

## LHP 303 BUILDING ELECTRICAL INSTALLATIONS LABORATORY



The LHP-303 laboratory covers all areas, theoretical and technical, concerning the **installation, operation and maintenance of electrical installations, power distribution, ground, lighting, security, surveillance, intercom and general electrical equipment for Residential Buildings.**

The general arrangement of the laboratory consists of a group of test bench racks for the installation, training and testing of the set of a numerous home electrical appliances and devices, desktop, modular simulation sub-units, testing devices and computer workstations (*not included-provided locally by reseller*). Additionally, bench type installations frames with panels for component assembly are recently to the lab complex.

The laboratory covers generally the training in electrical installations of:

- Conventional Domestic Electrical installations.
- Automated Home Installations (Smart Home).
- Electrical network in residential, commercial and special purpose buildings.

The laboratory equipment is accompanied by the appropriate software to run interactively with PC workstations, wherever this is applicable.

The simulators are accompanied by relevant software to enable the student to follow step-by-step the theory and the exercise. The whole exercise procedure is carried out on the simulator.

All systems are accompanied by technical manuals for theory and exercises.

### E.I. TRAINERS

#### **BENCH TRAINER MODULAR PT 2102 M**

Civil Home Installations Module Trainer

#### **SMART HOME BENCH TRAINER PT 2102 SH**

Smart Home Installations Module Trainer

#### **SW-ETS**

Software Application for  
Smart Home Simulator

#### **BENCH TRAINER FOR COMPONENT WIRING PT 2102 C & PT 2102 C4**

Civil Installation Wiring Bench trainer

#### **PT 2102 C**

Civil Installation Bench Trainer Kits

### DESKTOP SIMULATORS

#### **PTG-R**

Neutral Condition Panel

#### **PTG-2**

Electrical Testing of Industrial Building

#### **PTG-4**

Smart Home Electronic System Bus

#### **PTG-5**

Electrical Installation of Central Heating  
Stations

#### **PTG-9**

Electrical Installations for Surgeries

#### **PTGT**

Testing & Measurement Equipment

**PT 2102 M****Bench Modular Trainer**

## Civil Home Installations Modules



The Civil Home Electrical Installations is a modular bench top laboratory that consists of many different types of modules. Through their connection, the modules can define and explore the electrical circuits connectivity needed for the cabling and testing of civil home electrical module installations.

The **bench top modules** are experimental modules for insertion in work frames. Unit symbols and standardized mimic diagram are displayed on the front panel and the connections are made via sockets meeting safety standards.

The bench top frame can accommodate various test modules on its top metal racks so as four students can work at the same time.

The metal racks offer 3 levels for the positioning, assembly and disassembly of the individual components in order to perform the exercises.

The positioning, the assembly and disassembly of the experimental modules are easy and in accordance to the current European safety rules. The components are commercial materials mounted on insulating bases displaying the symbols and the standard mimic diagram. The modules cover a wide range of components used in Lighting systems, Signaling, Alarm systems, Security systems and Intercom systems and they come in various quantity configurations based on the needs of the client and the required number of supported users.

**Theoretical & Experimental Handbooks**

- Technical handbook
- Experiment worksheets



The following bench top modules are provided:

Bench
Three level aluminum frame
Test leads for PT01T
Single-phase power supply
Single-phase power supply
Switches and Commutator
Intermediate switch
Intermediate Switch and Two-Way Switches
Light pushbutton
Bell/door opener pushbutton
Marked pushbuttons
Single Phase mains socket
Halogen lamps
Low consumption Fluorescent lamps
Single Phase Transformer
Latching relay
Stepping relay
Staircase Light timer
Incandescent and Fluorescent lamp
Bells
Bell and Buzzer
Display signaling
Door Electric Lock
House Phone
Outdoor entry phone
Power Supply
Emergency light module
Stand-by Battery
Fire/intruder alarm control module
Smoke detector module
Thermal detector module
Emergency mushroom pushbutton module
Alarms
Gas Detector
Signaling Lamps
Microwave based sensor module
Passive infrared sensor module
Perimeter sensors module
Blinker module
Video-intercom power supply module
Video camera & pushbutton panel (outdoor)
Monitor/ intercom module (indoor)
Nurse Board Module
Patient room module
Dimmer
Pushbutton light regulator
Twilight switch
Presence and twilight sensor

