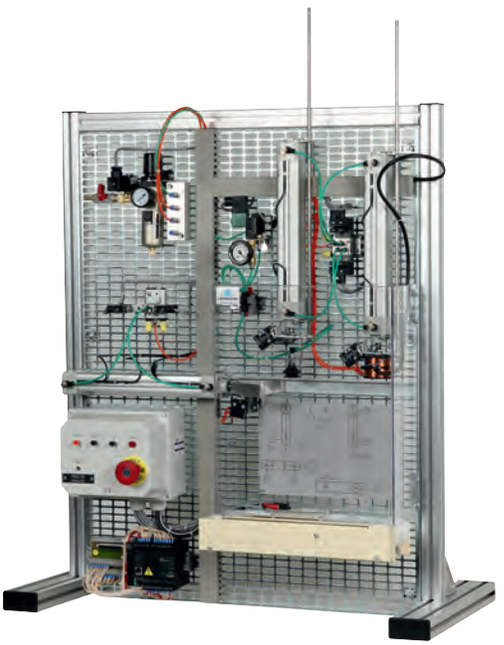
EDUCATIONAL SOLUTIONS



LANGLOIS

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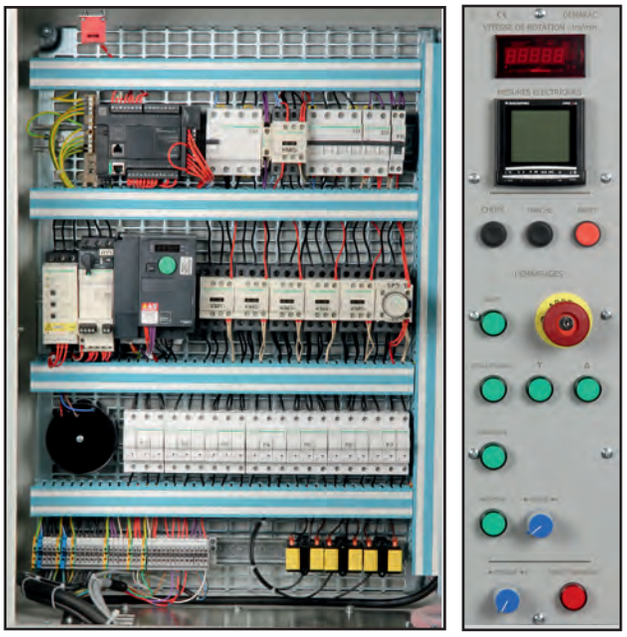
Phone: 0033 5 56 75 13 33

MOTOR START-UP STUDIES


FRONT



DEMARAC is supplied already wired, with tutorials, diagram and technical instructions. Safety leads Ø4mm supplied.
The unit can be supplied without the power unit. Please ask us for details. Compatibility with motors with a power of up to 1500W, with powder brakes controlled 0-12VDC and all 1000RPM tachometer generators with 0-10V, 0-20V or 0-60V outputs.


BACK

ref. DEMARAC

EDUCATIONAL OBJECTIVES

▪ ***Understanding the different ways of starting an induction motor***

TEACHING RESSOURCES + PRACTICAL WORKS

Proposed Practical Works

- Studying of the functioning star/delta starting, direct, by frequency converter, by soft starter
- Statement of engine characteristics, taking measurement of U and I
- Study of current transformers
- Modification of the acceleration and deceleration ramp of the frequency converter
- Setting the PC connection – PLC

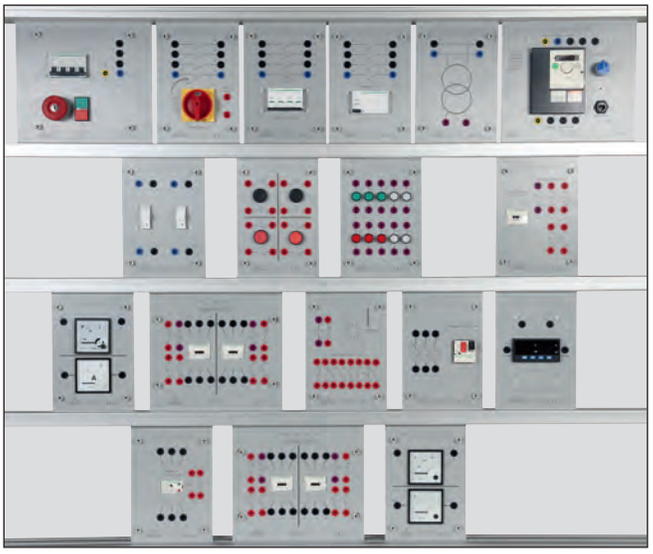
System for studying the start-up of asynchronous motors. For this completely stand-alone system, all you have to do is connect it to a 3-phase 400V mains socket. Selection of the required motor start-up type via push-buttons at the front of the electrical cabinet.
A 300W asynchronous motor, a powder brake and a tachometer generator are fixed directly onto the base with wheels. The power unit and the electrical cabinet are linked together using 4mm safety leads so that measurements can be taken using a hook-on ammeter or voltmeter, etc.
A key-operated switch at the front makes it possible to use the electrical cabinet when it is switched on with the door open. In this way, a qualified individual may take electrical measurements inside the cabinet.
A multifunction measuring unit displays the electrical quantities on the front door.
A digital tachometer shows the motor rotation speed.
A potentiometer at the front is used for varying the motor load.

- Dimensions:
  Base with wheels: 750 x 670mm
  Total height: 1970mm - Weight: 110kg

FEATURES

- Three-phase 400V supply voltage.
- Protected by residual current device, circuit breakers and fuses.
- Set of lamps and push-buttons for viewing and controlling the required type of start-up.
- Multifunction measuring unit with digital display, which is wired at the start of the circuit measuring the phase-to-ground and composite voltages, the line currents, the active, reactive and apparent power, in total, the power factor, the THD (total harmonic distortion)
- Digital display showing the motor's rotation speed
- Starter/Decelerator Schneider®. All of the settings are adjusted using potentiometers on the front of the device (acceleration time, deceleration time and torque, etc.)
  Acceleration time: from 1.1 to 5 seconds
  Deceleration time: from 0 to 5 seconds
  Torque adjustment: from 20% to 65% of the breakaway torque of the direct motor
- Frequency converter Schneider® (ATV32 type). Possible adjustments:
  - Acceleration ramp
  - Quick stop/free wheel
  - Pre-selected speeds...
- 2 potentiometers at the front of the cabinet adjust the motor's rotation speed and the motor's load.
- Contactor/circuit breaker, wired upstream of the motor, protect against overloads and short-circuits. A display built into the unit indicates the current consumed by the motor and the thermal protection threshold.
- 300W 400V/690V – 1/0.75A asynchronous motor 1500rpm.
- 300W powder brake. 0-10V power supply
- 20V for 1000rpm tachometer generator

STUDY OF WIRINGS FOR STARTING ASYNCHRONOUS MOTORS



Set of modules for studying the different types of wiring for starting asynchronous motors.
The modules are cabled using safety leads Ø4mm.
Compatible with asynchronous motors 400/690V 1500W max.

ref. QUICK-CPLUS

ref. QUICK-C **without frame and console**

Sockets on the back of the console for connecting the modules

EDUCATIONAL OBJECTIVES

- **Study of wiring diagrams for starting asynchronous motors.**
- **Study and operation of direct start-up.**
- **Study and operation of direct start-up with reversal of the direction of rotation.**
- **Study and operation of star/delta start-up.**
- **Configuration of a speed controller with software.**
- **Study and operation of start-up with speed controller.**
- **Using a digital wattmeter, ammeter and voltmeter.**

TEACHING RESOURCES STUDENT & TEACHER

Proposed Practical Works

- Creation of the wiring diagrams of different types of motor start-up.
- Creation of the different wirings of motor start-ups such as direct, direct with reversal of the direction of rotation, star/delta, with speed controller.
- Configuration of the speed controller using the SOMOVE software from Schneider
- Reading of the currents and voltages at the terminals of the asynchronous motor.
- Calculation of the absorbed power.

Comprises

- 1 Module – Distribution of three-phase voltage + Neutral 400V-50Hz
- 1 Module – 2 two-pole cut-out devices
- 1 Module – Four-pole thermal-magnetic circuit-breaker 4A D-curve
- 1 Module – Residual current four-pole switch 30mA
- 1 Module – Three-pole thermal magnetic circuit-breaker, motor support
- 1 Module – Four-pole isolating switch
- 1 Module – Transformer 230V/24VAC-50Hz 120VA
- 1 Module – Four pushbuttons
- 1 Module – 10 indicator lights 24VAC-50Hz
- 1 Module – Reversing contactor 24VAC-50Hz with 2NO+2NC
- 1 Module – Contactor 24VAC-50Hz with 2NO+2NC
- 1 Module – Contactor 24VAC-50Hz with 2NO+2NC
- 1 Module – Timed contactor 24VAC-50Hz
- 1 Module – Thermal relay
- 2 Modules – Analogue voltmeter (400V) and ammeter (10A) displays.
- 2 Modules – Digital wattmeter displays.
- 1 Module – Speed controller 1.5kW power supply and 3-phase 400V output.
- 1 set of safety leads for carrying out the different practical works.
- 1 frame with wheels (H x W x D): 1610 x 940 x 500mm equipped with rack for cords (30 fingers)
- 1 single-phase power console:

- 1 thermal magnetic circuit breaker (16A)
- 1 Emergency stop push button with key
- 1 Push button + LED indicator
- 1 230V single-phase output on 4mm safety terminals
- 2 230Vac sockets (2P + E) + 12 230Vac sockets (2P + E), at the back

FAN OPTION

QUICK-C can be completed by a fan.
- 300W 400/690V three-phase fan
- Rated speed 1500 rpm
- Power supply through 4mm dual chamber safety terminals

ref. KT-1M

Protection grid removed for photo purposes only

WIRING KIT TO START AN ASYNCHRONOUS MOTOR

ref. KT-1

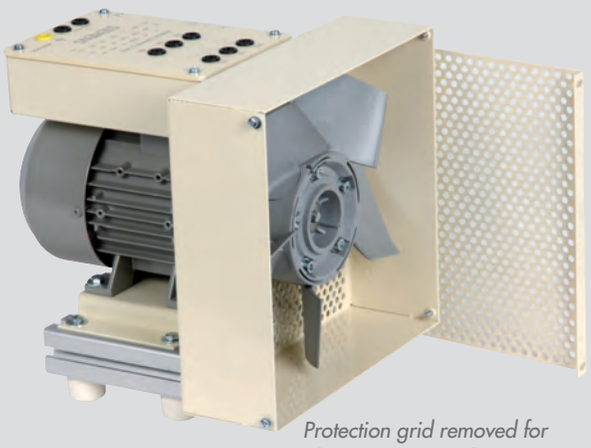
Wiring kit for industrial electrical equipment in housings to start-up a 300W asynchronous motor. Various diagrams are proposed:
Direct, Star/Triangle, reversal of the direction of rotation…
Each component unit has 4mm dual chamber safety terminals for the various connections.

The Kit is supplied with diagrams and instructions for the components. Option to complete this kit at a later date with for example, a speed controller, a starter/decelerator, etc. Your kit can be customised upon request. Please contact us.

The kit comprises

- 1 three phase power supply unit with circuit beaker, emergency stop and On/Off
- 4 power contactor units
- 2 single-pole + neutral circuit breaker units
- 1 25A – 30mA differential four-pole switch unit
- 1 4A D curve four-pole thermal magnetic circuit breaker unit
- 2 auxiliary contactor units for a 2F+2O control circuit
- 1 auxiliary contactor unit for a 4F+3O-time O+F work control circuit
- 1 emergency stop switch/disconnector unit with 4 25A contacts
- 1 0.4 to 0.63A + 1O three-pole thermal relay unit
- 1 230V/24V single phase 120VA safety transformer unit
- 1 24V green LED indicator light unit
- 1 24V red LED indicator light unit
- 1 24V white LED indicator light unit
- 2 black push-button units with 'F+O' contact
- 1 red push-button unit with 'O' contact
- 1 emergency stop unit with 'O' contact, key override
- 1 double push-button unit with 'F+O' contact and 24V indicator light
- 1 set of safety leads in several colours and lengths to wire all components.

FAN OPTION



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ref. KT-1M

The KT-1 kit can be completed by a fan.

- 300W 400/690V three-phase fan.
- Rated speed 1500 rpm
- Power supply through 4mm dual chamber safety terminals

This kit is also available with each industrial component fixed on a plate PVC (250mm high).

ref. KT-1PLA

ASYNCHRONOUS MOTOR START-UP KIT

Male and female HARTING® industrial rapid connectors, with mobile covers and fixed bases, are supplied with the KIT. They are used for connections between the following:
- cabling plate
- pushbuttons
- switches
- indicator lights
- motor.

