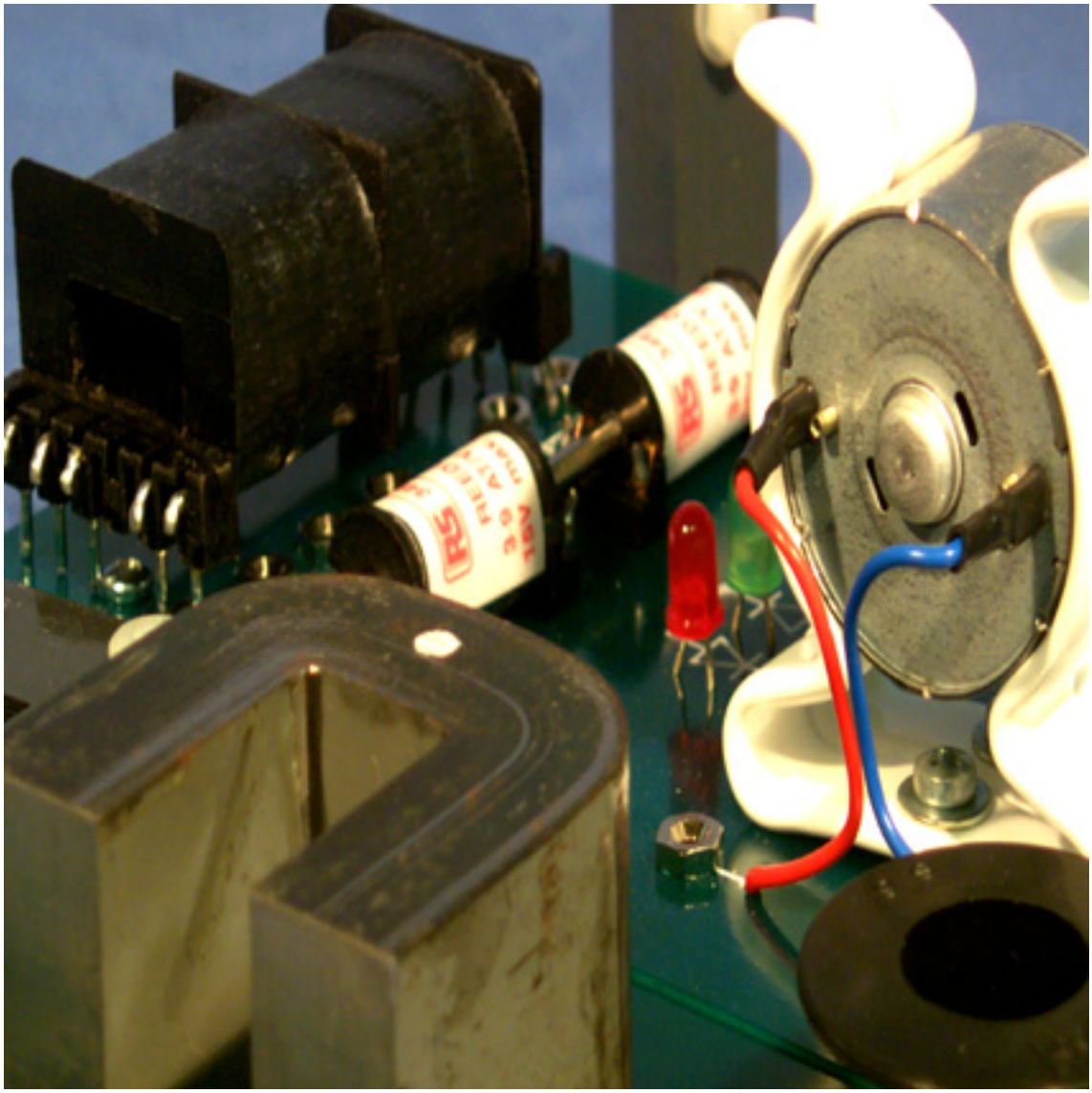
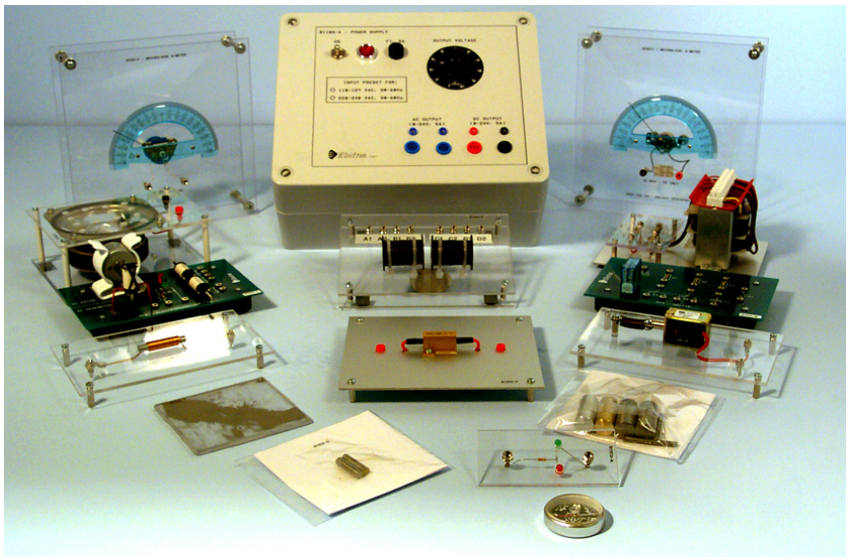
Electron S.R.L.