**PT 2102 SH****Smart Home Bench Trainer**

## Smart Home Installations Modules



The Home Automation System, available for over 20 Years by **KNX** has developed into the No.1 Standard for Intelligent Building Control in the World today. Previously known as **EIB**, the system has the ability to connect all installations within a home, residential or commercial building (light, blinds, heating, security, etc) and unify them across a single platform. This version of LHP 303 Lab **aims to define and explore the innovative electrical installations for the control of a building with KNX BUS typology** and it is a modular bench top lab, with many programmable modules and software control application to create operational scenarios of controlling the devices on the modules.

The Smart Home bench top modules are experimental modules for insertion in work frames. Unit symbols and standardized mimic diagram are displayed on the front panel and the connections are made via sockets meeting safety standards. The bench top frame can accommodate various modules on its metal racks so as four students can work at the same time. The metal racks provide 3 levels for the positioning, assembly and disassembly of the individual components in order to perform the exercises.

The individual experimental modules with the components are placed on the rack. The positioning, the assembly and disassembly of the experimental modules are easy and in accordance to the current European safety rules.

The components in the various modules are commercial materials mounted on insulating bases displaying the symbols and the standard mimic diagram.

**Theoretical & Experimental Handbooks**

- Technical handbook
- Experiment worksheets

The following bench top modules are provided:

Bench
Three level aluminum frame
Test leads for PT 01T
Power supply
Single-phase power unit
E.I. Bus power supply
Pushbutton interface
Movement Detector
Double pushbutton
Smoke Detector
Ambient thermostat
Brightness controller
Binary output
Universal dimmer
Shutter actuator
Valve actuator
Infrared transmitter/receiver
Scenery module
Display unit
USB to EIB interface
Sockets with lamps
Venetian drive

**REQUIRED APPLICATION****SW-ETS** Application

MS WINDOW Software Application for Smart Home



**SW-ETS** Application

Software Application for Smart Home Simulator



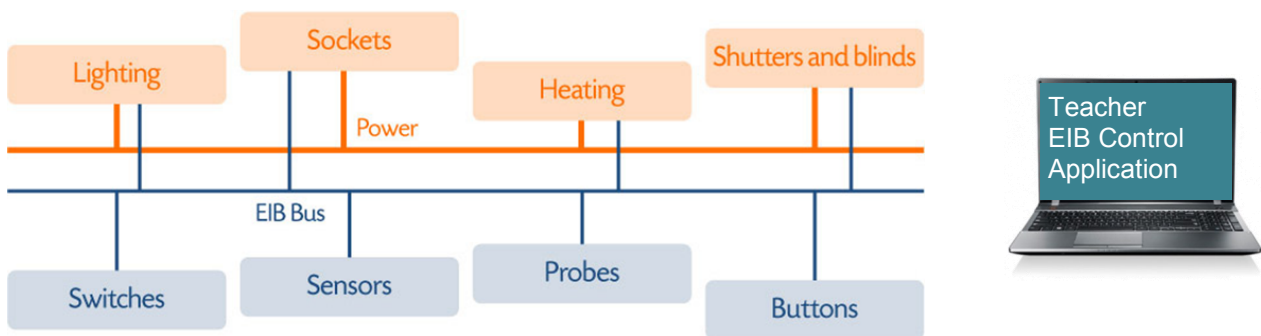
The Smart Home concept is built around an intelligent solution for networking and controlling building technology. Due to the **targeted linking of devices and functions** in accordance with the **KNX standard**, living and working have become more convenient and secure, as well as more energy efficient and economical.

The offered ETS application allows programming and controlling the LHP 303 Smart Home simulator modules. The software allows the development of project tasks for students and teacher in order to control the LHP 303 Smart Home.