A teaching manual including diagrams, characteristics and instructions for each component is supplied with the kit. This industrial kit includes actuators and control components for studying and creating the main start-up diagrams for asynchronous motors:
- direct start-up, with or without reversal of the direction of rotation.
- star/delta start-up
- star/delta start-up with reversal of the direction of rotation

ref. KI-BASE Basic kit required

SELECT THE CONTROLLER AND STARTER KITS TO BE COMBINED WITH YOUR BASIC KIT

SCHNEIDER® ATV312 CONTROLLER + STARTER

This addition to the KI-BASE kit includes:
- A Schneider® Altivar ATV312 controller for 1500W rotary machines. Single-phase mains power supply 230V AC 50-60 Hz. 3 x 230V AC outputs. A potentiometer on the front enables local setting of the controller and rotation speed control
- A USB cable and the SoMove® software.
- A GV2 motor circuit-breaker.
- A Schneider® soft starter 3 x 400 V - 6 A. Adjustment of acceleration, deceleration time and couple by front potentiometer.

ref. KI-VAR1

SCHNEIDER® ATV32 CONTROLLER + STARTER

This addition to the KI-BASE kit includes:
- A Schneider Altivar ATV32 controller for 1500W rotary machines. Single-phase mains power supply 230V AC 50-60 Hz. 3 x 230V AC outputs.
- A graphic terminal which connects directly to the controller front. Very simple to use, it lets you program the controller easily locally. A front potentiometer enables motor rotation speed adjustment.
- A USB cable and the SoMove software.
- A GV2 motor circuit-breaker.
- A Schneider® soft starter 3 x 400 V - 6 A. Adjustment of acceleration, deceleration time and couple by front potentiometer.

ref. KI-VAR32

SIEMENS® CONTROLLER + SCHNEIDER® STARTER

This addition to the KI-BASE kit includes:
- A Siemens® G120 controller for 1500W rotary machines. Power supply 3 x 400V AC 50/60 Hz. 3 x 400V AC outputs. A potentiometer on the front enables local setting of the controller and rotation speed control
- A USB cable and the STARTER software.
- A GV2 motor circuit-breaker.
- A Schneider soft starter 3 x 400V - 6A. Adjustment of acceleration, deceleration time and couple by front potentiometer.

ref. KI-VAR3

STUDY CASE FOR SPEED CONTROLLER ATV32 PROGRAMMABLE INPUTS / OUPUTS

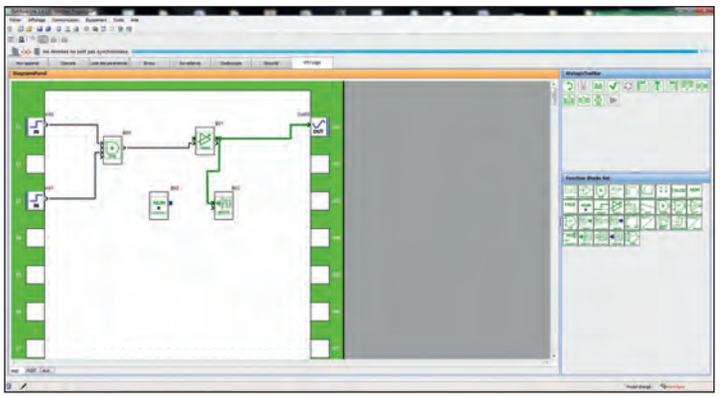
ref. VAL-VAR

VAL-VAR is a study case for the speed controller ATV32 for asynchronous machine.
It contains all the equipment required for autonomous operation.
The case connects directly to the mains 230V single-phase.
The printed PVC face includes the electrical protection and control equipment, safety terminals for cabling the inputs/outputs of the speed controller and taking current measurements in each phase of the motor.

EDUCATIONAL OBJECTIVES

- *Studying a 3-phase speed controller*
- *Studying a setup software and setting the speed controller*

TEACHING RESOURCES STUDENT & TEACHER



Programming screen of logical inputs/outputs of the variator.

COMPRISES

- 1 socket + switch unit module for linking to the mains 230V-50/60Hz.
- 1 main switch.
- 1 differential magneto-thermal circuit-breaker 16A-30mA.
- 1 motor circuit-breaker type GV2
- 1 speed controller for asynchronous machine ATV32 from Schneider® power 0.18kW. This speed controller can be programmed using controls on its front or from the offset programming graphic terminal. It can also be linked to a PC using the RJ45/USB lead or Bluetooth link if your PC is so equipped. All the control inputs and outputs of the speed controller are offset to the safety terminals:
  - 6 binary inputs
  - 1 analogue input -10…10VDC
  - 1 analogue input x…y mA
  - 1 Safety Input STO
  - 3 binary outputs
  - 1 analogue output 0…10V or 0…20mA
  - 1 logic output 30V/100mA
- 1 multifunction programming graphic terminal with large screen monochrome (8 lines) 240x160 pixels.
  This terminal is offset using RJ45 1-m lead (supplied).
- 1 three-phase asynchronous motor 0.12kW-230/400V-AC.
  The rotation of its shaft can be seen through a translucent safety window.
- 1 set of jumpers, a switch and a potentiometer enable immediate operation of the speed controller.

CASE SUPPLIED READY TO USE WITH

- 1 set of safety leads and jumpers.
- 1 programming graphic terminal
- 1 SoMove software (Schneider Electrique®) with RJ45/USB lead to link to PC
- 1 instruction manual, on CD, including the component data sheets and practical assignments for speed controller programming help.

STUDY OF SPEED CONTROLLER

Instructional Schneider® speed controller for asynchronous motor 3000W at voltage of 3x400V. Contact us for other capacities.

ref. VAR-3KW

Aluminium frame H 550 x 360 x 350mm. Carry handles.

EDUCATIONAL OBJECTIVES

- **To study and use a motor starter for an asynchronous machine.**
- **To configure an electronic controller**
- **To use the SOMOVE software**
- **To configure industrial ETHERNET communications.**

TEACHING RESOURCES

Practical works supplied

- Recap on asynchronous motors and electronic starters
- Creation of the wiring diagram
- Programming the controller from its console or the SOMOVE software
- Configuration of the Ethernet RJ45 link, viewing of the motor curves

The practical works requires an asynchronous motor 3x400V +E with load not supplied

Features

- Plug-in graphic screen.
- Thermal-magnetic protection 16A.
- Power indicator
- Analogue power supply 4-20mA Integrated.
  Adjustable by potentiometer. Output on terminals 4mm.
- Analogue power supply 0-10V Integrated.
  Adjustable by potentiometer. Output on terminals 4mm.
- 7 ON/OFF switches for the configurable inputs of the controller
- Analogue output 0/10V on safety terminals 4mm
- Braking resistance output on safety terminals 4mm (resistance not supplied).
- Analogue encoder output on connector Sub-D15 (encoder not supplied).
- Output RJ45 for Ethernet and MODBUS

Supplied with Schneider® SOMOVE software.
Motor power supply output on terminals 4mm at 3x400V +E.
Power supply input 3x400V+N+E on safety terminals 4mm

STUDY OF A STARTER / RETARDER UNIT

Adjustment of the initial voltage, of rise time and fall time with 3 adjustment potentiometers on the front of the starter.
Power supply input 3x400V+N+E on safety terminals 4mm.
Motor power supply output 3x400V +E on terminals 4mm.

Features

- Fuse and circuit-breaker protection
- Emergency stop button
- Power indicator
- Motor start pushbutton
- Motor stop pushbutton
- BOOST switch
- Motor running indicator

ref. DERA-3KW

Aluminium frame H 550 x 360 x 350mm. Carry handles.

EDUCATIONAL OBJECTIVES

- **To study and use a motor starter for an asynchronous machine.**
- **To configure an electronic starter/retarder unit**

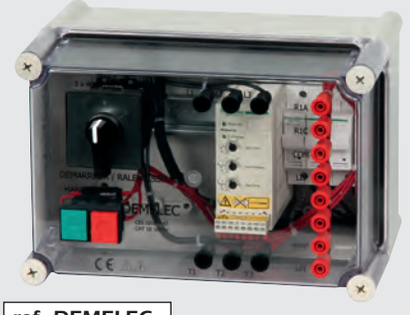
TEACHING RESOURCES

Practical works supplied

- Recap on asynchronous motors and electronic starters
- Creation of the wiring diagram
- Creation of different configurations for the motor starter

The practical works requires an asynchronous motor 3x400V +E with load not supplied

Starter & Retarder

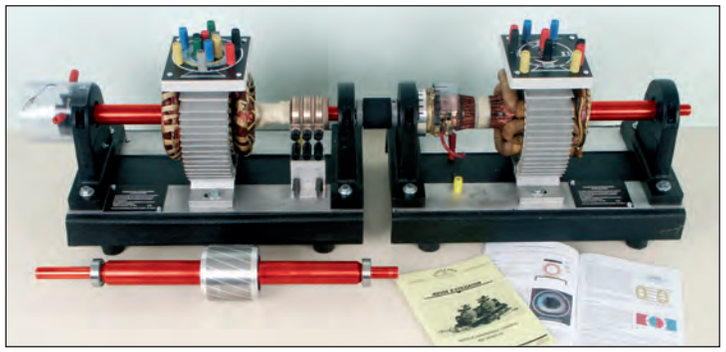


ref. DEMELEC

This unit starts up and decelerates squirrel-cage asynchronous, single-phase and three-phase motors smoothly with a low current.
All settings can be performed without opening the unit. These settings are: acceleration time, deceleration time and torque. Lamps indicate the "On" and "rated speed" operating statuses.

- Supply voltage: 400V three-phase
- Control: On/Off operated using a built-in push-button.
- Acceleration adjustment: from 1.1 to 5 seconds
- Deceleration adjustment: from 0 to 5 seconds
- Torque adjustment: from 20% to 65% of the breakaway torque of the direct motor
- Maximum current: 6A

DEMO PLUG & PLAY MOTOR (AC OR DC)

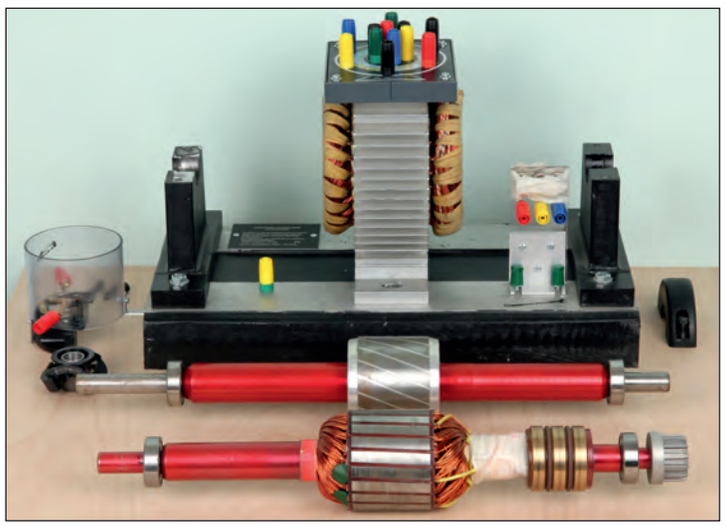


EDUCATIONAL OBJECTIVES

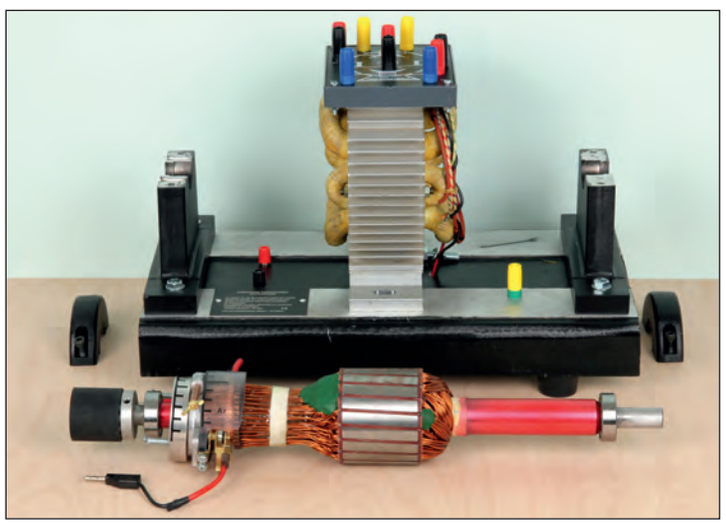
- **Understanding the different types of electrical motors & generators.**
- **Studying the operating characteristics of each device.**

TEACHING RESOURCES STUDENT & TEACHER

The various functions can be obtained by simple coupling, perfectly explained in the instructions.
Although powered by non-hazardous voltages (< 50VAC / < 100VDC), the powering up of these products is restricted to authorised staff due to the lack of protective housing.



ref. DEMO-AC 48V alternating current



ref. DEMO-DC 48V direct current unit

DEMO-AC: 48V ALTERNATING CURRENT

Works with the 3-phase variable 0-48V 15A power supply (not included). See Ref. ALI-DEMO.

Presentation: The interconnection of the widings on to a didactic terminal box provides a visual understanding of the coil of the various electrical machines and their functions. Users are able to see the position of the brushes and their movement. It is powered by 48 volt ELV. A full user manual is provided with the motor/alternator.

TECHNICAL DESCRIPTION

- Open frame.
- An alternating current stator.
- An aluminium base.
- Two aluminium bearings for supporting the motor shaft.
- Possibility for studying 8 different motors, with safety terminal connections
  Single-phase motor with capacitors
  2-pole star connection three-phase motor
  4-pole delta connection three-phase motor
  Star-delta three-phase asynchronous motor
  Dahlander connection asynchronous squirrel cage motor
  Three-phase slip-ring motor
  Synchronous three-phase motor
  Three-phase alternator
- Extension shafts.
- One squirrel cage rotor.
- One slip ring rotor. Enables the functioning of the motor and the alternator.
- One rotating brush holder.
- One brush holder mount.
- Three brushes for the slip-ring motor.
- Half coupling.
- A rotating centrifugal contact.
- A user manual.

DEVELOPED PRACTICAL WORK

- Single-phase alternating motor.
- Alternating motor theory.
- Repulsion-induction motor with auxiliary wiring.
- Capacitor motor.
- Capacitor start and run motor.
- Three-phase alternating motor theory.
- 2-pole star motor.
- 4-pole delta motor.
- Slip-ring motor.
- Alternator theory.
- Three-phase alternator functions.
- Synchronous motor.

DEMO-DC: 48V DIRECT CURRENT UNIT

Works with the 3-phase variable 0-48V 15A power supply (not included). See Ref. ALI-DEMO.

Presentation: The interconnection of the windings on to a didactic terminal box provides a visual understanding of the coil of the various electrical machines and their functions. Series poles can be added or removed to/from the shunt poles to create a compound machine. Users are able to see the position of the brushes and their movement. It is powered by 48 volt ELV. A full user manual is provided with the motor/alternator.

TECHNICAL DESCRIPTION

- Open frame.
- A direct current stator.
- An aluminium base.
- Two aluminium bearings for supporting the motor shaft.
- Possibility for studying 14 different motors, with safety terminal connections
  DC shunt motor/DC shunt motor with commutating poles
  DC series motor/DC series motor with commutating poles

Long shunt compound generator
Long shunt compound generator with commutating poles
Short shunt compound motor
Short shunt compound motor with commutating poles.
Separately excited shunt motor
Universal motor without commutating poles/with commutating poles
Repulsion motor
Series generator with commutating poles.
Separately excited series source rotor generator
Separately excited series source stator generator
Self-excited long shunt compound generator
Self-excited short shunt compound generator

- An armature
- Half coupling.
- A user manual.

DEVELOPED PRACTICAL WORK

- Direct current motor theory.
- Armature reaction.
- Winding polarities.
- DC shunt motor
- DC shunt motor with commutating poles.
- Speed control.
- Long shunt compound DC motor.
- Long shunt compound DC motor with commutating poles.
- Short shunt compound DC motor.
- Short shunt compound DC motor with commutating poles.
- DC shunt motor, separately excited.
- DC generator theory.
- DC shunt generator.
- Separately excited generator.
- Series DC generator with commutating poles.
- Series-excitation generator.
- Compound generator.
- Long shunt compound DC generator.
- Short shunt compound DC motor.