Design
Production &
Trading of
Educational
Equipment

A11 (B11) - BASIC ELECTRICITY TRAINERS



A1103 (B1103) - BASIC ELECTROMAGNETIC TRAINING KIT



General:

The trainer is a comprehensive collection of training aids, implemented in a modular form, which covers the range from electro-physic to the fundamentals of magnetism up to the principles of transformers, motors and generators.
The trainer consists of a collection of modules whose front face includes (whenever applicable) the components and devices needed to perform the experiments with clear silkprinting indicating the component symbols, identity and interconnection.

For the execution of the experiments more than a single module is generally used. The interconnections as well as the connections to the power supply and to the measuring instruments are by plug-in cables.

Several modules are available to cover in smooth steps the various study subjects.
The student is gradually brought to review the theoretical principles, then to experiment the same and finally to see them applied in real industry-standard applications.

Experiments and study topics:

The magnetic field:
- Basic magnetic phenomenons
- The magnetic field
- Magnetic fields generated by electric currents
- Magnetic polarity of a solenoid
- Magnetic flux and flux distribution

Electromagnetism:
- Electromagnetic induction
- Reversability of electromagnetic actions
- Lenz's law on induced EMF

Mechanical interactions of magnetic fields and electrical currents:
- The electromagnetic forces
- Reversability of mechanical-electro-magnetic actions
- The electric motor/generator

The transformer:
- Voltage transformation
- Current transformation

The trainer is supplied complete in all respects, with the power supply, experiment modules, accessories (cables and plug-in cords) and with instruction manual.
The trainer includes a general-purpose multimeter. Use of additional instruments may be recommended for certain experiments.

Ordering code: B1103

A1105 (B1105) – BASIC ELECTRICITY TRAINER (with single-phase AC experiments)
A1105-T (B1105-T) – BASIC ELECTRICITY TRAINER (with 3-phase AC experiments)

General:

The trainer is a comprehensive collection of training aids, implemented in a modular form, which covers the range from electro-physics to DC and AC circuits, up to circuit application of general electronics.
The trainer consists of a collection of box-like modules, 100 x 160 x 20mm size, with a magnetic base and a printed circuit board front face. The PCB face includes the components and devices needed to perform the experiments with clear silkprinting indicating the component symbols, identities and interconnections.

For the execution of the experiments the modules are placed on a metallic plate (Base Plate, 430x310x30 mm) where they are retained by magnetic strips. The connections to the power supply and to the measuring instruments are by plug-in cables.
Certain experiments require more than a single module to be interconnected. This is also done by plug-in cables.

The magnetic latching of the modules to the metallic Base Plate ensures that the various items remain steadily fixed even if the Base Plate is placed vertically, as in case of collective demonstrations by the Instructor.

A great variety of modules are available to cover in smooth steps the various subjects.

