

Electron S.R.L.

Design
Production &
Trading of
Educational
Equipment

A2 – ELECTRICAL INSTALLATIONS LABORATORY



A2 – ELECTRICAL INSTALLATIONS LABORATORY

Overview

The Electrical Installations Laboratory is conceived to provide the technical schools with the courses necessary to teach the future electricians how to assemble and test electrical circuitry both in the residential and in the industrial environments.

The Laboratory sections are structured so that they can be tailored to different training level requirements by choosing the desired area (Residential or Industrial), the presentation of the electrical parts (Functional Modules or discrete components) and the connection method (4 mm safe connectors cables, surface or conduit wiring).

Accessories such as power supply, work bench, panels of various formats, complete the outfit of the Laboratory.

Great attention has been given to the human interface to provide systems that are safe, user friendly, easy to understand, continuously updated and tuned to the actual industrial, real life world.

Choosing the most appropriate solution

The Laboratory A2 consists of three main sections:

A21 To build Residential and Industrial control circuits by means of pre-assembled Modules, each containing a discrete electrical Function, to be connected by means of 4 mm safety connector cables.

A24 To implement the same installations but, instead of being based on Functional Modules, it is based on discrete electrical components and electrical wires that must be mounted on work panels.

A25 To implement typical electrical installations based on discrete electrical components fastened on work panels made of non conductive and workable material.

The wiring can be executed, at the user's choice, on the board front surface or on the rear.

It is therefore important that in choosing the most appropriate approach, the course objectives be carefully considered.

In general, A21 should be chosen when the emphasis must be on the logic of the electrical functions, while the A24 and A25 is more appropriate when it is desired to make the students exercise practical hand work.

Number of students and stations

Then, the number of work stations has to be decided depending on the number of students attending the courses. Following is a rough guideline.

- In the case of the A21 and A25, it is suggested to have not more than 2-3 students working together on one exercise on the same work station.
- The A24 is different as it is based on stations that can accommodate up to 4 students on 4 different exercises simultaneously.
- The quantities of equipment per work station suggested in the following sections are based on these considerations but, of course, the best approach depends on the specific situations.

Documentation

Two Exercise Manuals describe typical Residential and Industrial Installations circuits.

Specifications and ordering

Detailed information and Ordering Codes can be found in the following sections.

A21 – MODULE-BASED ELECTRICAL INSTALLATIONS TRAINING SYSTEM

This Training System is based on two integrated sets of Training Modules built in metal housings with safety connectors and clear synoptic depicting the inside logic. The two sets are designed to exercise Residential Installations and Industrial Installations (Motor Control) circuits.

Each module contains one specific electrical function that can be connected to the others by means of 4 mm safety cables to implement different circuit combinations (control circuits of the Industrial Installations modules, when powered at low voltage, have 2 mm safety sockets).

The significant advantage for the student is that he can concentrate on the functional flow of the electrical system he is designing without having to worry about the characteristics of the components. Another advantage is that the wiring, and therefore the implementation time, is drastically reduced.

All Modules can be used both mounted on a vertical frame or on a bench and are therefore suitable for teacher demonstration and for student use. The Modules are also equipped with latches by which it is possible to hook them together when so desired. This mechanism is shown on the following page.



Unless otherwise specified at order time, Residential Installation Modules are supplied for low voltage use (<50V), while the Industrial Installation Modules have the power circuits fed at the electrical machines nominal voltage and the control circuits at low voltage.

When the modules are supposed to be used at mains voltage all components are fully protected against contacts.

The available Modules are listed under each set in the following pages. Others can be developed on specific customer requirements.

Various options include the Kit version, disassembled and provided with full mounting instructions to give the students additional training opportunity (suffix K) or transparent panel version (suffix T) for a full internal view of the module.

Owing to their total compatibility, it is possible to expand, at any time, the Module configuration originally acquired.

Power Supply, Instruments, cables and a Test Station with Bench, Universal Power Supply and Panels particularly suitable for testing motor control circuits, necessary for a correct execution of the exercises, are also proposed below as a separate set.

An Exercise Manual is supplied with each Installation Module Set. Both discuss the theory and show drawings of the electrical and practical implementation of a large variety of exercises.

VERTICAL FRAME AND BENCH

The frame can accommodate two rows of Modules and can be adjusted to be used vertical, or tilted for better visibility.

Some Modules are full height and they fit exactly into the frame rows, others are half height and must be plugged in couples to the module adapter shown below, to fit into the frame rows.

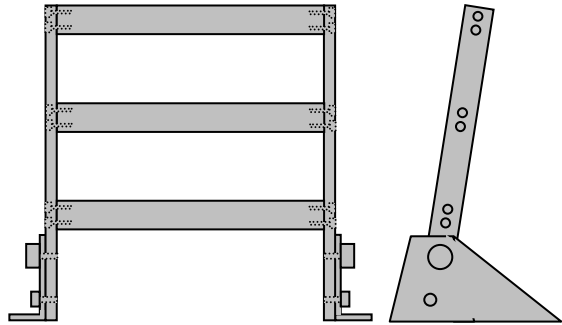
The frame can be positioned on a work bench such as the ELECTRON F1110 (see description in the related section of the Catalogue).

Ordering Codes

B4195	2 rows Frame
B4195-3	3 rows Frame
A21 M098	Module Adapter
F1110	Work Bench



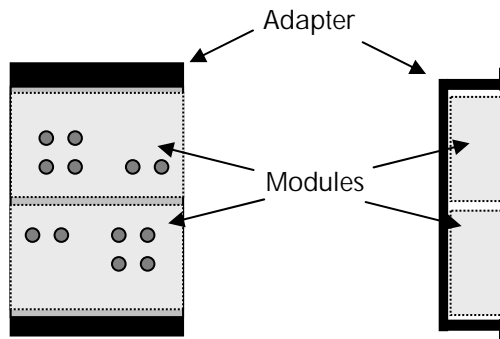
Front views of Frame



Side view



Module Adapter with latched Modules



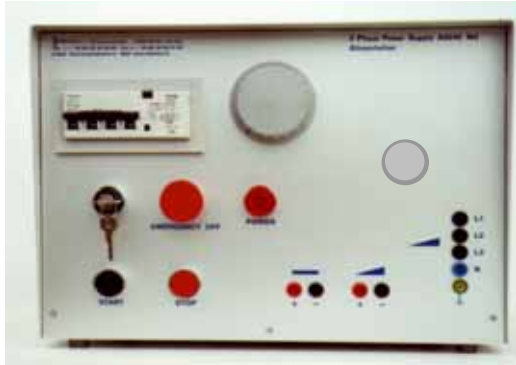
Front and side views



A21-A0240 M2 - POWER SUPPLY

This Power Supply can be used both with Residential and Industrial Installations because it has a Three Phase + Neutral variable output and can therefore provide single phase, three phase, low and nominal voltage outputs and is protected by magneto thermal and differential switches.