DISMANTLED MOTOR

ref. MAS-DEM

MAS-DEM educational objective is theoretical research into, and discovery of, the three-phase asynchronous squirrel-cage motor. Presented in a case containing the following items:

- The motor carcass with stator wiring, fitted with a terminal block.
- The squirrel-cage rotor.
- The left and right flanges + fan.
- Screws + screwdriver kit

The 370W motor can be assembled and disassembled depending on needs. This provides a better understanding of three-phase motor technology.
The instructions cover all theoretical research into the operation and technology involved in the 3-phase squirrel-cage motor

FEATURES OF THE CASE

- Dim. 534 x 427 x 182mm
- Weight: 10Kg

SIEMENS

POWER SUPPLY BENCH DEMO-AC & DC

Workbench for the study of motors ref. DEMO-AC and DEMO-DC.
Fitted with a 1200 x 750mm worktop and a 250mm width electrical cabinet.
High mechanical and high temperature resistance stratified worktop.

The lateral console delivers below outputs:

- variable 3-phase + N 0-48V / 15A per phase, usable in two-phase
- variable DC 0-48V / 6A
- 12V DC / 4,2A
- 2 x 230V power sockets (2P+E)

Common features for all outputs:

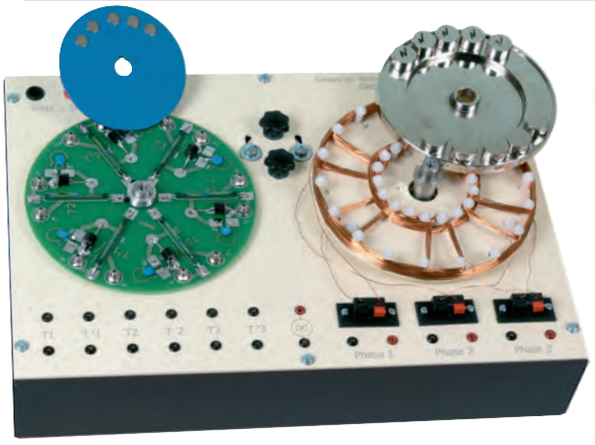
- Hard-wearing LED lamp, without maintenance
- Emergency key release stop button, and start/stop push button
- Each output is controlled independently
- Outputs protected with circuit breakers or auto-protection with auto reset
- Outputs with voltmeter and ammeter
- Electrical drawing available on request

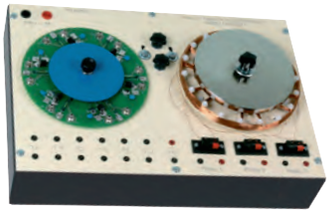
ref. ALI-DEMO

MOBILE VERSION WITHOUT TABLE
POWER SUPPLY ON WHEELS

ref. ALI-DEMO-M

AUTOMATICALLY CONTROLLED SYNCHRONOUS MACHINE





SCOPE OF SUPPLY
Supplied complete and in working order, together with:
- 1 wound stator
- 2 additional bare combs for winding
- enamelled wire dia. 0.5 mm
- 14 leads dia. 2 mm
- 1 full set of instructions with amended tutorials.

Dimensions : 425 x 300 x 110mm. Weight : 6.5kg.

EDUCATIONAL OBJECTIVES

- ***Identifying the internal components of a auto-controlled synchronous machine (theoretical and practical)***
- ***Functioning in motor and in generator***
- ***Achieving the coils and set the switch***

TEACHING RESOURCES MADE BY THE SCHOOL ENSEEIHT

MICROMAG uses only dry contacts (with no complex electronic circuit) so that its operation is accessible to everyone. Using this model, students discover little by little the various components of an automatically controlled synchronous machine and, more generally, of a motor, via a theoretical and practical approach. The theoretical approach can be accessed at different study levels. At the secondary school level, the torque, the EMF and the number of turns in the winding are calculated simply by applying formulae. Engineering students will have the necessary mathematical knowledge to establish these relationships by using the laws of electromagnetism and applying them to the MICROMAG machine.
MICROMAG comes with a manual containing all of the basic laws which are necessary for understanding the tutorials. Wherever necessary, colour drawings are used to illustrate comments. Angular diagrams, timing diagrams and schematic diagrams are used to illustrate, step-by-step, the operation and/or stages of implementation.
In addition, the following is required for all tutorials:
- a 30V DC 2A power supply
- an oscilloscope with a memory function
- a dynamometer
- a gaussmeter – not essential – used for checking the current of the field
- enamelled wire for winding on the rotor(s) (supplied)

TUTORIALS FOR ALL LEVELS OF TRAINING

Because the motor is open, students can see the air gap, the orientation of the magnetic field, the direction of the current, the direction of rotation, the "active" winding part and the yoke. MICROMAG can be used as a motor or a generator. By manually rotating the rotor, the machine will operate as a generator. Students read out from the oscilloscope the EMF on the two-phase terminals. This voltage indicates indirectly the torque ripple when the machine is operating as a motor.

EXAMPLE 1
For each of the three phases, students produce a static torque diagram (or EMF diagrams for each phase) based on the rotor's angular position. Students check the values experimentally by measuring torques using a dynamometer and the EMFs shown on the oscilloscope.
They plot torques in a graph and check them experimentally (EMFs respectively) when the two phases are connected in anti-series, or three phases in anti-series and parallel. They produce a phase power diagram based on the rotor's angular position.

EXAMPLE 2
The MICROMAG winding can include one, two or three notches per pole and per phase. Students perform a theoretical calculation to determine the number of notches and turns of the winding required for a torque specified by the teacher. They then perform this winding on a comb using enamelled wire. Next, they check the obtained static torque in practice using a dynamometer.

EXAMPLE 3
Using these diagrams, students study the principle of the switch, which powers in sequence the phases of a synchronous machine, based on the rotor's angular position. This switch comprises a "position sensor" and "electrical switching".
This is performed in MICROMAG by means of a rotating disk, which is synchronous with the rotor and carries magnets. The magnets activate reed switches, in series with the windings. Students have to place the magnets onto an angular sector of 120° on the switch's disk in order to power two phases. It is also possible to perform a 180° control by using one anti-series phase and the other two in parallel. By manually activating the disk, students check on the ohmmeter whether the opening/closing sequence of the switches matches the previously established phase power diagram exactly, based on the rotor position.

EXAMPLE 4
Students place the windings that they have produced inside the motor. By manually powering one phase after another, they firstly check the connection. Next, they connect the switches of the switching system with the three phases of the stator. By overriding the rotor/switch drive system, students check that its rotation is driving the rotor in synchronism. Finally, by resetting the switch drive by the rotor, students test the machine in automatically controlled operating mode. Students read out from the oscilloscope the currents in two successive phases and their conduction diagram.

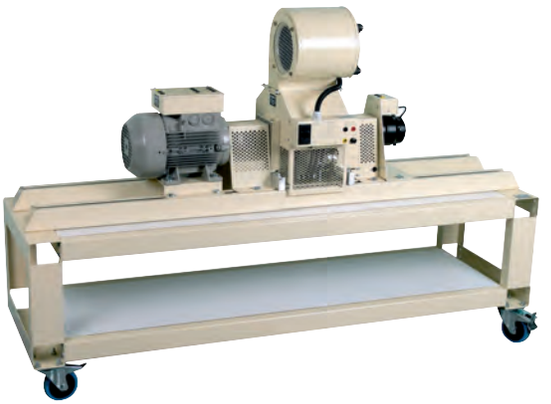
DYNAMOMETER

ref. FG5000

- Rating: 5000 gf
- Resolution: 1 gf
- Accuracy: 0.2% + 1 dgt
- Automatic shutdown
- Dim.: 240 x 80 x 40 mm
- Weight: 440 g

STUDY OF AN ASYNCHRONOUS MOTOR 1500W WITH POWDER BRAKE

+



Sets of modules (H-250mm) and rotating machinery for studying an asynchronous motor 1500W coupled with a powder brake with torque sensor and tachometer generator.

ref. QUICK-FPLUS (single-phase)
Requires connection to a mains single-phase electricity supply 230V AC

ref. QUICK-FTPLUS (3-phase)
Requires connection to a mains 3-phase electricity supply 3 x 400V AC + Neutral

Comprises

- 1 Power supply module with RC circuit-breaker and emergency stop button.
- 1 Speed controller module 1500W (single-phase or 3-phase according to version) with SoMove programming software.
- 1 Module with thermal-magnetic circuit-breaker for motor support.
- 1 Wattmeter switch module.
- 1 Power supply module 0-20V DC for powder brake supply.
- 1 Voltage digital display module.
- 1 Current digital display module.
- 1 Motor torque digital display module.
- 1 Rotation speed digital display module.
- 1 Analogue wattmeter RMS AC+DC.
- 1 Complete motor set on wheeled cart equipped with three-phase asynchronous motor 230/400V - 1500W, powder brake, rotary torque sensor, and tachometer generator.
- 1 set of safety leads for carrying out the different practical works.
- 1 frame with wheels (H x W x D): 1610 x 940 x 500mm equipped with rack for cords (30 fingers)

Single-phase version

- 1 single-phase power console:
- 1 thermal magnetic circuit breaker (16A)
- 1 Emergency stop push button with key
- 1 Push button + LED indicator
- 1 230V single-phase output on 4mm safety terminals
- 2 230Vac sockets (2P + E) + 12 230Vac sockets (2P + E), at the back

3-phase Version

- 1 three-phase power console:
- 1 4-poles thermal magnetic circuit breaker (16A)
- 1 Emergency stop push button with key
- 1 Push button + LED indicator
- 1 3-phase output 3x 400V+N+E on 4mm safety terminals
- 2 230Vac sockets (2P + E)
- 12 230Vac sockets (2P + E) with ON indicator (back side)

EDUCATIONAL OBJECTIVES

- ***Study the wiring diagram between a speed controller and an asynchronous motor.***
- ***Study the configuration of a speed controller using SoMove software.***
- ***Study the no-load behaviour of a three-phase asynchronous motor 1500W.***
- ***Study the with-load behaviour of a three-phase asynchronous motor 1500W.***
- ***Read and plot the electrical and mechanical characteristics of an asynchronous motor.***

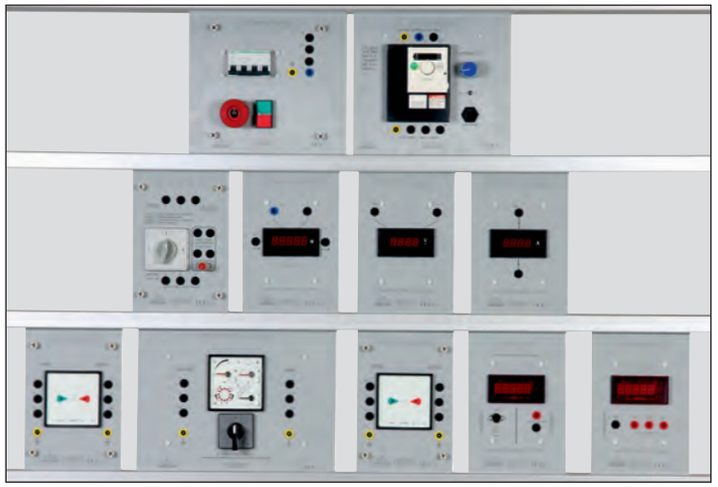
TEACHING RESOURCES STUDENT & TEACHER

Proposed Practical Works

- Creation of the wiring diagram of a speed controller and an asynchronous motor.
- Creation of the configuration of a speed controller using SoMove software.
- Creation of the no-load and with-load tests of the asynchronous motor.
- Calculations & plots of the electrical and mechanical characteristics of the motor bench.

Sockets on the back of the console for connecting the modules

STUDY OF THE SYNCHRONIZATION OF AN ALTERNATOR WITH THE ELECTRICAL GRID



ref. QUICK-JPLUS

The set can be supplied without the motor set, please ask for details.

Prises à l'arrière du pupitre pour raccordement des modules

Set of modules (H-250mm) and rotating machinery for studying the synchronization of an alternator 1500W with the electricity grid 3 x 400V.

EDUCATIONAL OBJECTIVES

- ***Understand the operation of a synchronous alternator.***
- ***Understand the rules of synchronization with the electricity grid.***
- ***Use a synchronoscope.***
- ***Study the wiring diagram between a speed controller and an asynchronous motor.***
- ***Creation of the configuration of a speed controller with software.***
- ***Study the no-load and with-load behaviour of a 3-phase asynchronous motor 1500W.***
- ***Study the no-load and with-load behaviour of an alternator.***
- ***Read and plot the electrical and mechanical characteristics of the motor bench.***

TEACHING RESOURCES STUDENT & TEACHER

ref. QUICK-JPLUS

ref. QUICK-J **without frame and console**

Proposed Practical Works

- Creation of the wiring diagram of a speed controller and the asynchronous motor.
- Configuration of the speed controller with software.
- Creation of the wiring of the alternator and the synchronoscope.
- Creation of the no-load and with-load tests of the asynchronous motor.
- Creation of the no-load and with-load tests of the alternator.
- Calculations and plots of the electrical and mechanical characteristics of the motor bench.

Comprises

- 1 Single-phase power supply module with RC circuit-breaker and emergency stop button.
- 1 Single-phase speed controller module 230V AC – 3x230V AC, 1500W. Adjustment of the rotation speed setting by potentiometer on the front.
- 1 Wattmeter switch module.
- 5 digital display modules:
  Voltage - Current - Power - Motor torque - Rotation speed.
- 1 Indicator module of phase order on the alternator side.
- 1 Indicator module of phase order on the electricity grid side.
- 1 Switching module with display of the matching of the voltages, speed of synchronism, frequency of the alternator, and output voltage of the alternator.
- 1 Machinery set on wheeled cart comprised of:
  1 Asynchronous motor 1500W - 3x 230V/3x400V
  1 Brushless rotary dynamic torque sensor
  1 Synchronous machine 1500W - 3x230V/3x400V
  1 Tachometer generator 10V/1000 revs
- 1 Analogue wattmeter RMS AC+DC.
- 1 Variable power supply 0-240V AC/DC for supplying the polar wheel of the alternator.
- 1 set of safety leads for carrying out the different practical works.
- 1 frame with wheels (H x W x D): 1610 x 940 x 500mm equipped with rack for cords (30 fingers)
- 1 three-phase power console:

- 1 4-poles thermal magnetic circuit breaker (16A)
- 1 Emergency stop push button with key
- 1 Push button + LED indicator
- 1 3-phase output 3x 400V+N+E on 4mm safety terminals
- 2 230Vac sockets (2P + E)
- 12 230Vac sockets (2P + E) with ON indicator (back side)

Mains power supply 230V - 50/60Hz. 3-metre lead with plug 2P+E.