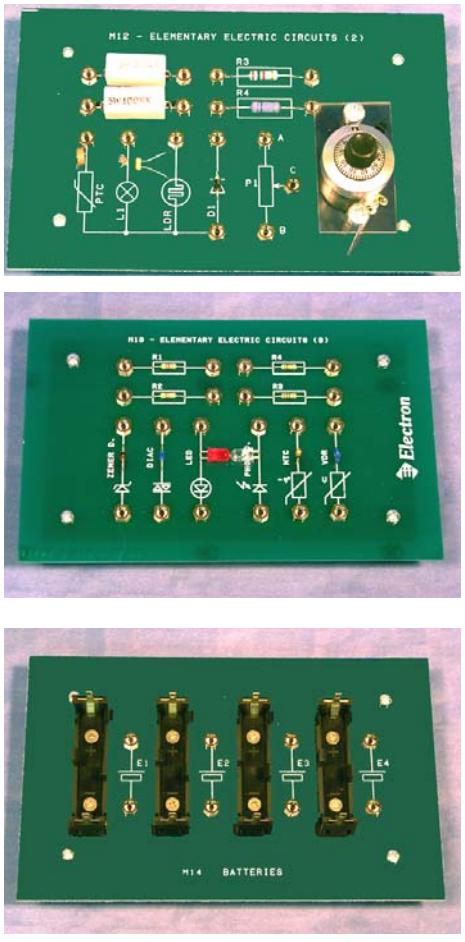
Study topics:

DC Technology:

- Assembly of simple a circuit
- Polarity of DC voltage
- Ohmic resistance
- Ohm's law
- Series connection of resistor
- Parallel connection of resistor
- Voltage divider in no load operation
- Voltage divider under load
- Wheatstone measuring bridge
- Kirchhoff laws
- Thevenin and Norton theorems

Non-linear resistances:

- Characteristics of a light bulb
- Voltage dependent resistor (VDR)
- Resistor with a Positive Temperature Coefficient (PTC)
- Resistor with a Negative Temperature Coefficient (NTC)
- Light dependent resistor (LDR)
- Characteristics of a diode



Some modules of the 1105 trainer

DC Measuring techniques:

- Reading scales
- Using current and voltage meters
- Internal resistance of a voltmeter
- Internal resistance of a current meters
- Expanding the range of a voltmeter
- Expanding the range of a current meter
- Measuring resistance with constant current

DC voltage sources:

- Measuring the internal resistance of batteries
- Parallel connection of batteries
- Series connection of batteries

Capacitors in a DC circuit:

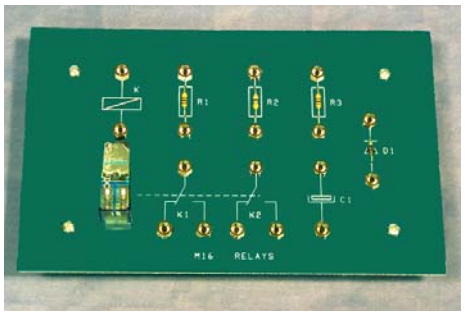
- Measuring capacity
- Parallel and series connection of capacitors
- Series connection of a resistor and capacitor

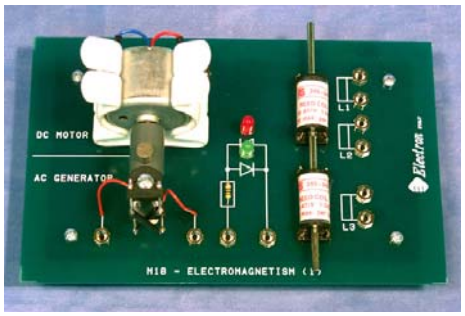
Coils in a DC circuit:

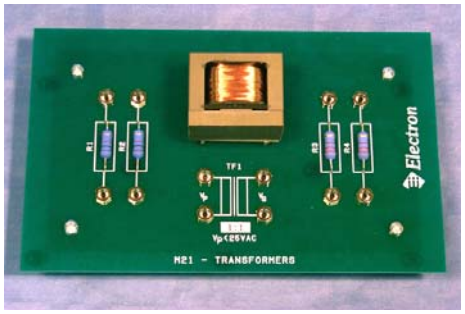
- Self induction of a coil
- Induction and the transformer principle
- Relay circuit

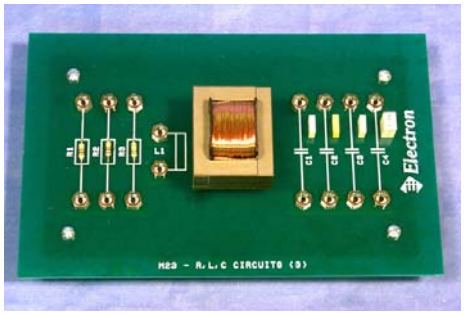
AC technology:

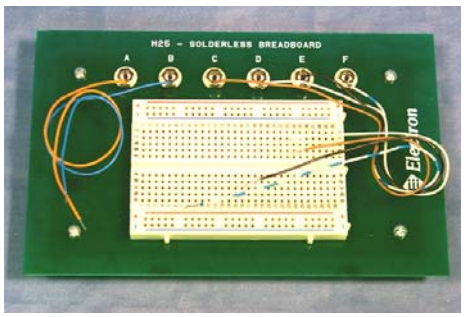
- Characteristics of the AC current
- Ohmic resistance in the AC circuit
- Ohmic resistance in the AC circuit with variable frequencies
- Coils in the AC circuit at constant frequency
- Coils in the AC circuit at variable frequencies
- Series connection of resistors and coils
- Capacitor in the AC circuit at constant frequency
- Capacitor in the AC circuit at variable frequencies
- Voltage resonance
- Current resonance
- Recording diode characteristics
- Single pulse center point circuit
- Two pulse center point circuit
- Two pulse bridge circuit
- Transformer with no load
- Transformer short circuited and under load
- Open circuit and short dissipation
- The diode in DC and AC circuits
- One way rectifier circuit.
- Bridge rectifier circuit.
- Function of a relay.











Some modules of the 1105 trainer

The trainer includes the power supply and a pair of general-purpose metering devices (voltmeter/ammeter/ohmmeter), as required to perform the experiments.

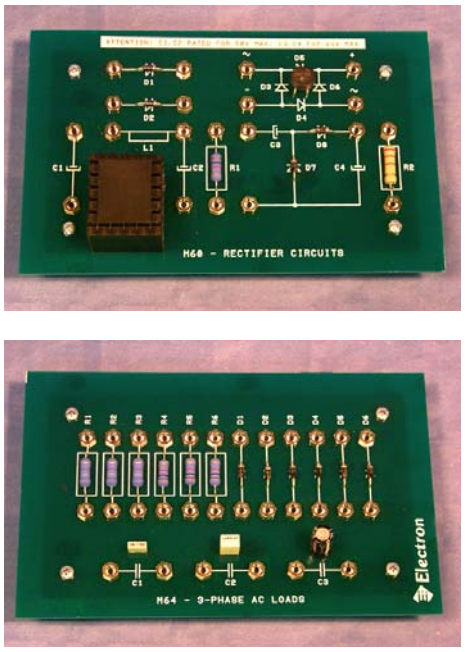
The optional instruments required to be used with the trainer are:

– Dual-trace oscilloscope, 20MHz bandwidth
– Low-frequency signal generator 10 to 100kHz, sinewave and square

The trainer is supplied with cable accessories kit, a storage case and an extensive instructions manual.

Ordering code:

1105



Some modules of the 1105 trainer

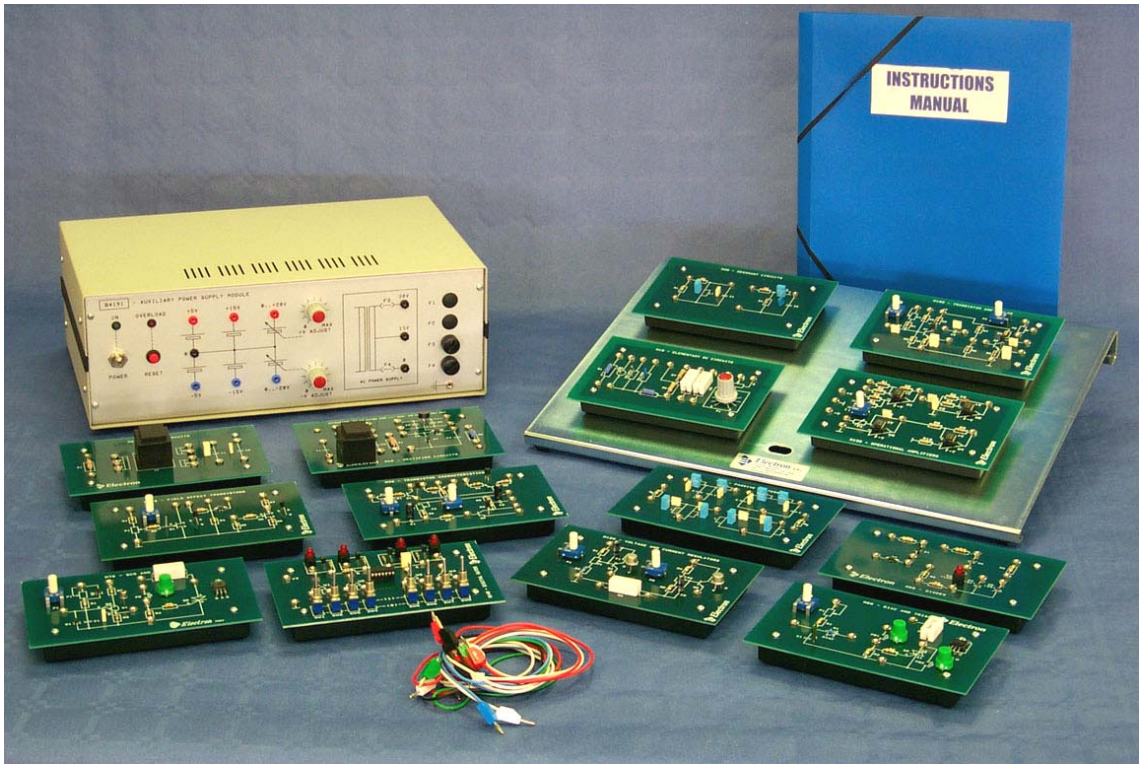


Photo of A1105 trainer

Note: The 1105-T is a version of the trainer with experiments extended to 3-phase AC.
It includes one additional experiment module and has the standard B4191 power supply replaced by the B4196 which provides 3-phase AC low-voltage outputs. All other features are unchanged.

Ordering code:

1105-T

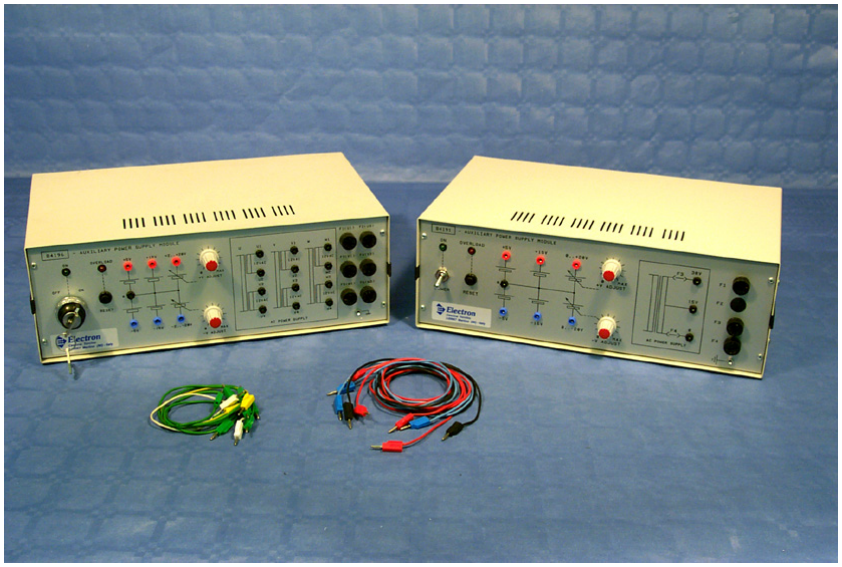
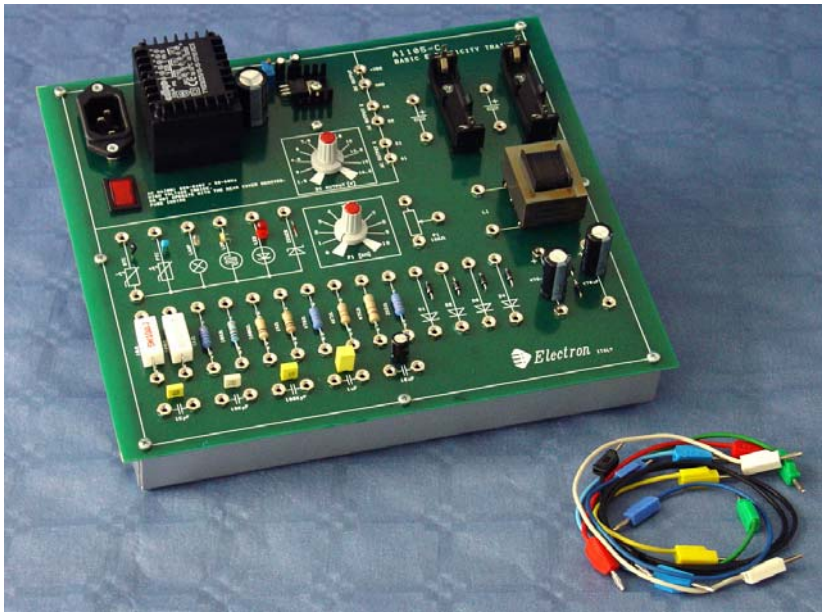


Photo of the two alternative power supplies used with the 1105 trainer.