It is controlled by Power On/Off, Emergency Off buttons and Power On Indicator.



Front view of the power supply

Technical Characteristics

Input 220/380 VAC

Outputs 3 phase 0-250/440 VAC+N
220 VDC fixed
1 phase 0 – 220VAC
independently variable

Thermal and Differential Protections

A21-A0240 x

Other similar compositions, other voltages and power ranges are available on request.

CABLE SETS


The cables have 4mm safety terminals according to IEC safety standards

A typical set is composed by the following cables, in quantity and mix suitable to perform even the more complex electrical laboratory experiment.

A set of 50 adapters, 2mm male to 4 mm female, is optionally available to allow the use of this set of cables on 2mm sockets.

This is especially useful with the A21 M200 Industrial Installation Trainer.

A cable rack can be ordered optionally for orderly storing of the cables.

Cable Set	Qty	Ordering Code	
1,5 mm ² . 250 mm. length, black color.	10		
1,5 mm ² . 250 mm. length, red color.	10		
1,5 mm ² . 500 mm. length, black color.	8		
1,5 mm ² . 500 mm. length, red color.	8		
1,5 mm ² . 500 mm. length, yellow-green color.	4		
1,5 mm ² . 1,000 mm. length, black color.	4		
1,5 mm ² . 1,000 mm. length, red color.	4		
1,5 mm ² . 1,000 mm. length, yellow-green color.	2		
1,5 mm ² . 2,000 mm. length, black color.	4		
1,5 mm ² . 2,000 mm. length, red color.	4		
1,5 mm ² . 2,000 mm. length, yellow-green color.	2		
2mm male to 4mm female adapters	50		A4890A
Cable rack	1		A4891

Other quantities are provided on request according to the circuit need

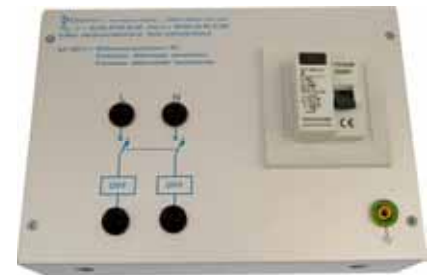
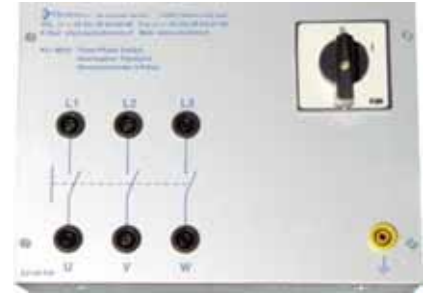
A21-M0x – BASIC MODULE SET

The modules listed below are of common use both with the Residential and Industrial Installations.

They contain functions from voltage step-down to protection, rectification and control.

Rated voltages and current values or intervention current values are according to system need or to user request, among the industrially available standards.

Module Description	Module Specifications	Module Code A21 M0xxxx
Single Phase Transformer (AC aux power supply)	220V Primary 0-12-24 V Secondary	M010-1
Three Phase Transformer	220/380 V Primary 24/42V Secondary	M010-3
Magneto Thermal Protection	2 poles 4 poles	M011-1 M011-3
Differential Protection (Earth Leakage Circuit Breaker)	30 mA sensitivity 1- Phase 30 mA sensitivity, 3- Phase	M012-1 M012-3
Fuse Holder	2 x 38 mm Set of 2	M014
Fuse Holder	5 x 20 mm Set of 4	M015
Isolator	Three industrial fuses	M016
DC Auxiliary power supply	transformer and rectifier bridge	M017
Rectifier Bridge	4 diodes bridge	M018
Key Switch	4 Poles	M020
Mains Switch	4 Poles	M021
Emergency Push Button	Mushroom type, Red 1NO + 1NC contacts	M022
Three Phase Socket	3P + N + T, 16A	M030



Module Description	Module Specifications	Module Code A21 M0xxxx
INSTRUMENTS		
AC Analogue Ammeter	Multi-range	M060
AC Digital Ammeter	Multi-range	M061
AC Analogue Voltmeter	Multi-range	M062
AC Digital Voltmeter	Multi-range	M063
AC Analogue Electrical Power Measuring Set (A, V, W)	See detailed specifications in the related section of the ELECTRON Catalogue	A4750A
AC Digital Three Phase Electrical Power Analyzer	See detailed specifications in the related section of the ELECTRON Catalogue	A4750D
Energy counter	for single-phase systems	M070-1
Energy counter	Electronic multi tariff type for single-phase systems	M070E-1
Energy counter	for three-phase systems	M070-3
Current transformer	Single-phase Secondary current 5A	M072-1
Current transformer	Three-phase Secondary current 5A	M072-3



A21 M1x – RESIDENTIAL INSTALLATIONS MODULE SET

The set consists of a comprehensive mix of integrated modules designed to be the building blocks of a large variety of residential installations.

Each module contains one logic function, such as protection, switch, lamp, relay, buzzer, electric lock, timer and so on, and all of them can be easily connected to implement the desired circuits. The connections are performed by means of 4mm safety connectors and cables (with 2mm adapters when necessary).

The electrical components are represented on top of the modules with clear silk prints that show the internal electrical details so that the students are always dealing with the logic of their projects rather than the construction details of the components they are connecting.

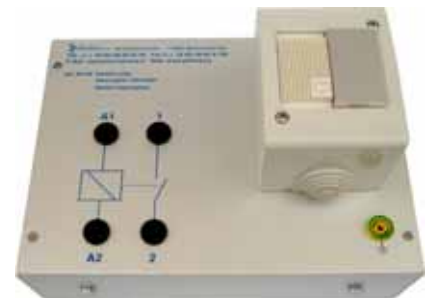
However, if so desired, the details can also be observed by easily accessing the inside of the modules (they can be opened by removing few screws). Some components are mounted on top of the modules and are therefore immediately visible.