STUDY OF THE BEHAVIOUR OF A MACHINE IN HYPO AND HYPERSYNCHRONY

An asynchronous motor can convert mechanical energy into electrical energy. To perform this conversion, it has to be driven above the synchronous speed. QUICK-IPLUS is a set of modules of measurement (H-250mm) of switching and 2 asynchronous motors mounted on the same axis of rotation for studying hypersynchrony. The speed controller module drives the first motor above its synchronous speed so that the second becomes a three-phase generator. A central zero wattmeter module indicates the direction of the electrical energy consumed or fed in the case of feeding into the grid. A central 0 phase-meter module demonstrates the change of power factor according to the addition of capacitors or speed variation.

Sockets on the back of the console for connecting the modules

ref. QUICK-IPLUS

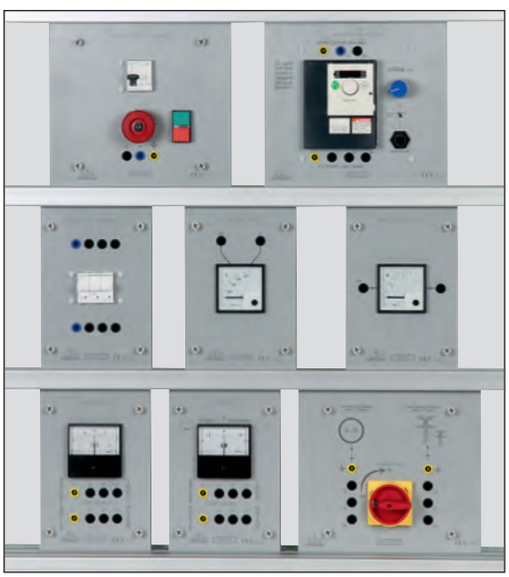
EDUCATIONAL OBJECTIVES

- **Study the hyposynchronous and hypersynchronous operations of an asynchronous motor.**
- **Study the effect of a battery of capacitors on the power factor value.**
- **Study the synchronisation with the national grid.**
- **Study energy use at an isolated site.**
- **Calculate the efficiencies of an energy production system.**
- **Use a clamp ammeter.**

TEACHING RESOURCES STUDENT & TEACHER

Proposed Practical Works

- Procedure of synchronization with the national grid.
- Hyposynchronous and hypersynchronous measurement.
- Reading power factor using a battery of capacitors and consequences.
- Plot of the electrical characteristics of the energy production system.
- Calculation of the overall efficiency.
- Study of the operation at an isolated site.



Comprises

- 1 Single-phase power supply module 230V AC with RC circuit-breaker and emergency stop button.
- 1 Speed controller module 1500W. Single-phase power supply 230V AC, motor supply output 3 x 230V AC.
  Adjustment of the rotation frequency by potentiometer on the front.
- 1 Three-pole cut-out module.
- 2 digital display modules: Current - Voltage
- 1 Module with central zero analogue display of the power.
- 1 Module with central 0 analogue display of power factor.
- 1 Start/Stop switch module for synchronizing with the electricity grid 3x230/400V.
- 1 Set of rotating machinery: 2 asynchronous motors 1500W, 3x 230/400V.
- 1 Resistive load 2000W.
- 1 Capacitive load 2000 kVAR.
- 1 set of safety leads for carrying out the different practical works.
- 1 frame with wheels (H x W x D): 2000 x 1490 x 750mm
  equipped with a rack for cords (30 fingers) and a melamine tablet 19mm
- 1 three-phase power console:

- 1 4-poles thermal magnetic circuit breaker (16A)
- 1 Emergency stop push button with key
- 1 Push button + LED indicator
- 1 3-phase output 3x 400V+N+E on 4mm safety terminals
- 2 230Vac sockets (2P + E)
- 12 230Vac sockets (2P + E) with ON indicator (back side)

Mains power supply 230V - 50/60Hz. 3-metre lead with plug 2P+E.

The set can be supplied without the motor set, without capacitive or resistive load, please ask for details.

TRAINING MODEL OF SINGLE-PHASE TRANSFORMER 140VA

ref. ETM140

OBJECTIFS PÉDAGOGIQUES

- **Theoritical practical study of a single-phase transformer with no load and loaded.**
- **Studying the electromagnetic induction**
- **power calculation, efficiency, transformation ratio, transformer losses.**

User's manual with theoretical study

ETM140 allows the study of a single phase transformer. It is made up with a portable console which includes:

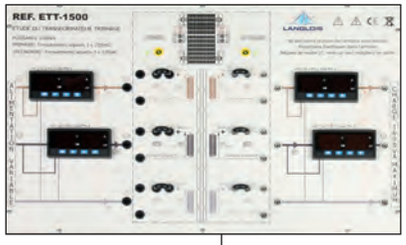
- 1 X 140VA single phase transformer
  Primary: 230V power supply. Use: 240V protected by fuses and output on safety terminals.
  Secondary: 1 x 15V/3.6A winding, 2 x 12V/3.6V independent windings, fuses protected and output on safety terminals.
- 3 displays on the primary (Current – Voltage – Power) show the absorbed electric values.
- 6 displays on the secondary (2 x Current – 2 x Voltage – 2 x Power) show electric values of secondary outputs.
- 1 variable single phase autotransformer, 0-240V 2.5A output, fuses protected, with safety terminals, can supply the transformer primary.
- 1 set of Ø4mm safety test leads.

User's manual includes: A theoretical study about single phase transformer and practical works with the 140VA transformer.

Specifications:

- Dimensions: 1000x160x180mm + handle
- Weight: 18kg
- Supply: 230V mains cable

STUDY OF THE 1500VA THREE-PHASE TRANSFORMER



Upper face
4 multi-displays show the active powers, voltages, currents and power factors at the primary and at the secondary.
Engraved synoptic equipped with safety sockets to facilitate the wiring.

ref. ETT-1500

EDUCATIONAL OBJECTIVES

- **Study of a 3-phase transformer with no load, in short-circuit and loaded**
- **Creation of Star / Delta wiring according to the primary/secondary voltages selected**
- **Electrical measurements of the different values**
- **Calculation of the powers with the method of the 2 wattmeters**

TEACHING RESOURCES & PRACTICAL WORK

Proposed practical work

- Understanding of the characteristics given on the identification plate
- Readings of the characteristics with no load, in short-circuit and loaded
- Study and influence of the different primary and secondary couplings
- Calculation of the transformation ratio
- Study of the clock hour figure
- Power statement with the method of the 2 wattmeters
- Study of the equivalent diagram for one phase

COMPOSITION OF THE MOBILE CABINET ON WHEELS

- Emergency stop, main switch, 'On' indicator light
- Primary and secondary electrical protection
- Variable three-phase autotransformer
- 1500VA three-phase transformer
  Primary 3 x 230V / Secondary 3 x 230V separate windings
- 4 digital multi-displays (2 at primary and 2 at secondary) showing the active power, voltage, current and cosϕ
- 4mm safety terminals including 3 at secondary for connecting a load
- HYPRA plug with 3-m lead for linking to the three-phase network
- Dimensions: 710 x 600 x 375mm - Weight: 72 kg
- Supply voltage: 3 x 400V-AC 50Hz + N +E

An autotransformer enables the voltage at the primary to be varied.
Separate windings allow for practical work with no load, in short-circuit, and loaded with different Star or Delta couplings.

MODULAR VERSION

ref. QUICK-GPLUS

This modular version meets the same educational objectives and makes it possible to carry out all the practical work.

Comprises

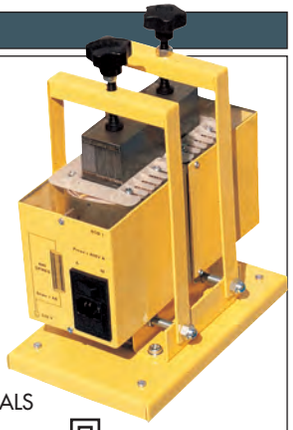
- 1 Variable autotransformer module 0-250V AC - 5A.
- 1 Single-phase transformer module 140VA.
- 3 Voltage digital display modules.
- 3 Current digital display modules.
- 3 Power digital display modules.
- 1 Variable rheostats module 0-22 ohms.
- 1 Variable rheostats module 0-3.3 ohms.
- 1 set of safety leads for carrying out the different practical works.
- 1 frame with wheels (H x W x D): 1610 x 940 x 500mm equipped with rack for cords (30 fingers)
- 1 single-phase power console:

- 1 thermal magnetic circuit breaker (16A)
- 1 Emergency stop push button with key + 1 Push button + LED indicator
- 1 230V single-phase output on 4mm safety terminals
- 2 230Vac sockets (2P + E) + 12 230Vac sockets (2P + E), at the back

Mains power supply 230V - 50/60Hz. 3-metre lead with plug 2P+E.

SAFETY DISMANTLED TRANSFORMER

MAGNETIC CIRCUIT



- Stacking of silicon sheet in U-shape.
- H: 200mm.
- L: 120mm.
- 40 x 40mm section
- The magnetic circuit is fixed onto a 230 x 150mm base with rubber feet.
- Two quick gripping clamps hold the head, closing the magnetic circuit.

ref. MAG800

User safety is maintained by SAFETY TERMINALS and a double insulation unit. ⧈

PRIMARY COIL

- 230V power supply.
- 800VA power
- 440 turns max. I = 4A
- Supplied with a power lead, an On/Off button, a safety fuse
- Dimensions. : 115 x 115 x 95mm

ref. BOB1

SECONDARY COIL

- Consists of 2 windings in series, each with 1000 turns, 0.8A.
- Warning - when empty, this coil delivers 1000V.
- Outputs to safety terminals.
- Double insulation ⧈
- Dimensions. : 115 x 115 x 95mm

ref. BOB3

PRIMARY COIL

- 230V power supply.
- 800VA power
- 440 turns max. I = 4A
- Connexion on safety terminals
- Dimensions. : 115 x 115 x 95mm

ref. BOB6

SECONDARY COIL

- consists of 2 windings in series, each one with 220 turns, 3.6A.
- When empty, this coil delivers 230V, with a mid-point of 110V.
- Outputs to safety terminals.
- Double insulation ⧈
- Dimensions: 115 x 115 x 95mm

ref. BOB4

SECONDARY COIL

- Consists of 5 windings in series.
- Outputs to safety terminals.
- Double insulation ⧈
- Dimensions: 115 x 115 x 95mm

Nb of turns	6	12	24	48	96
Current in A	50	25	13	6,6	3,3

ref. BOB2

STUDY OF A WALLBOX FOR ELECTRIC VEHICLE

This educational solution, available in 2 references, allows you to discover and study the operation of an electric car charging station for domestic use.
The learner will become familiar with the installation, configuration and testing of a charging station.
The 1-M version also allows wiring of the control, removal and installation of IRO / IRL tubes.
Put yourself in the shoes of an authorized installer by applying the NFC15100 verifications and by discovering the compulsory E.V.Ready self-checking sheets during an installation.

EDUCATIONAL OBJECTIVES

- **Study an electric vehicle charging station.**
- **Wire a charging station for a domestic electric vehicle (1-M version only)**
- **Commission an electric vehicle charging station.**
- **Test and diagnose an electric vehicle charging station.**
- **Study an access command by code keypad and RFID badge**
- **Study a communication by Wifi or Bluetooth**
- **Study the different types of electric vehicle charging sockets**

Educational support on DVD

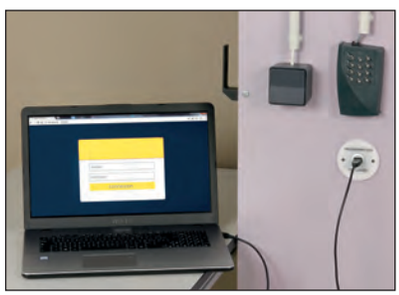
- Instructions and installation
- Technical notices
- Theoretical reminder on mode 3 type 2 sockets
- Teaching scenarios in the form of a TEACHER / PUPIL type practical work.
- Cable schematics

FULL VERSION FOR WIRING AND PROGRAMMING

ref. BORNELEC1-M

DELIVERED WIRED & SET | AUTONOMOUS WIFI NETWORK | Bluetooth | TEACHING RESSOURCES STUDENTS / TEACHER

Chassis on wheels. Weight: 65 kg
Dimensions: 1200 x 650 x 1860mm.
2 12mm melamine panels with an area of 1200 x 1600mm.
Power supply by 3 m 2P + E 230VAC 50Hz power cord.
The model is delivered wired and ready to operate.



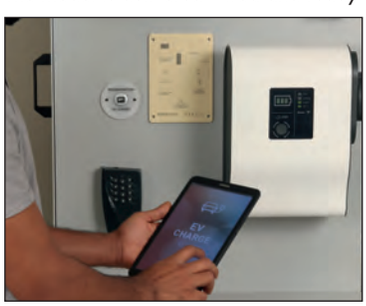
The charging station communicates via Wifi or Bluetooth.The locally created wifi network is specific to the model. It is isolated from the WiFi network of your establishment.

COMPACT VERSION FOR PROGRAMMING

ref. BORNELEC2-M

DELIVERED WIRED & SET | AUTONOMOUS WIFI NETWORK | Bluetooth | TEACHING RESSOURCES STUDENTS / TEACHER

Chassis on wheels. Weight: 80 kg
Dimensions: 750 x 730 x 1840mm.
2 19mm melamine panels with an area of 1400 x 670mm.
Power supply by 3 m 2P + E 230VAC 50Hz power cord.
The model is delivered wired and ready to operate.

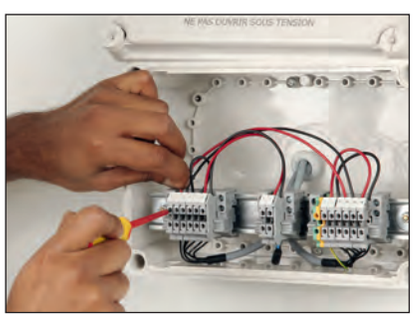


The charging station communicates via Wifi or Bluetooth.The locally created wifi network is specific to the model. It is isolated from the WiFi network of your establishment.