The system enables the **seamless integration of diverse devices and functions**. In this way, lighting, blinds and heating can be bundled to one line and coordinated with ease, as can multimedia, security and door communication systems. This intelligent networking automates the processes and guarantees even more convenient working and living. All switches, controllers and sensors allow the residential apartment fixtures offered in the LHP 303 Smart Home simulator to be controlled by the use of a PC workstation or Pad at the press of a button and specific control settings to be saved.

The software enables the assignment of the specific operation of the installation setup, the start up and diagnosis of the BUS devices, as well as the control scenarios built by the students as individual control projects and which the teacher runs on the LHP 303 Smart Home simulator. The software uses a personal computer (*not included*) connected to the BUS system with USB interface.

The application allows the programming of the simulator by the teacher and also the design of projects by the students.



**PT 2102 C** Trainer

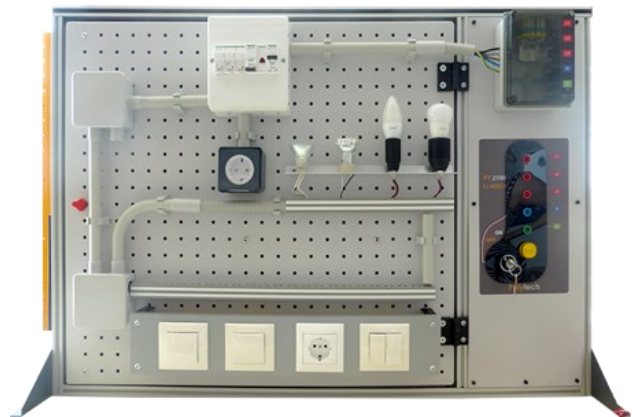
Civil Installation Bench Trainer 2 workgroups

The Civil Electrical Installation laboratory provides for a single or more PT-2102 C2 trainers which are special metal top bench frames allowing electrical component installations and wiring as in real cases.

Each PT-2102 C2 trainer can accommodate 2 student groups for training on each side. On each bench frame, metal hinged panels are installed to be used for the installation of the components of the lab in circuits as per the didactic content.



Each bench tabletop frame is provided with an independent power supply module, fuse and safety features for overload and key switch for power start-up from the teacher, test leads and all accessories needed to realize the exercises and the proposed circuits. Provides all the features for the safe use of the equipment by the students within the work process.



**PT 2102C Trainer Configuration**

Each trainer consists of:

**Work Bench tabletop Frame PT 2100B**

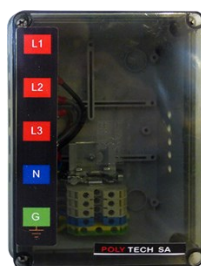
It is a vertical metal frame bench top with panels where students can easily and safely install the electrical components and create circuits. The bench frame is provided with a power supply module and accommodates for 2 working student spaces.

**Power supply for PT 2100B**

- 2 three-phase +N +T, 16A outputs on 36A safety terminals according to IEC 61010-1; protection through differential, magneto-thermal, 4-pole, 16A automatic switch, pilot lamp and key switch for teacher control.
- 4 outputs on 10/16A single-phase mains sockets, protection through differential magneto-thermal, 16A automatic switch and pilot lamp.

**Junction boxes, Grid and Wooden panels**

- 2 connection junction boxes PT 1100SD for the safe connection of the mains voltage between the safety terminals of the power supply board of the work bench and the circuit that the student



has wired on the panel. Each junction box is provided with 5 lead cables.

- 2 grind panels PT 1100D for component installation. Each panel is hinged on the frame panel, accurately perforated, rustproof paint treated and provided with adequate holes for mounting on work frames. It has thickness 1.6mm, hole diameter 6mm, center distances 30 mm. Suitable for assembling of the components in easy and fast manner, Dimensions: 75 x 65 x 2 cm
- **Multi - layer wooden panel PT 1100 C4** to be mounted on the panels frame, suitable for the in-wall wiring of civil installations, provided with 4 interconnected junction boxes; it simulates a wall on which it is possible to connect the different modules that can be found in civil installations, such as switches, deviators, buzzers, sockets, etc.