A1105-C – BASIC ELECTRICITY TRAINER



The A1105-C is a comprehensive training aid, implemented in a modular form, which covers the range from electro-physics to DC and AC circuits, up to circuit application of general electronics.
The trainer consists of a collection of circuits on a single, large sized board. The PCB face includes the components and devices needed to perform the experiments with clear silkscreen printing indicating the component symbols and identity.

The interconnection of the circuit blocks, as well as the connections to the power supply and to the measuring instruments are by plug-in cables.

The large board size makes the trainer also suitable for collective demonstrations by the Instructor.

The trainer is also supplied complete with accessories (set of plug-in cables) and instruction manual.

The following is a list of instruments recommended for use with the trainer:

- Dual-trace oscilloscope
- A pair of general purpose lab-type multimeters
- Low-frequency signal generator

The trainer includes an on-board power supply with the following specifications:

AC mains 220-240V AC, 50,60Hz
Outputs:
- 2 X 14V AC, independent
- One stabilized, adjustable output , 1.6 to 16.5V DC, with thermal overload and short-circuit protection

Study topics provided by the trainer:

DC TECHNOLOGY
- Polarity of DC voltages and currents
- Ohmic resistance
- Ohm's law
- Non-linear resistance: the incandescent lamp
- Differential resistance
- The NTC thermistor
- The Positive Temperature Coefficient resistor (PTC)
- The Light-Dependent Resistor (LDR)
- The diode characteristic
- The Zener diode characteristic
- The Light Emitting Diode (LED)

RESISTANCES IN SERIES AND PARALLEL
- Series circuit
- Parallel circuit
- Voltage divider
- Voltage divider in loaded conditions
- The potentiometer
- Wheatstone measuring bridge
- Kirchhoff laws
- Thévenin and Norton theorems

DC MEASUREMENTS
- DC current and voltage meters
- The Voltmeter
- The Ammeter
- Equivalent circuit of a generator
- DC power – power transfer

BATTERIES
- Internal resistance of a battery
- Batteries in series
- Batteries in parallel

AC CIRCUITS: RESISTANCE, REACTANCE, AND AC POWER
- R, L, C networks in AC
- AC Power
- CR and RC networks with sinewave signals
- CR and RC circuits with pulse signals

RESONANCE
- Measurement of inductance
- LC parallel resonant circuit
- LC series resonant circuit

THE TRANSFORMER
- General
- Serial/parallel connection of transformer secondaries
- Equivalent internal resistance of the transformer

AC/DC CONVERSION
- The half-wave rectifier
- The full-wave rectifier
- The midpoint full-wave rectifier
- The bridge-type full-wave rectifier
- Full-wave rectifier with smoothing capacitor
- Full-wave rectifier with LC filtering cell
- Voltage doubler

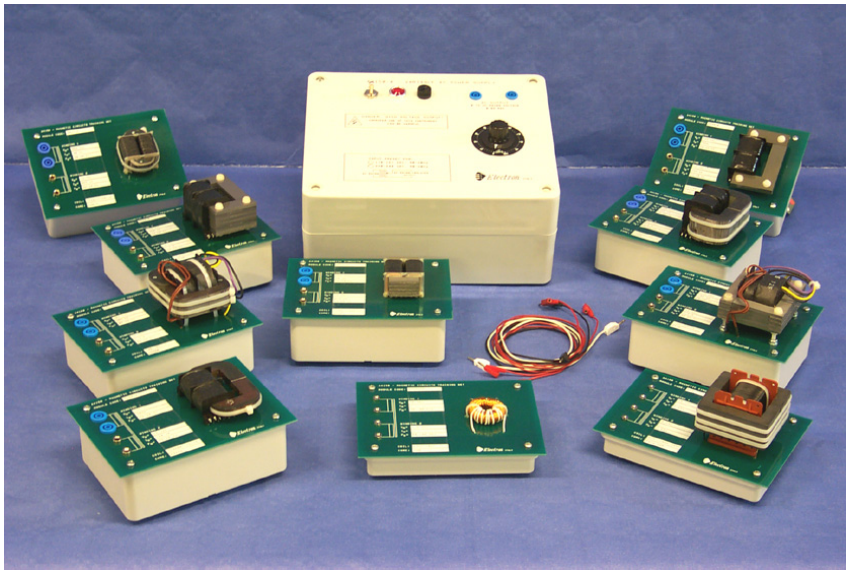
Ordering code

A1105-C

A1105-CT – BASIC ELECTRICITY TRAINER

The A1105-CT is a version of the trainer with experiments extended to 3-phase AC.