PRACTICAL WORKS	REFRENCES	
	BORNELEC1-M	BORNELEC2-M
Wiring a switch	✔	
Wiring a programmable keyboard	✔	
Wiring a clock	✔	
Wiring of a control circuit of a charging station	✔	
Cutting IRO / IRL tubes	✔	
Removal and installation of IRO / IRL tubes	✔	
Clock setting	✔	
Configuration of the RFID keyboard (daily use, user management, choice of operation by code, bage, keyboard, keyboard + RFID badges)	✔	✔
Creation of the maintenance book for a charging station	✔	✔
Performing checks of standard NFC 15100	✔	✔
Discovery of E.V ready self-checking sheets	✔	✔
Analysis of the signals received by the charging station (presence of voltage, charge with and without fan, error) using the simulator provided and an oscillocope.	✔	✔
Wifi switch configuration	✔	✔
Configuration of the charging station in wifi thanks to the Webserver integrated in the terminal (visualization of operating status, configuration of the kit communication, choice of charging mode, time programming, history, intensity setting, locking, charging stop, etc.)	✔	✔
Operation of the free EVCharge application in Bluetooth (history, cost of consumption, display of the state of the charging station)	✔	✔

Components on the panels	BORNELEC1-M	BORNELEC2-M
3.7 kW to 4.5 kW single-phase electric charging station (one mode 3 type 2 socket) with integrated web server allowing the setting of the station via the Wifi switch or operation by the user via Bluetooth. Application to download free from Play Store® or Apple Store®	✔	✔
RJ45 Wifi switch (connection on 2P + E socket)	✔	✔
Code keyboard with USB port for programming via the software supplied with the model (3 operating modes per RFID badge and / or code)	✔	✔
USB socket for keyboard programming	✔	✔
2P + E surface mounting socket	✔	✔
Waterproof modular electric panel	✔	✔
Differential circuit breaker 30mA	✔	✔
Undervoltage coil	✔	✔
Modular contactor	✔ (2)	✔ (1)
Surge arrester	✔	✔
Clock	✔	
Surface switch	✔	
Box containing industrial terminals for wiring components in 12Vdc	✔	
IRO / IRL tubes for cable passage	✔	
3D screen-printed side representing a car garage	✔	
Melamine tablet (PC support, oscilloscope ...)		✔

Supplied accessories	BORNELEC1-M	BORNELEC2-M
1 electric vehicle charging station tester to measure, test and simulate signals from an electric vehicle. BNC terminal allows you to observe these signals using an oscilloscope	✔	✔
2 RJ 45 cords (1 meter and 3 meters))	✔	✔
1 communication cable for programming the keyboard via a PC	✔	✔
2 RFID badges for the keyboard	✔	✔
Keyboard programming software	✔	✔
6m of IRO / IRL tube	✔	



Control and components wiring for BORNELEC1-M (back panel)

Charging station tester delivered with the model.

STUDY SYSTEME FOR THE KNX BUS - COMPLETE SOLUTION

Ref. QUICK-KNXPLUS

DELIVERED SET | TEACHING RESOURCES STUDENT / TEACHER

With "KNX PARTNER" certified manufacture, the QUICK-KNX model enables the study and putting into service of multibrand KNX products, SCHNEIDER® and HAGER® (other on request). The KNX devices are prepared in plastic housings with the front engraved and equipped with Ø4mm terminals.

EDUCATIONAL OBJECTIVES

- ***Studying KNX communication media***
- ***Studying the principle of a home control installation with KNX devices***
- ***Configuration of KNX devices***
- ***Creating the wiring of KNX devices***
- ***Creating home control scenarios***

Proposed Practical Works

- Creation of the complete wiring diagram
- Study the creation of KNX wiring and programming for the functions of lighting control, shutter and opening control using pushbuttons
- Creation of home control scenarios like using a single key to switch off the lights, lower the blinds and open the garage door and the gate
- Combine several different brands makes with the same KNX standard

Comprises

- 1 30V power supply module for the bus
- 1 USB interface module for programming from a PC
- 2 4-key pushbutton modules with indicator lights (1 per brand)
- 1 2-key pushbutton module with indicator lights
- 1 universal pushbutton interface module
- 1 Presence detector module
- 1 4-output switch actuator module
- 1 2-outputs switch actuator module
- 1 2-outputs control actuator module
- 1 1-outputs control actuator module
- 1 2-outputs roller blind actuator module
- 1 Module with printing and signalling for two roller blinds
- 1 Module with printing and signalling for opening / closing gate and garage
- 4 Modules for bulkhead lights 60W – 230VAC
- Software ETS lite
- 1 frame with wheels (H x W x D): 1610 x 940 x 500mm equipped with rack for cords (30 fingers)
- 1 single-phase power console:

- 1 thermal magnetic circuit breaker (16A) - 1 Emergency stop push button with key
- 1 Push button + LED indicator - 1 230V single-phase output on 4mm safety terminals
- 2 230Vac sockets (2P + E) + 12 230Vac sockets (2P + E), at the back

- 1 set of safety leads for carrying out the different practical works.

Sockets on the back of the console for connecting the modules

KNX HEATING CONTROL

- 2-key pushbutton module with indicator light.
- Thermostat module with programming screen + keys.
- 2-output switch actuator module.
- Resistive load module 320W – 230VAC + indicator light.

ref. DOMO-1

KNX TOUCH SCREEN CONTROL

The touch screen is used to view the states and control the KNX functionalities

- 7" touch screen (17.8cm) 65000 colours.
- Power supply 230VAC 50-60Hz.
- USB port
- LAN interface (10/100 Mbit/s)

ref. DOMO-2

OPTIONS FOR QUICK-KNXPLUS ONLY

HEAT SENSOR
HAGER®

LIGHT SENSOR
SCHNEIDER®

ref. DOMO-4

COMMUNICATING MODULE FOR SMARTPHONE AND TABLET

RÉSEAU WIFI AUTONOME

ref. COM-KNX

- InSideControl gateway module with power supply
- WiFi switch module

The InSideControl gateway links the KNX installation to the IP network (LAN).
Up to 5 smartphones / tablets can control the installation using the InSideControl App/HD App, available for IOS and Android. The gateway can be used as access interface to the bus (e.g. for. The functionalities of the application are configured with the InSideControl Builder software supplied. Smartphones or tablets communicate with KNX devices by WiFi. Smartphone and InSideControl App/HD App are not supplied.

Study of the KNX bus – Autonomous subassemblies

Frame : Height 610mm - Width 590mm.
Each reference is supplied with a lot of safety leads for wiring the modules.
General power supply via 230VAC mains lead of 1.5m provided.

Study of lighting control by pushbutton
- 1 bus power supply module 30V + USB interface.
- 1 pushbutton module, four keys with indicator lights.
- 1 switch actuator module, 2 outputs.
- 2 Bulkhead lighting modules 60W – 230VAC.

ref. QUICK-AK1 with frame

Study of variation lighting control by pushbutton
- 1 bus power supply module 30V + USB interface.
- 1 4-key pushbutton module with indicator lights.
- 1 variation actuator module, 2 outputs.
- 2 Modules for bulkhead lights 60W – 230VAC.

ref. QUICK-AK2 with frame

Study of lighting control by presence detector
- 1 bus power supply module 30V + USB interface.
- 1 presence detector module.
- 1 switch actuator module, 2 outputs.
- 2 Modules for bulkhead lights 60W – 230VAC.

ref. QUICK-AK3 with frame

Study of roller blind control by pushbutton
- 1 bus power supply module 30V + USB interface.
- 1 4-key pushbutton module with indicator lights
- 1 roller blind actuator module, 2 outputs.
- 1 module with diagram and signalling of two roller blinds.

ref. QUICK-AK4 with frame

Study of opening control of gate and garage door
- 1 bus power supply module 30V + USB interface.
- 1 4-key pushbutton module with indicator lights.
- 1 switch actuator module, 2 outputs.
- 1 module with diagram and signalling, opening/closing gate and garage.

ref. QUICK-AK5 with frame

ADDITIONAL MODULE
REF. COM-KNX
to make these subsets communicating smartphone and tablet

KNX TECHNOLOGY - STUDY OF WIRING AND PROGRAMMING

Specially designed for study and training in the KNX automation technology present in residential and tertiary premises as part of RT2012, these instructional solutions enable the acquisition and validation of the skills in a realistic eco-responsible environment.

EDUCATIONAL OBJECTIVES

- **To learn about the HOME AUTOMATION environment of an electrical installation**
- **To learn about and study the functionalities of a Schneider® KNX home automation installation**
- **To understand the specifications of an electrical installation**
- **To produce electrical diagrams**
- **To create a parts list of components and analyse manufacturer technical datasheets**
- **To install electrical equipment, route conductor cables, electrical ducts, etc.**
- **To wire and physically connect different electrical components**
- **To configure the KNX components**
- **To put the installation into service**
- **To perform electrical troubleshooting**

TEACHING FILE SUPPLIED

Teaching instructions in English on DVD-rom format Teacher / Students, including:

- Technical instructions, manufacturer resources for KNX components
- Extracts of electrical standards
- Layout diagram of the components
- Electric wiring diagram
- Different KNX installation programs
- Educational activities (6 dor DP1 / 12 for DP3) to create scenarios in order to optimize the operation of the installation while preserving the comfort of the occupant.
- Questionnaires for skills assessments of the question / answer type (under Excel® software). An administrator password allows the teacher to correct the student's assessment and modify the questions / answers if necessary

OPTION TABLET WIFI 9.6'' CONFIGURED

ref. TAB-97

Software installed and configured

Samsung® Tablet
Minimum features:

- Wifi 9.6 inch full HD touch
- 1.3Ghz
- 1.5GB RAM
- 8GB storage

1 PANEL SYSTEM – 2 SCREEN PRINTED FACES

ref. DP1-KNX

DELIVERED WIRED AND SET | AUTONOMOUS WIFI NETWORK | TEACHING RESSOURCES STUDENTS / TEACHER | REAL ELECTRICAL COMPONENTS

COMPOSITION OF THE SYSTEM DP1-KNX

2-panel aluminium structure

Mobile structure on pivoting casters with brake and rotation locking, composed of two screenprinted panels 1200 x 1600mm. The assembly is 1800mm high for moving from room to room. A system of hinges and casters allows the back face to be opened to facilitate wiring.

Panel 1 equipment

- Screenprinted image of indoor wall of dwelling entrance
- 1 LED light 230V
- 1 halogen light 230V-40W
- 1 heater 500W with control wire.
- 1 modular panel integrating:
  - 1 RC circuit-breaker 30mA
  - 2 thermal-magnetic circuit breakers 10A
  - 1 thermal-magnetic circuit breaker 16A
  - 1 KNX bus power supply 320mA 32 devices
  - 1 programming/connection interface USB/KNX
  - 1 KNX actuator, two outputs for roller shutter
  - 1 KNX actuator 2x230V for electric heating
  - 1 KNX actuator 4x230V for lighting control
  - 1 KNX dimmer actuator 2x300W for halogen/LED lights
- 1 KNX thermostat with screen and buttons (comfort mode, night mode, eco mode, set point T°C)
- 3 KNX pushbuttons, 2 buttons
- 1 socket 2P+E, 230V.
- 1 flush-mounted box for making the interconnections of the devices.

Panel 2 equipment

- Screenprinted image of outer wall of dwelling with window
- 1 light 230V-40W
- 1 halogen light 150W.
- 1 electric roller shutter 230V.
- 1 weatherproof socket 2P+E, 230V.

Delivered fully wired and parameterized, with a software ETS5 Lite (1 license) to design and configure the KNX system components and a WiFi switch to communicate with tablet or smartphone.

3-PANEL SYSTEM - 3 SCREEN PRINTED FACES

Dimensions fully unfolded: L 4400mm x D 400mm x H 1800mm
Dimensions folded: L 1500mm x D 1800mm x H 1800mm

ref. DP3-KNX-C

DELIVERED WIRED AND SET | AUTONOMOUS WIFI NETWORK | TEACHING RESSOURCES STUDENTS / TEACHER | REAL ELECTRICAL COMPONENTS

ref. DP3-KNX **Version not wired with components delivered as a kit**

AUTONOMOUS WIFI NETWORK | TEACHING RESSOURCES STUDENTS / TEACHER | REAL ELECTRICAL COMPONENTS

The aluminium structure of the frame allows ICTA ducts to run the whole height of the panel. The surfaces (12mm thick) of a panel are separated by 120mm which is very convenient for integrating the electrical components, partition pots 50mm and other embedded connection boxes. The different panels are fixed using a ¼ turn screw system for easy mounting/dismounting of the teaching sequences.

Panel 1 equipment
- Screenprinted image of indoor wall of dwelling entrance
- 1 light 230V
- 1 convector 500W
- 1 building technical duct
- 1 flush-mounted box for making the interconnections of the devices.
- 2 pots for hollow partition

Panel 2 equipment
- Screenprinted image of living room wall of a dwelling
- 2 LED lights
- 3 flush-mounted boxes for making the interconnections of the devices.
- 3 boxes for hollow partition

Panel 3 equipment
- Screenprinted image of outer wall of dwelling with window
- 2 halogen type outdoor lights
- 1 electric roller shutter
- 1 flush-mounted box for making the interconnections of the devices.
- 1 surface-mounted weatherproof socket 230V 2P+E

Foldable and mobile structure

Disassembly of plates

Easy ICTA sheaths passing

COMPOSITION OF THE SYSTEM DP3-KNX

3-panel aluminium structure
Mobile structure on pivoting casters with brake and locking, composed of three screenprinted panels 1200 x1600mm.
Hinges allow the assembly to be opened and closed like a screen. You can position the assembly to allow for your room constraints, each panel can be oriented separately from the others.

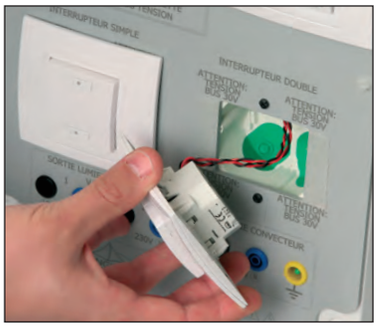
A set of electrical protection devices
- 1 RC circuit-breaker 30mA
- 1 thermal-magnetic circuit-breaker Uni+ Neutral rated 2A.
- 2 thermal-magnetic circuit-breakers Uni+ Neutral rated 10A.
- 2 thermal-magnetic circuit-breakers Uni+ Neutral rated 16A.