Owing to their modularity and integration capabilities, additional modules can be ordered at any time to expand the flexibility of the system and the range of the circuits that can be implemented.

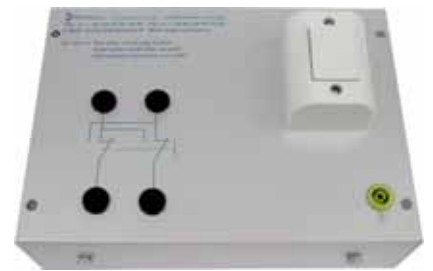
The modules can be mounted on the vertical frame described earlier to facilitate the students activities and the instructor's theoretical and practical lessons.

An Exercise Manual describes in detail, theoretically and practically, a set of basic experiments by showing and discussing the electrical diagrams and module connections for each one of them.

Module Description	Module Specifications	Module Code A21 M1xxxx
One Pole, One Way Switch		M110
Two Circuit Switch		M111
One Pole, Two Ways Switch		M112
One Pole Reversing Switch		M114
One Pole Push Button		M116
Illuminated Pushbutton		M116L
Bell Pushbutton		M116B
Bell-Door Opener Pushbutton		M117
Touch Sensitive Switch		M118
Maid – Valet Pushbutton		M119
BBM (Break before make) micro-switch	auxiliary contacts: 1NO and 1NC	M119 BBM
MBB (Make before break) micro-switch	auxiliary contacts: 1NO and 1NC	M119 MMB



Module Description	Module Specifications	Module Code A21 M1xxxx
Switch relay		M120
Four Positions Step Relay		M122
Light dimmer with Switch	For filament lamps	M125
Dusk-to-dawn switch	with cell	M126
Universal Socket	For various plugs	M130
Lamp holder and Lamp	Various socket (E14 as standard)	M140
Fluorescent lamp	With integrated starter.	M142
Emergency light	With battery and charger	M143
Buzzer		M144
Bell		M144B
Timing Relay	0 to 30 sec (other ranges on request)	M150
Calling Unit Answering Unit	From manager to secretary From secretary to manager	M160C M160A
House Phone	Internal and external units	M170
Door Electric Lock		M190



Module Description	Module Specifications	Module Code A21 M3xxxx
FIRE ALARM		M310
Stand-by Battery	12 V	M311
Smoke Detector	Detects the presence of smoke	M312
Fire Alarm	Panel	M313
Thermal Detector	Detects increase in temperature	M315
Indicators	Acoustic and light indicators	M318
INTRUSION ALARM		M330
Intruder Alarm	Panel	M331



Microwave based Detector	Volumetric radar sensor	M332
Passive Infrared based Detector	Sensor for heat radiations	M333
Perimeter Sensor	Magnetic contacts	M334
Blinker	Pulsing indicator	M335
HOSPITAL SIGNALLING		M370
Nurse Board Module	Call board	M371
Patient Room Panel	Call pushbutton and answer lamp	M372
VIDEO INTERCOM		M380
Video-Intercom Power Supply	Power supply and control	M381
Video Camera	External video camera	M382
Monitor Intercom	Internal unit	M385
Pushbutton Panel	External unit	M387



A21 M2X – INDUSTRIAL INSTALLATIONS MODULE SET

The trainer consists of a comprehensive set of integrated modules designed to be the building blocks of a large variety of industrial installations.

Each module contains one logic function, such as protection, push buttons, lamps, contactors, timer, and so on, and all of them can be easily connected to implement the desired circuits. The connections are performed by means of 4mm and 2mm safety connectors and cables: 4mm are used in the power circuits, and 2mm in the low voltage control circuits.

The electrical components are represented on top of the modules with clear silk prints that show the internal electrical details so that the students are always dealing with the logic of their projects rather than the construction details of the components they are putting together.

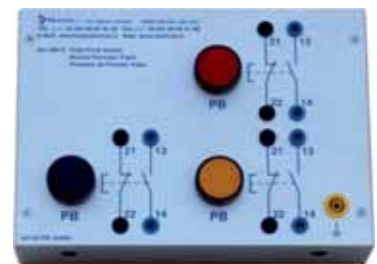
However, if so desired, the details can also be observed by easily accessing the inside of the modules (they can be opened by removing few screws). Some components are mounted on top of the modules and are therefore immediately visible.

Owing to their modularity and integration capabilities, additional modules can be ordered at any time to expand the flexibility of the system and the range of the circuits that can be implemented.

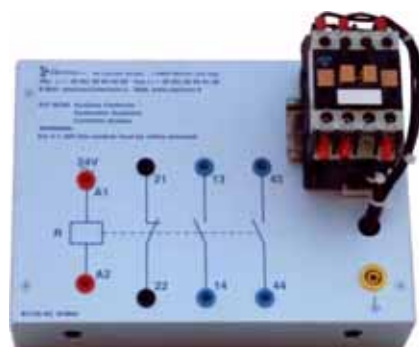
The modules can be mounted on the metal frame described earlier to facilitate the students activities and the instructors practical lessons.

An Exercise Manual describes in detail, theoretically and practically, a set of basic experiments by showing and discussing the electrical diagrams and module connections for each one of them.

Module Description	Module Specifications	Module Code A21 M2xxxx
Contactors	3 x 9 A 2NO + 1NC contacts 3NO + 2NC contacts Coil Voltage 24V	M210-A M210-B
Double Contactor	With Mechanical Interlock 3 x 9 A 2NO + 1NC contacts 3NO + 2NC contacts Coil voltage 24V	M210-2
Push Buttons	Triple: Red, Black and Green 1NO + 1NC Contacts	M212
Rotation Reversing Switch	20A, AC, Forw – Off – Rev	M214
4 – 2 Poles Commutator	Off - 1 – 2, 20A, AC	M215
Pole Switching Unit with Inversion		M215I
Pole Switching Unit (2 separate windings)		M215S
Star Delta switch	Off – S – D, 20A, AC	M216