A1150 – MAGNETIC CIRCUITS TRAINING SET
(factory code A4150)



This trainer is a comprehensive collection of training aids, implemented in a modular form which covers the range from the fundamentals of magnetism up to the principle of transformers. The trainer also includes a set of interchangeable elements (cores and coils) to set up magnetic circuits of various configurations.

In detail the covered subjects are:

ELECTROMAGNETISM:

- Electromagnetic induction.
- Reversability of electromagnetic actions.
- Lenz's law or induced EMF.
- Production and characteristics of magnetic fields.

PRACTICAL MAGNETIC CIRCUITS:

- Solid syntherized magnetic materials and laminated ferromagnetic cores.
- Set up and experiment of magnetic circuits of E, I, C, U, O configuration.
- Measurement of flux and circuit reluctance.

The trainer includes all accessories needed to perform the experiments: cables, mounting base, power supply.

COMPOSITION OF THE TRAINER – INVENTORY OF PARTS

The trainer consists of:

- AC Power Supply, code A4150-A. Input voltage from AC mains 220V, 50Hz, output variable 0 to 220V, 0.8A.
- Experiment modules, 1 piece each:
  - 3208-A ("C" core)
  - 3208-B ("UI48" laminated core)
  - 3228-A ("C" core)
  - 3228-B ("UI48" laminated core)
  - 2017-A ("C" core)
  - 2017-B ("UI30" laminated core)
  - T45-A (dual "C" core)
  - T45-B ("EI75" laminated core)
  - E65 (dual "E" core, sinterized low-frequency ferrite)
  - ITOR225 ("O"-shape core, high frequency ferrite)
- Cable-set, with both 4-mm safety jacks for high voltage and 2.5-mm jacks for low-voltage signals.
- Storage case.
- Instruction manual

The trainer can be optionally provided with a sine/triangle/square wave generator, code B4194.

ORDERING CODES:

A1150 basic trainer
B1255 (B4194) optional signal generator with power supply

A1152 - ELECTROCHEMISTRY KIT

Strong plastic case containing a complete set for the study of electrochemistry.

The Kit Includes:

- Hoffman Voltmeter 1 set
- Digital Multimeter 1 pcs
- Analogue Multimeter 1 pcs
- Digital pH Meter 1 pcs
- Power Supply 1 pcs
- Four copper electrodes 1 set
- Four Zinc electrodes 1 set
- Two Iron electrodes 1 set
- U Bridge 1 pcs
- Thermometer -10 to 110 Deg C 1 pcs
- Two Red Connecting Wires, 50 cm long 1 set
- Two Red Connecting Wires, 100 cm long 1 set
- Two Black Connecting Wires, 50 cm long 1 set
- Two Black Connecting wires, 100cm long 1 set
- Red Crocodile clips, 5 1 set
- Black Crocodile clips, 5 1 set
- Double clamp 1 set
- Small weighing spoon. Combustion spoon, phosphorus 1 set
- Metal stand 1 set
- Flask holder 1 pcs
- Retort stand clamp 2 set
- Test tube holder 1 set
- Lamp 1 set
- Test tube brush set 1 set
- Gloves 1 pack
- Test cells module 1 set
- Cover test cells 1 set
- Silver electrode 1 set

Experiments that could be performed:

- Electrolytes and conductivity
- Conductivity and Concentrations
- Elettrolytic processes
- Salt solution cell
- Lemon cell
- Hydrogen Electrode
- Daniell cell
- Volta cell
- Concentration series
- Galvanic cells different couples
- Water Electrolysis I
- Water Electrolysis II
- Accumulators
- Silver reference electrode
- Reduction potential and the silver electrode
- Plotting a titration curve
- Weak acid strong base titration curve
- Corrosion and protection
- Galvanic Zinking

Includes manuals for student and for teacher