One set of KNX components from Schneider® and HAGER®
- 1 KNX bus power supply 320mA 32 devices
- 1 programming/connection interface USB/KNX
- 1 KNX actuator, two outputs for roller shutter
- 1 KNX actuator 2x230V for electric heating
- 1 KNX actuator 2x230V for power outlets
- 1 KNX actuator 4x230V for lighting control
- 1 KNX dimmer actuator 2x300W for halogen/LED lights
- 6 KNX pushbuttons (3x4 buttons and 3x2 buttons)
- 1 KNX thermostat with screen and buttons (comfort mode, night mode, eco mode, set point T°C)
- 1 ETS5 Lite software (1 licence) for designing and configuring the components of the KNX system.
- 1 KNX/IP gateway Inside Control
- 1 3-way energy meter 230V/16A
- 1 power supply 24VDC for KNX/IP gateway

A set of electric components
- 1 building technical duct with modular panel with 4 rows of modules and VDI unit with space for broadband box.
- 2 mains power outlets 2P+E modular
- 5 lights 230V including 2 with LEDs.
- 2 halogen type outdoor lights
- 1 convector 500W.
- 1 electric roller shutter 230V.
- 2 mains power outlets 2P+E for flush mounting.
- 1 mains power outlet 2P+E surface-mounted weatherproof
- 100m of ICTA duct D16mm
- 100m of ICTA duct D20mm
- 4 reels of 100m rigid wire 1.5mm² (Blue, Black, Red, G/Y)
- 4 reels of 100m rigid wire 2.5mm² (Blue, Black, Red, G/Y)
- 100m EIB KNX bus cable. (already installed on wired version)
- 5 junction boxes.
- 10 dry partition boxes.
- 7 flush mounting boxes, weatherproof.
- 1 set of WAGO terminal blocks

A set of IT components
- 1 VDI unit mounted in the building technical duct with space for broadband box.
- 4 RJ45 connectors
- 10 RJ45 leads for VDI patching.
- 1 RJ45 socket cat 6
- 25m of 4-pair cable F/UTP Cat6 for RJ45
- 1 NETGEAR WIFI router configured for local WiFi use specific to the system (no connection to the computer network or WiFi of your organisation).
  This router is for connecting a tablet or a smartphone to the KNX network so that students can measure consumption and control the installation remotely.

KNX TECHNOLOGY – INTRODUCTORY CASE FOR THE KNX BUS



Pushbuttons are easily removable without a tool to facilitate access to the programming buttons.

Case with ergonomic handle.
Dimensions 534 x 374 x 190mm.
Power supply 230V-2P + E.

Learn about KNX building automation technology quickly and easily with this simple, intuitive model. This instructional solution enables acquisition and validation of the skills for the diploma in Electricity and Connected Environments, in a simple home automation environment. Ideal for introducing your students quickly and clearly!

Safe wiring on 4mm terminals.
Identifying information for components and other technical features are printed on the sides. Operational status of NETATMO Céliane™ components (rolling shutter and lighting) are displayed directly on LEDs integrated in the case.
With the communicating version, an energy meter integrated in the system can indicate the power consumed by the spotlight and display it directly on your tablet or smartphone.
A WiFi switch + IP interface unit lets the student measure consumption and control the installation from a tablet or smartphone. The WiFi network created locally is specific to the model, so it is isolated from your institution's WiFi network.

VALDOM-KNX and **VALDOM-KNX-C** are delivered completely configured.
Delivered with ETS Lite software for programming the model.
Teaching instructions on DVD in Instructor / Student format, including:
- Technical instructions, manufacturer resources for KNX components
- Excerpts of electrical standards
- Layout diagram of the components
- Electrical wiring diagram
- Video tutorials to teach KNX programming simply.
- Different KNX installation programmes
- Learning activities that allow you to create scenarios in order to optimise the installation's operation, while preserving the occupant's comfort.
- Q/A-type skill assessment sheets in Excel® software.
  An administrator password lets the instructor correct the student's assessment and modify the questions/answers as required.

OPTION TABLET WIFI 9,6'' CONFIGURED

Samsung® tablet
- Wifi 9,6 pouce touch Full HD
- 1,3Ghz / 1,5Go RAM
- 8Go

ref. TAB-97

ref. VALDOM-KNX	**Standard version without Wifi**
ref. VALDOM-KNX-C	**Communicating version**

SUPPLIED FULLY WIRED AND CONFIGURED | AUTONOMOUS WIFI NETWORK | TEACHING RESOURCES STUDENT / TEACHER | SIMULATED ELECTRICAL COMPONENTS

EDUCATIONAL OBJECTIVES

- **To learn about the HOME AUTOMATION environment of an electrical installation**
- **To learn about and study the features of a KNX home automation installation**
- **To understand the specifications of an electrical installation**
- **To produce electrical diagrams**
- **To create a parts list of components & analyse manufacturer technical data sheets**
- **To configure the KNX components**
- **To put installation into service**
- **VALDOM-KNX-C only : To configure the WiFi network**

TEACHING RESOURCES WITH PRACTICAL WORKS

COMPOSITION OF THE CASE

On the upper side
- 5 LEDs with 2x 4mm power supply terminals simulating: Garden lighting; Kitchen lighting; Dining room lighting; Living room lighting; Room lighting
- 1 60W wall light for lighting variation and power measurement.
- 2 "Up and Down Roller Shutter" LEDs with 4x 4mm power supply terminals.
- 1 pushbutton 2 keys with LEDs. KNX
- 1 push button 4 keys with LEDs. KNX
- 1 3-way energy meter. KNX (Communicating version only)
- 1 roller shutter actuator. KNX
- 1 thermostat with programming screen + keys. KNX

On the lower side
- 1 USB interface for programming. KNX
- 1 BUS supply 30V-320mA. KNX
- 1 KNX Ethernet interface for WIFI communication. (Communicating version only)
- 1 actuator 2x digital outputs supply for convector (16A). KNX
- 1 actuator 2x digital outputs lighting supply (10A). KNX
- 1 actuator 2x dimming lighting outputs. KNX
- 4mm safety terminals for wiring all components
- 1 230V mains socket.
- 1 Ph+N 10A (C curve) circuit breaker with its 30mA residual current block.
- 1 socket with switch + protection for connecting the 230V mains cable.

1 configured WiFi router (VALDOM-KNX-C only) Local WiFi specific to the system

KNX TECHNOLOGY – INTRODUCTORY MODEL FOR THE KNX BUS

Learn about KNX building automation technology quickly and easily with this simple, intuitive model. This instructional solution enables acquisition and validation of the skills for the diploma in Electricity and Connected Environments, in a simple home automation environment. Ideal for introducing your students quickly and clearly!

All the KNX modules, as well as the configurable pushbuttons and room thermostat, are integrated in a modular panel fixed to an aluminium frame easy to set up on a table. A connection interface with 4mm safety terminals can connect 2 230V bulkhead lights provided with the model. Statuses of KNX component operation (lighting and roller shutter) are displayed directly on each module.

Two other terminals (on the communicating version only) enable connection of a convector or any other load (not supplied). The power will display directly on your tablet or smartphone. A WiFi switch + IP interface unit lets the student measure consumption and control the installation from a tablet or smartphone. The WiFi network created locally is specific to the model,so it is isolated from your institution's WiFi network.

COMPOSITION OF THE MODEL

- 2 40W bulkhead lights
- 1 tertiary panel attached to the aluminium frame including:
  - 1 Ph+N C10A circuit-breaker with its residual current device
  - 1 Ph+N C2A circuit-breaker
  - 1 30V-320mA power supply module. KNX
  - 1 USB interface module. KNX
  - 1 module, 2 on/off outputs, power supply for convector (16A). KNX
  - 1 module, 2 on/off outputs, light power supply (10A). KNX
  - 1 module, 2 variable outputs. KNX
  - 1 rolling shutter module. KNX
  - 1 4-key pushbutton. KNX
  - 1 2-key pushbutton. KNX
  - 1 thermostat with screen. KNX
  - 6 4mm safety terminals to connect the 2 bulkhead lights and 1 load
  - 1 wattmeter module. (MAQ-KNX-C only)
  - 1 KNX Ethernet interface. (MAQ-KNX-C only)
- **1 configured WiFi router (MAQ-KNX-C only)**

Pushbuttons are easily removable without a tool to facilitate access to the programming buttons.

Dims : H780 x 210 x 280mm

EDUCATIONAL OBJECTIVES

- To learn about the HOME AUTOMATION environment of an electrical installation
- To learn about and study the features of a KNX home automation installation
- To understand the specifications of an electrical installation
- To produce electrical diagrams
- To create a parts list of components and analyse manufacturer technical data sheets
- To configure the KNX components
- To put installation into service

MAQ-KNX-C only

- To configure the WiFi network for control via tablet or smartphone

ref. MAQ-KNX

ref. MAQ-KNX-C **Communicating version**

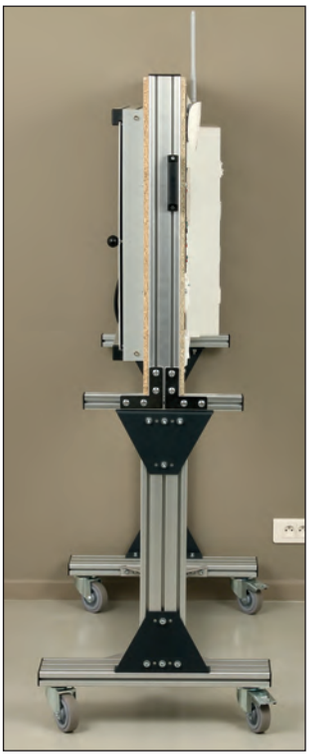
SUPPLIED FULLY WIRED AND CONFIGURED | AUTONOMOUS WIFI NETWORK | TEACHING RESOURCES STUDENT / TEACHER

TEACHING RESOURCES WITH PRACTICAL WORKS

MAQ-KNX and **MAQ-KNX-C** are delivered completely configured.
Delivered with ETS Lite software for programming the model.
Teaching instructions on DVD in Instructor / Student format, including:

- Technical instructions, manufacturer resources for KNX components
- Excerpts of electrical standards
- Layout diagram of the components
- Electrical wiring diagram
- Video tutorials to teach KNX programming simply.
- Different KNX installation programs
- Learning activities that allow you to create scenarios in order to optimise the installation's operation, while preserving the occupant's comfort.
- Excel question / answer skills assessment forms. An administrator password allows the teacher to correct the student's assessment and modify the questions / answers if necessary.

KNX TECHNOLOGY - COMPLETE CONNECTED HOUSE



Learn about KNX multi-brand home automation technology quickly and easily with this complete model of connected house.
This instructional solution enables acquisition and validation of the skills for the diploma in Electricity and Connected Environments, in a simple home automation environment. Ideal for introducing your students quickly and clearly!

A chassis with wheels in aluminum profile
• Dimensions: (W)1200 x (D)700 x (H)1700mm - Weight: 92kg

ref. MCP-KNX-R	Version with wheels

DELIVERED WIRED AND SET | AUTONOMOUS WIFI NETWORK | TEACHING RESSOURCES STUDENTS / TEACHER

PARTNER KNX

Un châssis en profilé aluminium à poser sur une table
• Dimensions: (W)1200 x (D)410 x (H)845mm - Weight: 68kg

ref. MCP-KNX	Version à poser

DELIVERED WIRED AND SET | AUTONOMOUS WIFI NETWORK | TEACHING RESSOURCES STUDENTS / TEACHER

EDUCATIONAL OBJECTIVES

- ***To learn about the HOME AUTOMATION environment of a simulated electrical installation***
- ***To learn about and study the features of a KNX multi-brand home automation installation (Schneider / Hager)***
- ***To understand the specifications of an electrical installation***
- ***To produce electrical diagrams***
- ***To create a parts list of components***
- ***To analyze manufacturer technical datasheets***
- ***To configure the KNX components***
- ***To perform wiring and connection of electrical components in jumper wires on industrial terminals to avoid wear of component terminals***
- ***To put installation into service***
- ***To configure the WiFi network for control via tablet or Smartphone***

TEACHING FILE SUPPLIED

Teaching instructions in English on DVD-rom format Teacher / Students, including:
- Educational activities to create scenarios in order to optimize the operation of the installation while preserving the comfort of the occupant.
- Worksheets for skills assessment
- Technical instructions, KNX component manufacturer resources + Extracts of electrical standards + different wiring diagrams depending on the progress of the Practical Work
- Technical instructions, manufacturer resources for KNX components
- Different KNX installation programs

OPTION TABLET WIFI 9,6'' CONFIGURED

Samsung® tablet
- 9.6 inch touch screen Full HD
- 1.3Ghz / 1.5Gb RAM
- 8GB

ref. TAB-97

COMPOSITION

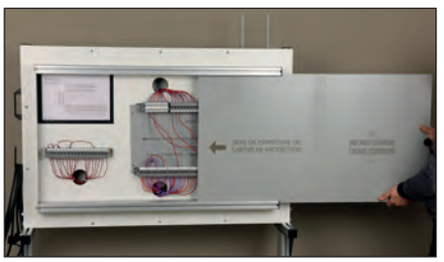
front Face

- 1 KNX infrared detector
- 4 KNX programmable 4-button switches
- 1 KNX programmable 4-button switch
- 1 KNX programmable thermostat with display and keys (comfort mode, night mode, Eco mode, setpoint T °C)
- 1 simple two-way switch of standard habitat type
- 1 KNX universal adapter (example of use for houses to renovate)
- 1 WIFI router configured (system-specific local WIFI)
- 1 remote control
- 1 AC power cord
- 1 Image of a connected home composed of:
  - 1 LED light for simulating a strike
  - 2 LEDs for opening / closing simulation a garage door
  - 2 LEDs for opening / closing simulation a portal
  - 1 LED "running" simulation light of a watering pump
  - 8 LEDs for simple lighting simulation
  - 8 LEDs for opening / closing simulation of 4 shutters
  - 1 LED "ON" simulation light of a convector
  - 1 simulation lamp of a variable lighting
  - 1 simulation lamp of a controlled power socket
- 1 modular table composed of:
  - 1 differential circuit breaker 20A - 30mA
  - 1 circuit breaker 16A (modular socket circuit)
  - 5 circuit breakers 10A (heating circuit, circuit lighting, circuit shutters, controlled socket circuit, opening circuit and watering)
  - 2 modular sockets
  - 2 modular remote switches
  - 1 KNX bus supply (320mA) for 32 devices
  - 1 24VDC power supply for the KNX / IP gateway
  - 1 KNX gateway / IP Inside Control
  - 1 programming interface / USB / KNX connection
  - 1 KNX dimming actuator 1x300W for halogen / LED lighting
  - 1 KNX actuator 4x230V for control simulated lighting
  - 2 KNX actuators 2x230V for control simulated lighting
  - 1 KNX actuator 2x230V for electric heating simulated
  - 1 KNX actuator 2x230V for simulated power sockets
  - 2 KNX actuators with two outputs for simulated rolling shutter
  - 1 KNX actuator 2x230V for openings control and simulated watering
  - 1 KNX actuator 2x230V for simulated opening
  - 1 ETS5 Lite software (1 license) to design and configure the KNX system components.