Module Description	Module Specifications	Module Code A21 M2xxxx
Star Delta Starter with inversion		M216I
Auxiliary Contactor	4 A 2NO + 2NC Contacts Coil voltage 24V	M220
Limit Switches	Two toggle switches	M225
Signaling Lamps	Triple: Red, Green and Yellow 24V	M240
Time Relay	0-30 sec, 4 A 1NO + 1NC Contacts Coil Voltage 24V	M250
Thermal Protection	1NO + 1NC contacts 0,6-1 A 1-1.6 A 1,6-2.5 A 2.5-4 A 4-6.3 A	M260-1 M260-1.6 M260-2.5 M260-4 M260-6.3
Three Phase Motor Protection Switch	0,6-1 A 1-1.6 A 1,6-2.5 A 2.5-4 A 4-6.3 A	M262-1 M262-1.6 M262-2.5 M262-4 M262-6.3
Position Sensor	Limit switch	M264
Inductive Proximity Sensor	Activated by changes in magnetic field	M265I
Capacitive Proximity Sensor	Activated by change in capacitance	M265C
Level Magnetic Sensor	Sensor for level of liquids	M266
Photoelectrical Barrage Sensor	Activated by change in received light	M267
Photoelectrical Reflecting Sensor	Activated by a change in reflected light	M268



A21 M200FS – INDUSTRIAL INSTALLATIONS FAULT SIMULATOR

The Fault Simulator consists of a rack on which up to 12 ELECTRON Industrial Installations Modules can be mounted to implement the control circuits described in the ELECTRON A21-A24 M200 Circuits Manual.

Of course, with the Modules provided, many more different circuits can be designed by the instructor and students.

The Modules are those proposed by ELECTRON for implementing Industrial Controls, modified on their back by the addition, on all, of switches to be used to cause faults into the circuits. Therefore more than 20 faults can be simulated.

The back of the whole set of modules on the rack is hidden by a cover that is locked with a key held by the instructor.

An Instructor Manual describes the faults that can be simulated in the circuits described on the Circuits Manual mentioned above.

Practically, this is how it is the Simulator can be used:

1. The instructor decides which circuit will be experimented.
2. By referring to the Circuits Manual, the required Modules are mounted on the

rack and connected (Note: if they are mounted in the positions shown by the manual, it will be easier to connect them, or check their connections against those of the manual).

3. The circuit is tested to make sure that there are no "real" faults.
4. The instructor simulates the desired fault by operating the related switch on the back of the proper Module.
5. The students analyze the failure and, once found the cause, report their conclusion to the instructor.
6. If the students have correctly identified the cause, the instructor can reset the switch to prove the correctness of the analysis.

Ordering Code

A21 M200FS Industrial Installations Fault Simulator

Content

A21 M210FS Contactor	Q.ty	4
A21 M212FS Push Buttons		1
A21 M225FS Limit Switches		1
A21 M240FS Lamps		2
A21 M250FS Timer		2
A21 M260FS Magneto Thermal Switch		2
A21 M200RFS Rack		

Note: Other configurations can be quoted on request.

Typical setup of the Fault Simulator



A21 M370 – HOSPITAL SIGNALING

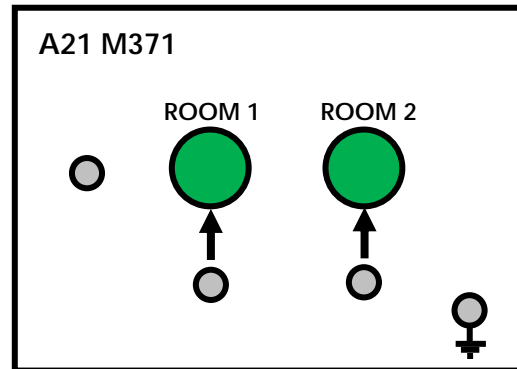
The following modules allow an assistance call to be sent by a patient to the nurse room. By pressing the call button on his panel, the patient activates the call and in the nurse room the request is posted on a panel by turning on the light corresponding to the calling room and sounding a buzzer.

The nurse goes to the calling room and can turn the request off by pressing the off button on the patient's panel.

The modules need an external 24VAC supply and are connected through 4mm safety connectors.

A21 M371 – NURSE ROOM PANEL

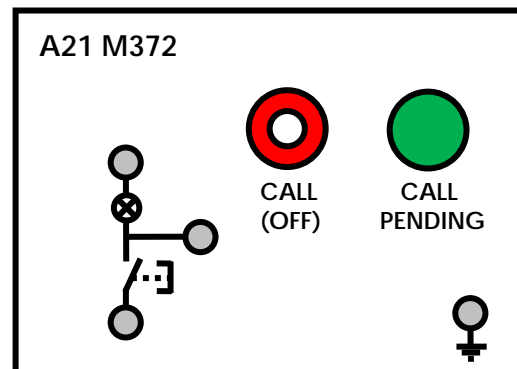
The buzzer calls the nurse's attention on the panel where the light shows the calling room number. Two rooms may be connected to this panel.



A21 M372 – PATIENT ROOM PANEL

Depression of the CALL pushbutton turns on the CALL PENDING light on the patient panel and the buzzer plus the corresponding room light in the nurse room.

The nurse goes to the calling patient and by depressing the OFF pushbutton on the patient panel turns off both lights and the buzzer.



A21 SCE – RESIDENTIAL ELECTRIC WIRING TRAINER

(factory code A24 SCE)

The trainer consists of a board, approximately 750 x 850mm, on which the map of a typical apartment is drawn and each room contains the basic equipment required for distribution and utilization of electric power. Each electric component is accessed through 4mm safety connectors thus making it possible to implement a very large variety of residential installation circuits.

Description

The apartment has 4 rooms and a balcony equipped as listed below. The components are fixed on the board, connected to the safety connectors on the back and identified by their symbols printed on the front. Input is 220VAC and so are the differential switch, the LED lamps and the switch relay.

Living Room:

- at the right of the main entrance is the simulation of the main control panel that contains the line and ground inputs, a 30mA differential switch, two fuses and a switch relay; the switch relay is a bi-stable device that changes the status of its contact at each impulse received by its coil
- 3 lamps
- 2 power sockets with ground connectors
- 1 switch
- 3 pushbuttons that are likely to be used to impulse the switch relay in order to control illumination from more than two points in the room

Kitchen:

- 2 lamps
- 2 power sockets with ground
- 2 switches

Bedroom:

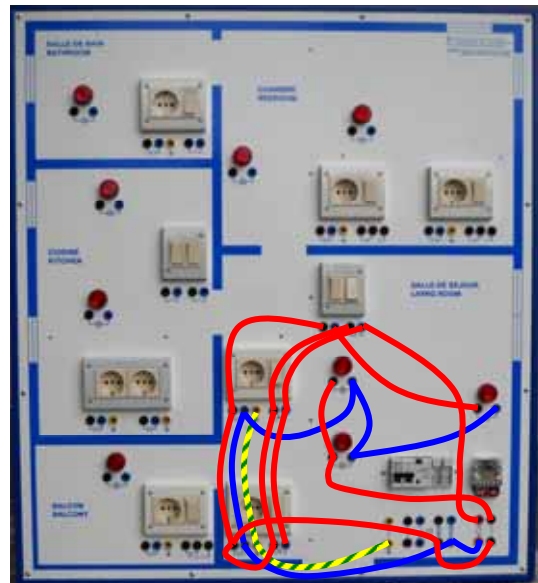
- 2 lamps
- 2 exchange contact switches; may be used to control the lamp(s) from both points
- 2 power sockets with ground

Bathroom:

- 1 lamp
- 1 power socket with ground
- 1 switch

Balcony:

- 1 lamp
- 1 power socket with ground
- 1 common input and two outputs switch that may be used to control the lamp and the power socket



Board with example connection of the Living Room

A2190 (A0245) – TEST STATION

This Test station is designed to be an autonomous test station particularly suitable for testing Residential and Industrial circuits.

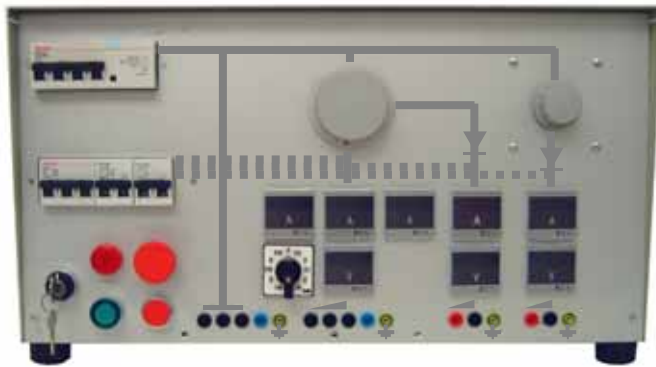
It consists of a Bench, and a Power Supply
The bench is the same described in the previous sections, while the power supply is an extension of ELECTRON Model A0245 (see ELECTRON Catalogue) as a new AC 0-24-50 VAC output has been added.

As a result, the power supply can deliver fixed and variable 220/380 (240/400) VAC, fixed and variable 220 VDC and Variable 0 to 50 VAC.

With these outputs, it is possible to power AC and DC motors, as well as low AC voltage control circuits

Ordering Code

A2190 Test Station for Residential and Industrial Installations



A24 – KIT-BASED ELECTRICAL INSTALLATIONS TRAINING SYSTEM

This training system has the objective of teaching the techniques for correct, professional implementation of residential and industrial electrical circuits. The circuits are assembled on panels by using specialized electrical component kits and electrical wiring kits. The panels can accommodate more students at the same time. Three types of panels arrangements are available to satisfy different requirements. A work bench is also available on which the panels can be placed for use.

The components of the training system are summarized here (for detailed descriptions please refer to the following sections):

- Bench, panels and power supplies. One panel type has a typical apartment layout map laid on top and the students can be given the task to design and implement its electrical system. The map can be replaced by others with different design.
- Instruments for the correct execution of the experiments.
- One components kit for residential installations including lamps, miscellaneous switches, a timer, call panels, an electric lock and an intercom system.

Two wiring kits including components for conduit and surface wiring respectively.

- One components kit for single and three phase motor control circuits

Two instruction manuals, one for residential and one for industrial installations, describe some of the feasible experiments in detail. Many more can be designed by the instructor and students to cover other aspects.

The system is a comprehensive course based on industrial type components and the student who goes through the whole system acquires sufficient knowledge to be able to confront himself with almost any kind of real life electrical installation requirement.

The following additional equipment is proposed for completing the laboratory:

- A metal sheet Hand Punching Kit to build metal panels
- A Test Station with Bench, Universal Power Supply and Panels particularly suitable for testing motor control circuits.



A2410 – ELECTRICAL INSTALLATIONS WORK BENCH

The picture below shows the assembly of the bench, the vertical work panels and the in-between power supply.

Work Bench

Accurate construction, made in Italy, it provides the necessary working area for the training kits. Bi-laminated wood, conglomerate top, 20 mm thick, white (other colors on request). Optionally, it can be equipped with 1 or 2 drawers with lock, 1 or 2 optional chest of drawers and one cabinet with 1 drawer and 1 shelf. The cabinet can be optionally equipped with wheels.

Approximate dimensions (L x W x H): 1000 x 750 x 800 mm (2 students), 1800 x 750 x 800 mm (4 students).

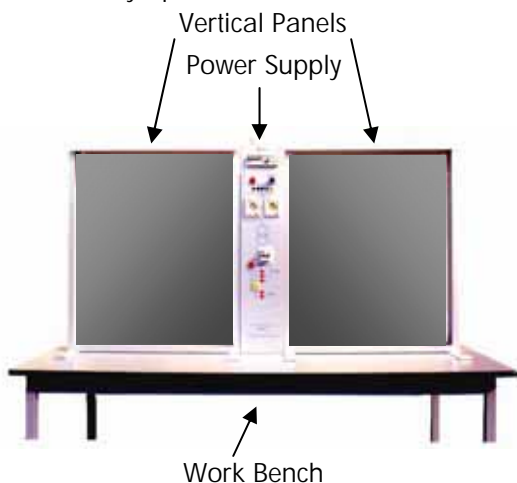
Vertical Panels

The work panels are mounted on a frame and are two sided to accommodate from 2 to 4 students. Two types of panels are available, as explained below, to be used with residential and industrial kits.

Power Supply

Also this unit is two sided and provides the power sources needed to test and operate the circuits of the Residential and Industrial Trainers. It can be powered from the main line or from the ELECTRON distribution panel Model A0250.

Output voltages are supplied through 4mm safety connectors and are fully protected against overload, short circuits and ground leakage by magneto-thermal and differential switches. The unit is activated by a key operated switch.



Power Requirements:

Input 220/380 V, 3 Phase, 50 Hz (127/220V, 60 Hz available on request)

Each side of the unit has the following features:

- 3 phase output, N, GND, 16A
- 2 Shuko outlets 220 V, 10 A (other types on request)
- 0-12-24 VAC, 4 A output with indicator lamp
- 0-12-24 V DC, 4A output, unfiltered
- Mains indicator lamp
- Low voltage indicator lamp
- Continuity tester with indicator lamp (buzzer is optional)

Ordering Code

A2410 Electrical Installations Work Bench

Optional Features

- **A2410 AT** Acoustic circuit tester
- **A2410 DR** 1 or 2 optional drawers with lock.
- **A2410 CH** 1 or 2 optional chest of drawers.
- **A2410 CA** Cabinet with 1 drawer and 1 shelf.