The trainer comes complete with installation manuals, accessories for components installation and cables.

It requires a 3phase power facility in the laboratory. It operates with two PT-2102 set of components and cable tubing with 2 junction boxes.

**Trainer Overall Dimensions**

Dimensions: 105 x 70 cm

## PT 2102 C4 Trainer

### Civil Installation Bench Trainer 4 workgroups

The Civil Electrical Installation laboratory provides for a single or more of PT-2102 C4 trainers which are special benches with metal top bench frames.

Each PT-2102 C4 trainer can accommodate 4 student groups for training on each side. On each bench frame, a combination of wooden and metal panels are installed to be used for the installation of the components of the lab in circuits as per the didactic content.

Each bench tabletop frame is provided with an independent power supply module, fuse and safety features for overload and key switch for power start-up from the teacher, test leads and all accessories needed to realize the exercises and the proposed circuits.

Provides all the features for the safe use of the equipment by the students within the work process.



### PT 2102 C4 trainer Configuration

Each trainer consists of:

#### Work Bench tabletop Frame PT 2100C

It is a vertical metal frame bench top with panels where students can easily and safely install the electrical components and create circuits. The bench frame is provided with a power supply module and accommodates for 4 working student spaces.

#### Power supply for PT 2100

- 2 three-phase +N +T, 16A outputs on 36A safety terminals according to IEC 61010-1; protection through differential, magneto-thermal, 4-pole, 16A automatic switch, pilot lamp and key switch for teacher control.
- 4 outputs on 10/16A single-phase mains sockets, protection through differential, magneto-thermal, 16A automatic switch and pilot lamp.
- 2 outputs isolated from the mains, 0-12-24Vac, 4A on isolated terminals, protection through magneto-thermal, automatic switch.
- 2 optical and acoustic circuit testers on isolated terminals, protection through fuses.

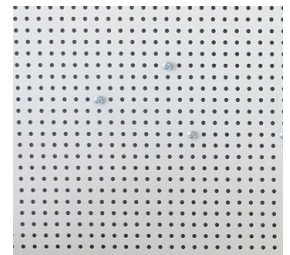


#### Junction boxes, Grid and Wooden panels

- 4 connection junction boxes PT 1100SD for the safe connection of the mains voltage between the safety terminals of the power supply board of the work bench and the circuit that the student has wired on the panel. Each box is provided with 5

lead cables.

- 4 grind panels PT 1100D for component installation. The panel is accurately perforated, rustproof paint treated and provided with adequate holes for mounting on work frames. It has thickness 1.6mm, hole diameter 6mm, center distances 12mm. Suitable for assembling of the components in easy and fast manner. Dimensions: 75 x 65 x 2 cm.
- 1 Multi-layer wooden panel PT 1100 C6 to be mounted on the panels frame, suitable for the in-wall wiring of civil installations, provided with 4 or 6 interconnected junction boxes; it simulates a wall on which it is possible to connect the different modules that can be found in civil installations, such as switches, deviators, buzzers, sockets, etc. Provided with metal frame on it, where the doorbell can be easily connected.



The trainer comes complete with installation manuals, accessories for installation of components and cables.

It requires a 3phase power facility in the laboratory.

It operates with four PT-2102 set of components and cable tubing with 2 junction boxes.