Back side

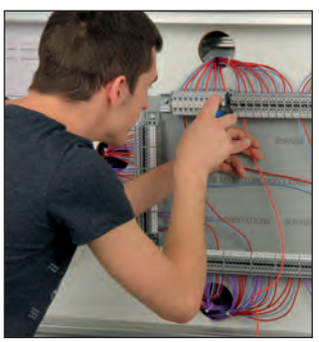
- 1 removable side with warning sign
- 1 KNX bus terminal block
- 1 KNX 230V terminal block
- 1 power terminal block
- 1 receiver terminal block
- 1 wiring diagram

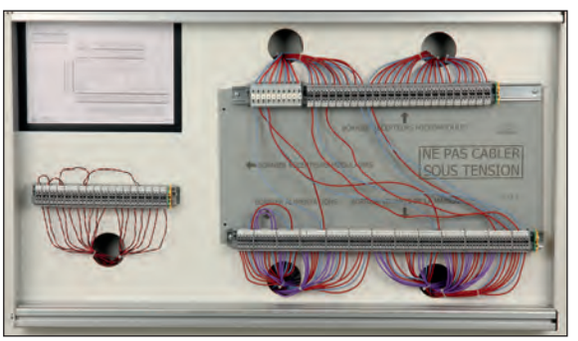
The set of switches of habitat type and KNX are integrated on the front panel.
A translucent plate on the universal adapter, covers the connectors and protects electrical contacts, only the programming buttons remain accessible.
The push buttons are very easily removable to facilitate access for programming.



The components are wired on the rear panel via industrial terminals to prevent wear of the component terminals.

A housing protects access to industrial terminals during live tests. Removable wiring diagram.





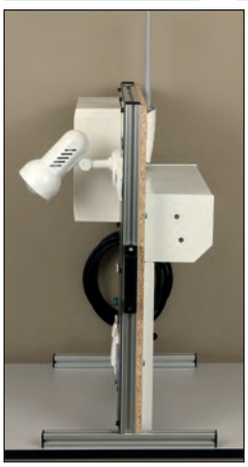
Rear panel with protective cover removed for wiring.

Supplied with a KNX remote control

KNX TECHNOLOGY - CONNECTED HOUSE

ref. MC-KNX-1

SUPPLIED FULLY WIRED AND CONFIGURED | AUTONOMOUS WIFI NETWORK | TEACHING RESOURCES STUDENT / TEACHER



Profile view

Back side

The micromodule is protected behind a transparent plate that covers the connectors and protects electrical contacts. Only the programming button remains accessible without disassembly.

Front side

The educational panel study of home automation systems of KNX type is a habitation of house type. Simple and intuitive, it makes it easy to discover this technology.
It offers educational features allowing the student:
- To observe, manipulate, assemble and disassemble
- To measure, evaluate characteristics
- To reproduce industrial schemes
- To understand and to interpret the mechanical, electrical, electronic operations...

EDUCATIONAL OBJECTIVES

- **Discovery of the KNX protocol**
- **Discovery of the ETS5 programming tool**
- **Getting started with the system and maintenance**

TEACHING FILE PROVIDED

Teaching instructions in Instructor / Students format (supplied on DVD and paper support), including:
- Educational activities to create scenarios
- Tutorials sheets for skills assessment.
- Technical instructions, manufacturer resources for KNX components
- Excerpts of electrical standards
- Layout diagram of the components
- Electrical wiring diagram

COMPOSITION

An aluminum profile frame
- Profile section 30 x 30mm
- Frame dimensions: 650 x 700 x 350mm

1 silkscreened front panel equipped with:
- 1 electric panel 1 row 18 modules
  - 1 residual current circuit breaker 25A of habitat type
  - 1 16A circuit breaker of habitat type
  - 1 circuit breaker 2A of habitat type
  - 1 KNX Power Supply
  - 1 variable lighting actuator
  - 1 actuator with 4 digital outputs (2 fixed lighting and one electric strike)
  - 1 USB / KNX interface
- 1 recessed roller shutter actuator
- 1 LED lighting spot for variable lighting
- 2 fixed LED lights (living room + bedroom)
- 1 LED light simulating the gate strike
- 1 KNX switch with 2-button (manages the variable and fixed lighting of the room)
- 1 KNX switch with 4-button (manages the fixed lighting of the living room, the electric lock and realize 2 scenarios).

1 white back side equipped with:
- 1 roller shutter
- 1 Wifi router to create a local Wifi network and control the installation from a Smartphone application (Wifi network specific to the model)
- 1 power socket 230V 2P+E to connect the Wifi router.

An "EASY" configuration kit from HAGI
- Allows KNX programming with PC or tablet.

MYHOME TECHNOLOGY - STUDY OF WIRING AND PROGRAMMING

1 PANEL SYSTEM – 2 SCREEN PRINTED FACES

Specially designed for study and training in the MYHOME automation technology present in residential and tertiary premises as part of RT2012, these instructional solutions enable the acquisition and validation of the skills in a realistic eco-responsible environment.

The frame is delivered assembled. Building technical duct, roller shutter, convector, lighting, recessed boxes are always integrated in the frame before departure.

ref. DP1-MH

DELIVERED WIRED AND SET | AUTONOMOUS WIFI NETWORK | TEACHING RESSOURCES STUDENTS / TEACHER | REAL ELECTRICAL COMPONENTS

EDUCATIONAL OBJECTIVES

- **To learn about the HOME AUTOMATION environment of an electrical installation**
- **To learn about and study the functionalities of a MyHome BUS / SCS Legrand® home automation installation**
- **To understand the specifications of an electrical installation**
- **To produce electrical diagrams**
- **To create a parts list of components and analyse manufacturer technical data sheets**
- **To install electrical equipment, route conductor cables, electrical ducts, etc.**
- **To wire and physically connect different electrical components**
- **To configure the MyHome BUS / SCS Legrand® components**
- **To put the installation into service**
- **To perform electrical troubleshooting**

TEACHING FILE SUPPLIED

Teaching instructions in English on DVD-rom format Teacher / Students, including:

- Technical manuals, manufacturer resources for MyHome components
- Extracts from electrical standards
- Component layout diagram
- Electrical wiring diagram
- 6x Educational activities to create scenarios in order to optimize the operation of the installation while preserving the comfort of the occupant.

OPTION TABLET WIFI 9.6'' CONFIGURED

ref. TAB-97

Software installed and configured

Samsung® Tablet
Minimum features:

- Wifi 9.6 inch full HD touch
- 1.3Ghz
- 1.5GB RAM
- 8GB storage

COMPOSITION OF THE SYSTEM DP1-MH

2-panel aluminium structure

Mobile structure on pivoting casters with brake and rotation locking, composed of two screenprinted panels 1200 x 1600mm. The assembly is 1800mm high for moving from room to room. A system of hinges and casters allows the back face to be opened to facilitate wiring.

Panel 1 equipment

- Screenprinted image of indoor wall of dwelling entrance
- 1 LED light 230V
- 1 light at 230V
- 1 heater 500W with control wire.
- 1 modular panel integrating:
  - 1 RC circuit-breaker 30mA
  - 3 thermal-magnetic circuit breakers 10A
  - 1 thermal-magnetic circuit breaker 16A
  - 1 power supply of MyHome bus 600mA.
  - 1 up-down modular actuator for MyHome roller shutter.
  - 1 modular interface for MyHome current measurement.
  - 1 modular interface for MyHome heating control.
  - 1 modular actuator for simple lighting
  - 1 modular actuator for variable lighting
  - 1 MyHome / IP Bus Gateway for remote control of the MyHome installation
- 1 thermostat for MyHome heating.
- 3 control actuator buttons with 2 MyHome Céliane relays
- 1 socket 2P+E, 230V.
- 1 flush-mounted box for making the interconnections of the devices.
- 1 audio/video web server for remotely controlling the MyHOME installation using web pages or using the Webserver MyHOME portal for free download on Android or Apple. One WiFi switch is supplied with the web server to control the setup directly from your smartphone or tablet.

Panel 2 equipment

- Screenprinted image of outer wall of dwelling with window
- 1 light 230V
- 1 halogen light
- 1 electric roller shutter 230V.
- 1 weatherproof socket 2P+E, 230V.

MYHOME TECHNOLOGY - STUDY OF WIRING AND PROGRAMMING

3-PANEL SYSTEM - 3 SCREEN PRINTED FACES

Specially designed for study and training in the MyHome BUS/SCS LEGRAND®automation technology present in residential and tertiary premises as part of RT2012, these instructional solutions enable the acquisition and validation of the skills in a realistic eco-responsible environment.

MY HOME legrand

The frame is delivered assembled. Building technical duct, roller shutter, convector, lighting, recessed boxes are always integrated in the frame before departure.

Dimensions fully unfolded: L 4400mm x D 400mm x H 1800mm
Dimensions folded: L 1500mm x D 1800mm x H 1800mm

ref. DP3-MH-C

DELIVERED WIRED AND SET | AUTONOMOUS WIFI NETWORK | TEACHING RESSOURCES STUDENTS / TEACHER | REAL ELECTRICAL COMPONENTS

ref. DP3-MH ***Version not wired with components delivered as a kit***

AUTONOMOUS WIFI NETWORK | TEACHING RESSOURCES STUDENTS / TEACHER | REAL ELECTRICAL COMPONENTS

EDUCATIONAL OBJECTIVES

- **To learn about the HOME AUTOMATION environment of an electrical installation**
- **To learn about and study the functionalities of a MyHome BUS / SCS Legrand® home automation installation**
- **To understand the specifications of an electrical installation**
- **To produce electrical diagrams**
- **To create a parts list of components and analyse manufacturer technical data sheets**
- **To install electrical equipment, route conductor cables, electrical ducts, etc.**
- **To wire and physically connect different electrical components**
- **To configure the MyHome BUS / SCS Legrand® components**
- **To put the installation into service**
- **To perform electrical consumption measurements**
- **To perform electrical troubleshooting**

TEACHING FILE SUPPLIED

Teaching instructions in English on DVD as Instructor / Students, including:

- Technical instructions, manufacturer resources for MyHome components
- Extracts of electrical standards
- Layout diagram of the components
- Electric wiring diagram
- Different KNX installation programs
- 12 Educational activities to create scenarios in order to optimize the operation of the installation while preserving the comfort of the occupant.

OPTION TABLET WIFI 9.6'' CONFIGURED

ref. TAB-97

Software installed and configured

Samsung® Tablet
Minimum features:

- Wifi 9.6 inch full HD touch
- 1.3Ghz
- 1.5GB RAM
- 8GB storage

The aluminium structure of the frame allows ICTA ducts to run the whole height of the panel. The surfaces (12mm thick) of a panel are separated by 120mm which is very convenient for integrating the electrical components, partition pots 50mm and other embedded connection boxes. The different panels are fixed using a ¼ turn screw system for easy mounting/dismounting of the teaching sequences.

Panel 1 equipment

- Screenprinted image of indoor wall of dwelling entrance
- 1 light 230V
- 1 convector 500W
- 1 building technical duct
- 1 flush-mounted box for making the interconnections of the devices.
- 3 pots for hollow partition

Panel 2 equipment

- Screenprinted image of living room wall of a dwelling
- 2 LED lights
- 1 flush-mounted box for making the interconnections of the devices.
- 5 boxes for hollow partition

Panel 3 equipment

- Screenprinted image of outer wall of dwelling with window
- 2 halogen type outdoor lights
- 1 electric roller shutter
- 1 flush-mounted box for making the interconnections of the devices.
- 1 surface-mounted weatherproof socket 230V 2P+E

Foldable and mobile structure

Disassembly of plates

ICTA sheaths passing

COMPOSITION OF THE SYSTEM DP3-MH

3-panel aluminium structure
Mobile structure on pivoting casters with brake and locking, composed of three screenprinted panels 1200 x1600mm. Hinges allow the assembly to be opened and closed like a screen. You can position the assembly to allow for your room constraints, each panel can be oriented separately from the others.

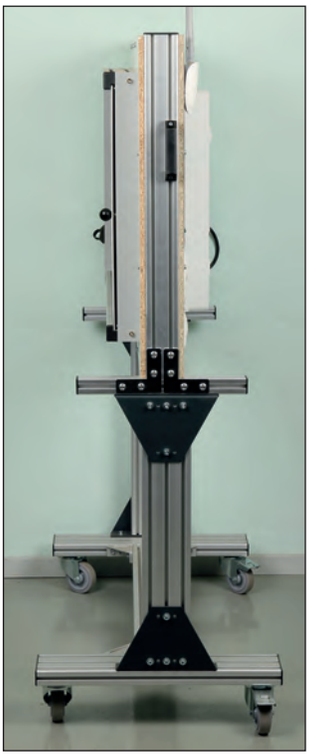
A set of electrical protection devices
- 1 RC circuit-breaker 30mA
- 1 thermal-magnetic circuit-breaker Uni+ Neutral rated 2A.
- 3 thermal-magnetic circuit-breakers Uni+ Neutral rated 10A.
- 1 thermal-magnetic circuit-breaker Uni+ Neutral rated 16A.

A set of MyHome BUS / SCS Legrand® components
- 1 touch screen 3.5" colour for managing shutter, lighting, etc.
- 1 power supply of BUS SCS 27V 600mA
- 1 actuator for roller shutter control
- 1 actuator for LED and halogen lighting control
- 1 actuator for variable lighting control
- 1 actuator for heater control
- 1 actuator to control power outlets 230V
- 1 module with 16 scenarios (integrated with the MyHome / IP Bus Gateway)
- 1 module, thermostat with screen for heater control
- 4 pushbuttons, 2 buttons
- 1 pushbutton, 1 button
- 1 data concentrator with Energy Data Logger with 3 current transformer to display consumption on your PC or on the touch screen.
- 1 set of jumpers for configuring the addresses of each component
- 1 MyHome / IP Bus Gateway

A set of electric components
- 1 building technical duct with modular panel with 4 rows of modules and VDI unit with space for broad-band box.
- 2 mains power outlets 2P+E modular
- 5 lights 230V including 2 with LEDs and 3 halogen.
- 1 convector 500W.
- 1 electric roller shutter 230V.
- 1 mains power outlet 2P+E for flush-mounting.
- 100m of ICTA duct D16mm
- 100m of ICTA duct D20mm
- 4 reels of 100m rigid wire 1.5mm² (Blue, Black, Red, G/Y)
- 4 reels of 100m rigid wire 2.5mm² (Blue, Black, Red, G/Y)
- 100m MyHome LEGRAND bus cable
- 5 junction boxes.
- 8 pots for hollow partitions.
- 3 flush mounting boxes, weatherproof.
- 1 set of WAGO terminal blocks

A set of IT components
- 1 VDI unit mounted in the building technical duct with space for broadband box.
- 4 RJ45 connectors
- 10 RJ45 leads for VDI patching.
- 1 RJ45 socket cat 6
- 25m of 4-pair cable F/UTP Cat6 for RJ45
- 1 WIFI router configured for the use of a local WiFi system (no connection to the computer network or Wifi of your building). This router allows to connect a tablet or smartphone on the KNX network allowing the student to measure consumption and remote control the installation. The application is downloadable for free from '' Play Store '' or '' Apple Store ''

MY HOME TECHNOLOGY - COMPLETE CONNECTED HOUSE



Discover SCS Bus MyHome LEGRAND home automation technology quickly and easily with this complete model of a connected home. This educational solution allows the acquisition and the validation of the skills of this technology in a simple environment of the home automation.