Optional Units and Trainers

- **A2420** Panel for residential installations (780x860 mm)
- **A2430** Panel for industrial installations (780x860 mm)
- **A2440** Panel storage cupboard (suitable to store up to 6 panels), closed, with 2 key-locked wings
- **A2421** Residential installations components kit
- **A2431** Industrial installations components kit

A2410 Technical and Ordering Information		
Model N.	N. Students	Power Requirements
A2410-2	2	220/380V, 3 Phase, 50Hz (*)
A2410-4	4	220/380V, 3 Phase, 50Hz (*)
(*) 230/400 or 240/415V to be specified on order		

A2421 – RESIDENTIAL COMPONENTS KIT

The trainer includes all typical components used in domestic applications. They can be easily mounted on the panels described above to implement a large variety of exercises, some of which are fully described in the Manual supplied with the Trainer (Included are various methods of controlling incandescent and fluorescent lamps, with switches, inverters, relay, timer, signaling and communication systems).

Components:

- One pole, one way switch Q.ty 2
- Lamps + sockets 2
- One pole, two ways switch 2
- Reversing switch 2
- Push buttons 3
- Single phase + ground outlets 2
- Switch relay 1
- Step relay 1
- Timer 1
- Fluorescent lamp+choke+starter 1
- Buzzer 1
- Intercom system 1
- Electric lock 1
- Exercise Manual showing and discussing typical exercises and related circuits

Note: The types and quantities suggested above are supposed to satisfy the great majority of requirements; different mix of components can however be quoted on customer request.



Example of Components Kits in Carrying Case

A2425 - UNIVERSAL PANEL FOR ELECTRICAL INSTALLATIONS

This work panel can accommodate different electrical installations trainers based on standard components that are fastened on top of it by means of screws.

The wiring can be executed, at the instructor/student choice, on the front surface, or on the rear with the wires threaded through the holes.

The trainers are supplied disassembled to give the students additional training opportunity by simulating a real life environment where all components require to be installed individually.

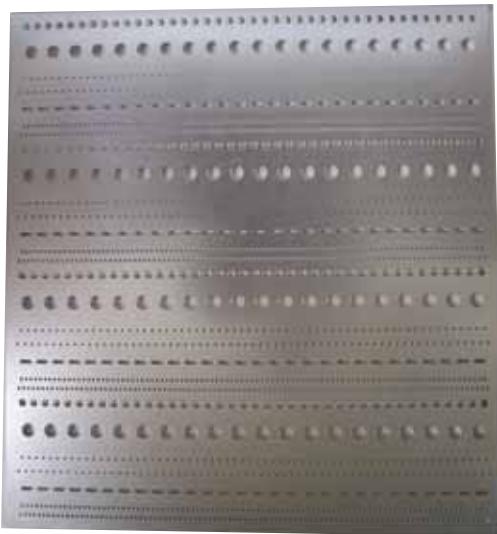
The panel is a galvanized metal sheet with several rows of holes of different diameters punched through it to make it as flexible as possible in mounting the electrical components.

Important Notice

The panel must be grounded during use as it is a conductive metal sheet.

Dimensions

- H860 x W800mm, 1mm thick
- Punched area 820 x 760mm:
 - . One row of holes 12 mm Ø
 - . One row of holes 22 mm Ø
 - . Two rows of holes 4 mm Ø
 - . One row of holes 6 x 20 mm
 - . Two rows of holes 5 mm ØThe 7 rows are repeated 4 times from top to bottom
- The edges are folded to allow their use laid on a bench or hinged
- The panels can be stacked for storing



A2426 - STAND FOR UNIVERSAL PANEL A2425

The A2426 stand can accommodate two Electron Universal Panels Code A2425 (see related catalogue).

The stand is stored folded and must be opened in an X type of arrangement: then two universal panels A2425 can be mounted on it, one on each side, to allow at least two students to work simultaneously, one (or more) on each side.

The pictures below show this sequence.

Important Notice

The stand must be electrically grounded during use as it is made of conductive metal.



A2431 – INDUSTRIAL COMPONENTS KIT

The trainer includes all typical components used in industrial applications. They can be easily mounted on the panels described above to implement a large variety of exercises, some of which are fully described and discussed in the Manual supplied with the Trainer.

Among the exercises covered are:

- Basic control circuits
- Direct-on-line starters, manual and automatic.
- Electrical interlocks.
- Time delay switching.
- Star-delta starters.
- Rotation reversing
- Protection circuits

The kit consists of:

- | | | |
|---|------|---|
| • Three phase contactor | Q.ty | 4 |
| • Auxiliary contact units (2 N/O + 2 N/C contacts each) | | 4 |
| • Lamp sockets & lamps | | 5 |
| • Thermal relay | | 2 |
| • Electronic timer | | 2 |
| • Push Button | | 3 |
| • Exercise Manual showing and discussing typical exercises and related circuits | | |

A24 FA FIRE ALARM KIT

The kit allows assembling a fire alarm system. Several specific components are provided. Among them an automatic smoke detector, a fire detector, one evacuation unit and a powerful sound diffuser. The kit is complete of all the assembling material and an exhausting instruction manual.



The kit can be used both in single and three phase applications.

Note: The types and quantities suggested above are supposed to satisfy the great majority of requirements; different configurations can however be quoted on customer request.

A24 IA INTRUDER ALARM KIT

The kit allows assembling an anti-intruder alarm system. Several specific components are provided. Among them 2 infrared motion sensors, 2 magnetic contacts to detect a door or window opening, a siren, a flashing light. The kit is complete of all the assembling material and an exhausting instruction manual.

A2460 – SURFACE WIRING COMPONENTS KIT

The kit serves the purpose of developing skills in clipping, bending and setting surface mounted wires and cables, implementing circuit connection from a fuse board to single and three phase outlets, circuit breakers, controllers, etc.

It is designed to be used with the Residential or Industrial Installations Trainers, A2421 and A2431, and to be installed on the panels described above.