#### Trainer Overall Dimensions

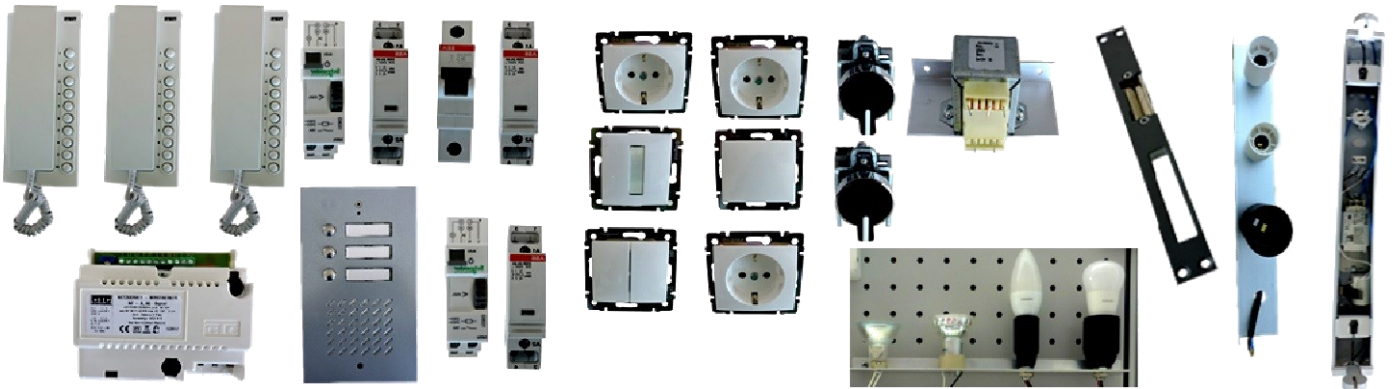
Dimensions: 210 x 80 cm

## PT 2102 C Component set Civil Installation Bench Trainer Kit



The PT 2102 C or C4 trainers also include sets of components used for theory, demonstration and practical exercises in the most commonly used circuits of Civil Electrical Installations (houses, apartments, hotels). These electrical components are delivered in 2 plastic containers/tool cases. Each experiment is described by initiating the aim, the required components needed for the wiring, the theory reference, the electric circuit schematics and the component wiring scheme.

The PT 2102 C1 set of components includes:



### Component set

The PT 2102 C set of components is composed of:

- 3 general purpose electrical pushbuttons,
- 3 bell pushbuttons,
- 3 door opener pushbuttons,
- 3 switches,
- 2 change - over switches,
- 2 reversing switches,
- 1 mains socket,
- 3 bells,
- 1 buzzer,
- 2 fuse holders complete with fuses,
- 1 stairs light timing relay,
- 1 pulse relay,
- 1 incandescent lamps,
- 1 fluorescent lamp complete with lamp holder, starter and choke,
- 1 electric lock,
- 1 external 3 door bell pushbutton panel,
- 3 wall - type entry phones,
- 1 power supply for the entry phone,
- 1 transformer mains/2x12V,
- 1 piece of DIN section,
- 1 set of screws to fix the components,
- 2 containers for storage,
- 2 Multimeters,
- Wiring tubing and 2 junction boxes.

### Didactic material and training subjects

The PT 2102 Didactic Course material provides theory references for each lab work and trains the

students to practice in Electrical Civil installations circuits as per the following subjects:

### Lighting

- Single - point controlled lighting system
- Single - point controlled lighting system with socket
- Switch - controlled two - lamps lighting system
- Two - point controlled lighting system
- Three - point controlled lighting system
- Four - point controlled lighting system
- Circuit breaking - relay controlled lighting system
- Switching - relay controlled lighting system
- Timed - relay controlled lighting system
- Hot cathode fluorescent lamp system

### Signaling - Intercom

- Single - control signaling system
- Reciprocal control signaling system
- Ringing plant with doors and main entrance control with electric lock
- Three reciprocal call house - phone
- Intercommunicating house - phone system

The set comes complete with Exercise manuals, accessories for installation of components and cables.

### Optionally offered

Additional Kits for training in installations of:

- **Alarm and security (kit 2102 AS)**
- **Smart Home Zeewave (kit 2102 AZ)**

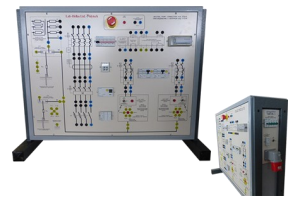
## DESKTOP SIMULATORS

This part of the LHP 303 laboratory consists of various desktop demonstration panels that allow the study of different ground connection diagrams normally used to distribute the electrical power and the electrical installations of an apartment building or industry (e.g. energy distribution). This equipment is simulators which include the following circuits for experimenting and testing: Neutral condition, Electrical testing of residential building and industrial building, Electrical installations of central heating systems and for consulting rooms and surgeries.