The kit consists of:

- Cables: 5 x 1,5 mm sq. 25 m,
4 x 1,5 mm sq - 100 m

- Clips: 150 pcs
- Wood screws: 1 box (about 100pcs)
- Cable junctions: 20 pcs
- Fuse board for fuse holders (1 pc)
- Fuse holders with 12 x 10 A fuses

Note: The types and quantities suggested above are supposed to satisfy the great majority of requirements; different quantities can however be quoted on customer request.

A2461– CONDUIT WIRING KIT

The kit is meant to provide the necessary parts to practice wiring of electrical circuits in isolated conduits.

It is designed to be used with the Residential or Industrial Installations Trainers, A24 M100 and A24 M200, and to be installed on the panels described above.

The kit contains:

- PVC tubing approx. 15 mm diameter, 10m
- jointing sleeves for PVC tubing, 15 mm diameter, 10 pcs
- 90 degrees bents, 5 pcs

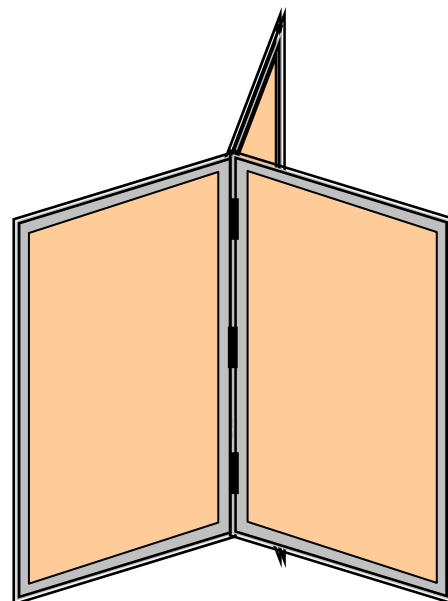
- cables of following types:
2 x 0,7 sq. mm, 10 m,
3 x 1,5 sq. mm, 20m
1 x 1,5 sq. mm (y/g), 100m
1 x 1,5 sq. mm (blue), 100m
1 x 1,5 sq. mm (black), 100m
1 x 1,5 sq. mm (white), 100m
- cable junctions:, 25 pcs
- mains connector (1ph + N + GND)
- distribution box, 5 pcs

Note: The types and quantities suggested above are supposed to satisfy the great majority of requirements; different quantities can however be quoted on customer request.

A2465- FOLDING PANELS

It consists of three swinging panels with a metallic frame, each one 1000 x 2000 mm, 16 mm thick approximately, and with central strong hinges. The frame is self standing on the floor and can be folded for storage.

It can be used as an alternative for implementing Residential as well as Industrial Installations.



A2470 – INSTRUCTOR TOOLS KIT

The tools kit contains the tools that are normally necessary in an Electrical Laboratory.

Additional tools and different content of the kit can be quoted on request.

Content:

- 11 socket wrenches
- 1 extension 100 mm
- 1 hinge
- 1 lever with sliding attachment 115 mm
- 1 ratchet lever 100 mm
- plastic handle for socket wrenches
- 12 wrenches 4 to 13 mm
- 4 double open wrenches 14 to 24 mm
- 9 hex key wrenches 2 to 10 mm
- 4 isolated screwdrivers 3.5 to 6.5 mm
- 6 cross tip screwdrivers
- 3 lever screwdrivers 5.5, 8 mm and PH1 + PH2
- 1 universal isolated pliers 180 mm
- 1 isolated cutter 180 mm
- 1 isolated half round pliers 180 mm
- 1 isolated wire stripper pliers
- 1 isolated flat noses pliers 180 mm

- 1 adjustable pliers 250 mm
- 1 roller wrench 250 mm
- 1 isolated scissors
- 1 electrician knife
- 1 hack saw with 10 blades
- 1 center punch
- 1 flexible measuring tape 2 m
- 1 tracing point
- 1 phase detector screwdriver
- 1 hammer 100 g
- 1 hammer 300 g
- 3 chisels 175, 200 and 250 mm
- 2 punches 2 and 4 mm
- 1 "automatic" punch
- 1 soldering iron with 3 accessories
- 1 carrying case

Ordering Code

A2470 Instructor Tool Kit



Tools Kit case

A2471 – STUDENT TOOLS KIT

The tools kit contains the tools that are normally necessary in an Electrical Laboratory.

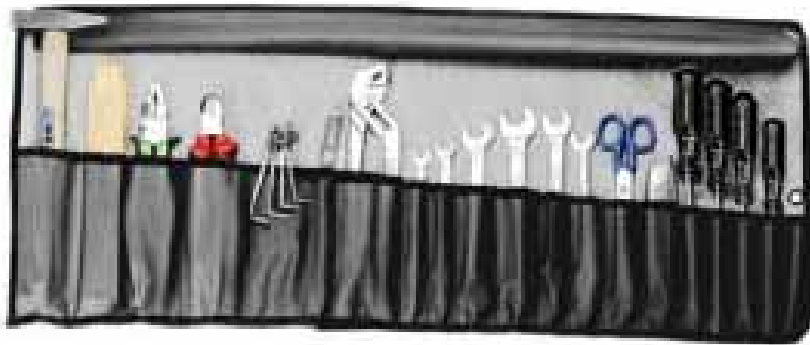
Additional tools and different content of the kit can be quoted on request.

Ordering Code

A2471 Student Tool Kit

Content:

- 6 double open end wrenches 6 to 17mm
- 7 socket wrenches 2 to 8mm
- 1 universal pliers
- 1 adjustable pliers
- 1 cutter
- scissors
- 5 screwdrivers
- 1 hammer
- 1 knife
- 1 double meter
- 1 folding carrying bag



A2480 - PLASTIC AND METAL SHEETS HAND PUNCH KIT

This kit (factory code 760GN) contains a single-hand operated hydraulic gun and accessories for punching round holes in plastic and metal sheets. It can be used to build various kinds of works such as terminal boards and electric panels.

Before punching, a hole must be drilled that is used to guide the positioning pin.

It can punch metal sheets up to 3mm thickness.

Supplied in a carrying case.

Technical Characteristics

- Metal sheets max. thickness: 3mm
- Force: 50 kN
- Weight: 2.4 Kg
- Length: 340mm
- Quick movement hardened steel, ergonomic handles

Components

- Hand Oil Pump
- Round Punches and Dies \varnothing 15.2 – 18.6
- 20.4 – 22.5 – 28.3 and 30.5 mm
- 2 punch holder pins
- Carrying Case

Square punches may be quoted and supplied on request.