- The **PTG-R** simulator is aimed for experimenting and testing in Neutral condition. The demonstration panel allows the study of different ground connection diagrams normally used to distribute the electrical energy.
  - The **PTG-2** simulator is aimed for experimenting and training in electrical testing of industrial building.
  - The **PTG-4** simulator is aimed for the automation of an electronic system bus for the building.
  - The **PTG-5** simulator is aimed for experimenting and training in the electrical installations of central heating stations.
  - The **PTG-9** simulator is aimed for the Electrical installations for Consulting Rooms and Surgeries.
- Also, a set of instruments, **PTGT** is offered for professional training in instrumentation used in such systems.

### PTG-R Simulator

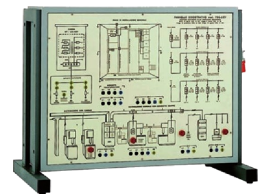
#### Neutral Condition Panel



The PTG-R simulator is aimed for **experimenting and testing in Neutral condition**. The demonstration panel allows the study of different ground connection diagrams normally used to distribute the electrical energy.

### PTG-2 Simulator

#### Electrical Testing Of Industrial Building



The PTG-2 simulator is aimed for experimenting and training in **electrical testing of an industrial building**. The panel enables to define the electrical installations of an industry (energy distribution with TN system). All electrical components necessary to the proper power supply of the circuits are included in the panel.

### PTG-4 Simulator

#### Smart Home Electronic System Bus



The PTG-4 simulator is aimed for the automation of an **Electronic system bus** for the building. The panel enables to define the innovative electrical installations for the control of a building with BUS topology.



### PTG-5 Simulator

Electrical Installation of Central Heating Stations

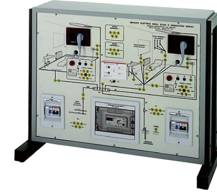


The PTG-5 simulator is aimed for experimenting and training in the Electrical installations of **central heating stations**.

The panel depicts an electrical installation which can be present in a building for residential, commercial, handicraft, industrial use related to installations in central heating stations.

### PTG-9 Simulator

Electrical Installations for Surgeries



The PTG-9 simulator is aimed for the Electrical installations for **Consulting Rooms and Surgeries**.

The panel depicts an electrical installation related to a hospital building for surgery use.

### PTGT

Testing & Measurement Equipment

The PTGT is a set of instruments required for the operation of the PTG series of simulators. It includes a Digital Multimeter, a Macro-test multi-function instrument and a Digital Clamp Multimeter.

### MACROTEST MULTI-FUNCTION INSTRUMENT



MACROTEST is capable of carrying out complete tests on civil and industrial electric systems in compliance with standard IEC/EN61557-1. Thanks to its simple and intuitive use, this instrument allows saving all measurement results in their internal memory and transferring the saved data onto the PC by means of an optical interface in order to print useful measuring reports, to be attached to Declarations of Conformity, with the aid of the dedicated software supplied. It's possible to obtain precise measurement results, also near HV/LV transformation cabs, where the inductive effect due to the presence of the transformer is significant, and therefore also allows correctly choosing the appropriate protections in industrial systems.

### DIGITAL MULTIMETER

#### CHARACTERISTICS

- Auto ranging
- Automatic power-off
- HOLD function
- MIN/MAX function
- REL function
- USB interface
- Impact resistant holster
- Diode and continuity test with buzzer
- Transistor gain test
- Overflow indicator
- LCD with bargraph
- Low battery indicator



### DIGITAL CLAMP MULTIMETER

#### CHARACTERISTICS

- HOLD function
- continuity test with buzzer
- overflow indicator
- low battery indicator