Ordering Code

A2480 Hand Punch Kit



A25 – WORK PANELS FOR ELECTRICAL INSTALLATIONS TRAINERS

This work panel is made of non conductive and workable material and can accommodate different electrical installations trainers based on standard components that are factory fastened by means of screws.

Two versions of each trainer are available: with or without wiring (standard version is not wired).

The wiring itself, in both versions, can be executed, at the user's choice, on the board front surface or on the rear. In the latter case, holes must be drilled across the board to create passage for the wires.

The trainers, unless otherwise specified, are supplied disassembled, to give the students additional training opportunity by simulating a real life environment where all components require to be installed individually.

The picture below shows an example of a back-wired panel with an intrusion alarm system that includes (left to right, top to bottom):

- . System Control Station
- . Infrared Sensor
- . Siren
- . Telephone Dialer
- . Two Magnetic Contact Sensors
- . Remote Control

TABLES, TROLLEY AND OTHER ACCESSORIES CAN BE OPTIONALLY PROVIDED



A25-AC RESIDENTIAL ACCESS CONTROL TRAINER

Allows wiring and programming the access to rooms. The doors of the room are equipped with electronic devices allowing the access only to authorized people by swipe cards or digital codes.

A25-FA FIRE ALARM TRAINER

The unit allows the assembling of a fire alarm system using ionization fire detector, thermal fire detector and smoke detector. The detection of fire activates a water electro-valve.

A25-FC FLOODING CONTROL TRAINER

The unit allows the assembling of a flooding control using a flooding detector with probe. The control activates a water electro-valve. The alarm indication is visual (light) and acoustic (buzzer). A siren is also included.

A25-HA RESIDENTIAL AUTOMATION TRAINER

Includes many functions for house automation: Remote control of the alarms, automatic control of the lighting depending on the external light if the house is occupied, switching on the heating and closing the blind if the outside temperature is lower than a preset value, and many other functions.

A25-IC INTRUSION ALARM TRAINER

The unit allows programming and wiring an alarm system controlling three areas. Different kinds of sensors are provided, infrared and magnetic. The sensors detect the opening of a window and activate the alarms (a siren and a flashing light).

A25-IW WIRELESS INTRUSION ALARM TRAINER

The unit allows the assembling of a wireless intrusion detector using radio frequency communication. Intrusions are detected and an alarm system is activated. The alarm indication is visual and acoustic.

A25-LC RESIDENTIAL LIGHT CONTROL TRAINER

Allows wiring and programming the lighting to incandescent and fluorescent lights. Dimmer switches are included. The brightness of the spotlights can be adjusted automatically thanks to a photo-cell.

A25-PC ENERGY CONSUMPTION TRAINER

A watt-hour meter displays the instantaneous and over time consumption. Fluorescent and incandescent lighting circuits, protected by breakers. Heating circuits with convectors and radiator.

A25-PD POWER DISTRIBUTION TRAINER

This distribution board provides up to 12 separate three phase plus neutral outputs and is particularly useful in laboratories of schools, workshops and similar work places.

A25-RC REMOTE HOME AUTOMATION TRAINER

Includes the main home automation functions: heating, lighting of different rooms in the house, roller-blind control, hi-fi equipment, telephone control.

A25-SC SECURITY LIGHTING TRAINER

The unit allows wiring a security lighting system. An anti-panic lighting system is also provided, which can be controlled from a communication unit. A manual shut-down control is provided.

A25-VC VIDEO ACCESS CONTROL TRAINER

the unit allows wiring a building access control system with video monitoring and communication via the entry phone. Three entry phones and a videophone connected to the street unit where a camera, a loudspeaker and a keypad are provided.



A25 RW - RESIDENTIAL WIRING STUDY MODULE

The Trainer is designed to teach residential electric wiring by showing a typical apartment layout on a wooden exercise board, its electric requirements on a work sheet diagram and by providing a set of components to implement such requirements.

The student is requested to understand the apartment layout and the electric diagram, choose the correct components, fasten them in the correct positions of the panel, connect them and demonstrate the resulting circuits.

Standard electrical components are included (listed below): they are fastened on the board by means of screws and wiring can be performed, at the user's choice, on the board front surface or on the rear. In the latter case, holes must be drilled across the board to create passage for the wires.

At the end of the session the components are removed from the panel and stored for future exercise sessions.

The user can design different electric apartment layouts and electric diagrams for enriching the exercise set and satisfying additional training requirements.

Two boards approx. 800 x 860 mm are supplied.

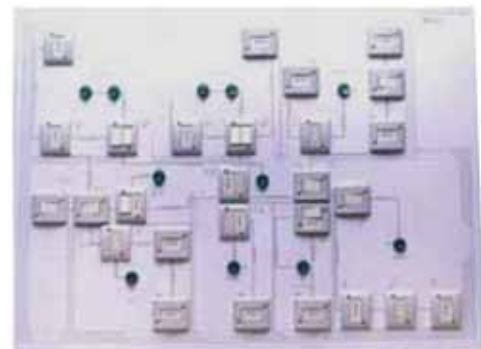
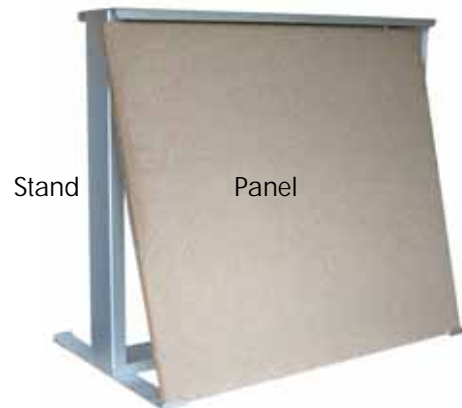
Electrical Components

	Q.ty
- Power analyzer	1
- Step-down transformer	1
- Magneto-thermal protection	1
- Differential protection	1
- Single phase + ground socket outlets	10
- One pole switches	9
- One pole, two way switches	5
- Reversing switches	2
- Pushbuttons	3

The panel can be mounted on a stand that allows adjusting its inclination for ease of working and demonstration

Ordering Codes

A25 RW	Residential Wiring Trainer
A25S	Stand



Panel with typical implementation

Electrical Components

	Q.ty
- Buzzer	1
- Lamps and sockets	10
- Wires (2 wires + gnd)	100 m
- PVC tubing	50 m
- Relay	1
- Board	1
- Exercise manual showing typical exercises and related circuits diagrams	