A chassis with wheels in aluminum profile
• Dimensions : (W)1200 x (D)700 x (H)1700mm - Weight: 94 kg

ref. MCP-MH-R	Version with wheels

DELIVERED WIRED AND SET | AUTONOMOUS WIFI NETWORK | TEACHING RESSOURCES STUDENTS / TEACHER

MY HOME legrand

A chassis in aluminum profile to put on a tabl
• Dimensions : (W)1200 x (D)410 x (H)845mm - Weight: 70 kg

ref. MCP-MH	Version to put on a table

DELIVERED WIRED AND SET | AUTONOMOUS WIFI NETWORK | TEACHING RESSOURCES STUDENTS / TEACHER

EDUCATIONAL OBJECTIVES

- **Discover the Home Automation environment of a simulated electrical installation.**
- **Discover and study the features of a SCS Bus MyHome LEGRAND home automation system**
- **Understand the specifications of an electrical installation**
- **Make electrical diagrams**
- **Produce a components nomenclature**
- **Analyze the manufacturer datasheets**
- **Perform parameter setting of MyHome components**
- **Carry out the wiring and the connection of the electrical components to flying wires on industrial terminals to prevent wear of component terminals.**
- **Perform the commissioning of the installation**
- **Perform a WIFI network setting for control on tablet or Smartphone**

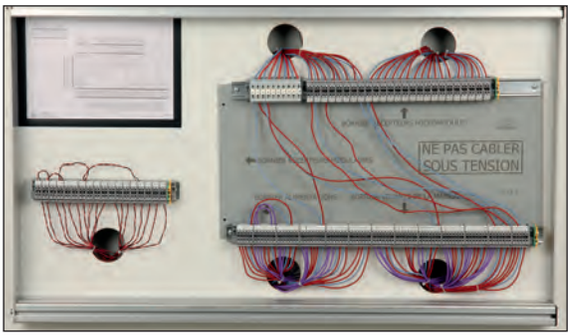
TEACHING FILE SUPPLIED

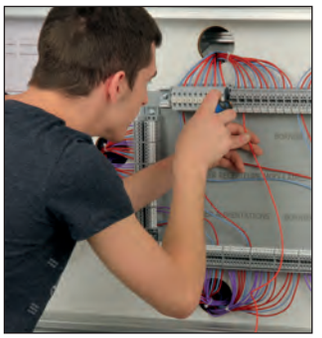
Teaching instructions in Instructor / Students format (supplied on DVD), including:
- Educational activities to create scenarios in order to optimize the operation of the installation while preserving the comfort of the occupant
- Tutorials sheets for skills assessment
- Technical instructions, manufacturer resources for MyHome components + Excerpts of electrical standards + different wiring diagrams according to the progress of the Practical Work
- Various programs for MyHome install

OPTION TABLET WIFI 9.6'' CONFIGURED

Samsung® tablet
- Wifi 9.6" touch screen Full HD
- 1.3Ghz / 1.5Gb RAM
- 8GB

ref. TAB-97





The components are wired on the rear panel via industrial terminals to prevent wear of the component terminals.
A housing protects access to industrial terminals during tests with power on. Removable wiring diagram.

COMPOSITION

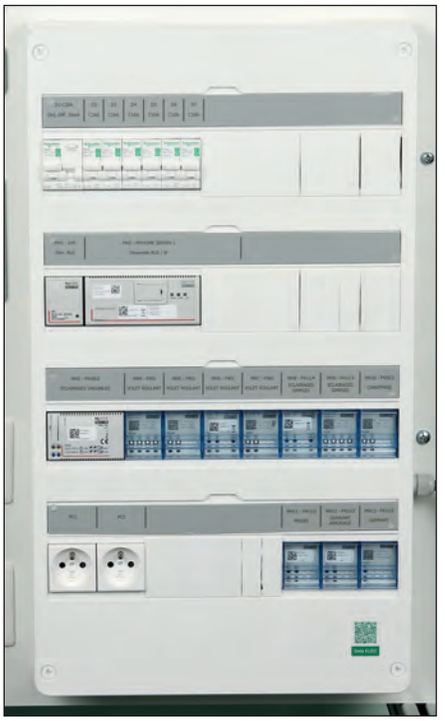
Front face

- 1 MyHome infrared detector
- 2 programmable MyHome switches 4 keys
- 5 programmable MyHome switches 2 keys
- 1 programmable MyHome switch 1 button
- 1 programmable MyHome thermostat with screen and keys
- 1 simple two-way switch, standard habitat type
- 1 universal MyHome adapter (example of use for houses to renovate)
- 1 WIFI router configured (local WIFI specific to the system)
- 1 AC power cord
- 1 Image of a connected house made up of:
  - 1 LED light to simulate a strike
  - 2 LED lights to simulate the opening / closing of a garage door
  - 2 LED simulation lights for opening / closing a gate
  - 1 LED simulation of a watering pump running
  - 8 LED lights for simple lighting simulation
  - 8 LED lights to simulate the opening / closing of 4 roller shutters
  - 1 LED simulating convector running
  - 1 simulation lamp with variable lighting
  - 1 simulation lamp of a controlled electrical socket
- 1 modular board composed of:
  - 1 differential circuit breaker 20A - 30mA
  - 1 16A protection circuit breaker (modular socket circuit)
  - 5 10A protection circuit breakers (heating circuit, lighting circuit, roller shutter circuit, controlled socket circuit, opening circuit and watering)
  - 2 modular sockets
  - 2 modular remote switches
  - 1 SCS MH 600mA bus power supply
  - 1 Audio / video Web server for remote control of MyHOME components via web pages or via the MyHome Webserver Portal to download free of charge from Android® or Apple Store®. 1 MH / IP Inside Control gateway
  - 1 programming interface / USB / MyHome connection
  - 1 MyHome dimmer actuator for halogen / LED lighting
  - 2 MyHome 4x230V actuators for driving simulated single lighting
  - 1 MyHome 2x230V actuator for simulated electric heating
  - 1 MyHome 2x230V actuator for simulated socket
  - 4 MyHome actuators for simulated roller shutters
  - 1 MyHome 2x230V actuator for piloting an opening and a simulated watering
  - 1 MyHome 2x230V actuator for simulated openings

Back side

- 1 removable side with warning
- 1 MyHome Bus terminal block
- 1 MyHome 230V component terminal block
- 1 power supply terminal block
- 1 receiver terminal block
- 1 wiring diagram

All of the configurable standard and MyHome switches are integrated on the front panel. A translucent plate on the universal adapter covers the connectors and protects against electrical contacts. The programming of MyHome components does not require any disassembly on said components, thus improving their lifespan.



Modular panel allowing configuration of MyHome components

MYHOME TECHNOLOGY - INTRODUCTORY MODEL

Learn about SCS LEGRAND MYHOME building automation technology quickly and easily with this simple, intuitive model. This instructional solution enables acquisition and validation of the skills for the diploma in Electricity and Connected Environments, in a simple home automation environment. Ideal for introducing your students quickly and clearly!

All the modules, as well as the configurable pushbuttons and room thermostat, are integrated in a modular panel fixed to an aluminium frame easy to set up on a table. A connection interface with 4mm safety terminals can connect 2 230V bulkhead lights provided with the model. Statuses of MH component operation (lighting and roller shutter) are displayed directly on each module.
Two other terminals enable connection of a convector or any other load (not supplied). The power will display directly on your tablet or smartphone. A WiFi switch + IP interface unit lets the student measure consumption and control the installation from a tablet or smartphone. The WiFi network created locally is specific to the model,so it is isolated from your institution's WiFi network.

COMPOSITION OF THE MODEL

- 1 Tableau électrique
- 1 disjoncteur 10 A avec son bloc différentiel de 30 mA
- 1 alimentation de bus SCS MH 600mA
- 1 Serveur Web audio/vidéo pour le contrôle à distance des composants MyHOME via le Portail MyHOME Webserveur à télécharger gratuitement sur Android® ou Apple Store®
- 1 prise modulaire 230V 2P +T pour connecter le switch wifi
- 1 concentrateur de données avec Energie Data Logger avec 1 TI pour afficher les consommations sur votre PC, Smartphone ou tablette.
- 1 actionneur pour la commande des éclairages variables
- 1 actionneur pour la commande du convecteur.
- 1 actionneur pour la commande des éclairages LEDS et halogène.
- 1 module thermostat avec écran pour le pilotage du convecteur.
- 1 interrupteurs MH programmables 2 touches
- 1 interrupteur MH programmable pour gérer 4 scénarios
- 7 bornes de sécurité 4mm pour connecter les 2 Hublots et 1 charge
- 2 Hublots avec lampes variables
- 1 ensemble de cavaliers pour la configuration des adresses de chaque composant avec marquage chiffre.
- **1 Routeur WIFI configuré**

Pushbuttons are easily removable without a tool to facilitate access to the programming buttons.

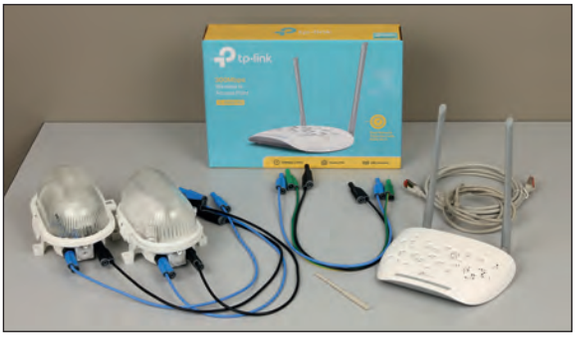
Dims : H780 x 210 x 280mm

EDUCATIONAL OBJECTIVES

- ***To learn about the HOME AUTOMATION environment of an electrical installation***
- ***To learn about and study the features of a MyHome home automation installation***
- ***To understand the specifications of an electrical installation***
- ***To produce electrical diagrams***
- ***To create a parts list of components and analyse manufacturer technical data sheets***
- ***To configure the MyHome components***
- ***To put installation into service***
- ***To configure the WiFi network for control via tablet or smartphone***

ref. MAQ-MH

SUPPLIED FULLY WIRED AND SET | AUTONOMOUS WIFI NETWORK | TEACHING RESOURCES STUDENT / TEACHER



MAQ-MH is delivered completely configured.
Teaching instructions on DVD in Instructor / Student format, including:

- Technical instructions, manufacturer resources for KNX components
- Excerpts of electrical standards
- Layout diagram of the components
- Electrical wiring diagram
- Learning activities that allow you to create scenarios in order to optimise the installation's operation, while preserving the occupant's comfort.
- Excel question / answer skills assessment forms. An administrator password allows the teacher to correct the student's assessment and modify the questions / answers if necessary.

INTRODUCTORY CASE FOR MYHOME TECHNOLOGY

Learn about MyHome building automation technology quickly and easily with this simple, intuitive case.

This instructional solution enables acquisition and validation of the skill for the diploma in Electricity & Connected Environments, in a simple home automation environment.

Ideal for introducing your students quickly and clearly!

NEW

ref. VALDOM-MH

SUPPLIED FULLY WIRED AND CONFIGURED | AUTONOMOUS WIFI NETWORK | TEACHING RESOURCES STUDENT / TEACHER | SIMULATED ELECTRICAL COMPONENTS

Case with ergonomic handle.
Dimensions 534 x 374 x 190mm.
Supply by power cord 230V-2P + E.

Safe wiring on 4mm terminals. The safety leads and the power cord are provided. Identifying information for components and other technical features are printed on the sides.

A MyHome energy meter integrated in the system can indicate the power consumed by the spotlight and display it directly on your tablet or smartphone. A BUS gateway MyHome / IP + Wifi switch, is integrated in the case. The gateway allows the student to control the installation from a tablet or smartphone. The application is downloadable for free from '' Play Store '' or '' Apple Store ''.
The WIFI network created locally is specific to the system and isolated from the Wifi network of your building.

VALDOM-MH is delivered completely configured with a set of 4mm safety leads.

Teaching instructions on DVD
in Instructor / Students format, including:
- Technical instructions, manufacturer resources for My Home components
- Layout diagram of the components
- Electrical wiring diagram
- Learning activities that allow you to create scenarios in order to optimise the installation's operation, while preserving the occupant's comfort.
- Tutorials sheets for skills assessment.

OPTION TABLET WIFI 9,6'' CONFIGURED

Samsung® tablet
- Wifi 9.6 inch touch screen Full HD
- 1.3Ghz / 1.5Gb RAM
- 8GB

ref. TAB-97

OBJECTIFS PÉDAGOGIQUES

- ***To learn about the HOME AUTOMATION environment of an electrical installation***
- ***To learn about and study the features of a MyHome home automation installation***
- ***To understand the specifications of an electrical installation***
- ***To produce electrical diagrams***
- ***To create a parts list of components***
- ***To analyse manufacturer technical data sheets***
- ***To configure the MyHome components***
- ***To put the MyHome installation into service***
- ***To configure a Wifi network for control via a tablet or smartphone.***

COMPOSITION OF THE CASE

On upper side

- 1 wall light for lighting variation
- 4 LED lights simulation of 4 simple lights
- 2 LED lights simulation of 1 rolling shutter
- 1 LED light simulation of a convector
- 1 MyHome / IP BUS gateway for WIFI communication.
- 1 configured WIFI router (system-specific local WIFI)
- 1 circuit breaker 10A Ph+N, habitat type. An LED indicates whether the 230Vac power supply is available on the safety terminals.
- 1 power socket module for power supply (protected by 10A fuse).
- 2 MyHome pushbuttons, 2 keys
- 1 MyHome pushbutton, 1 key
- 1 MyHome pushbutton, 4 keys for scenarios
- 1 room thermostat

On the lower side

- 1 BUS power supply 27V-600mA (MyHome)
- 1 MyHome Ethernet interface for WIFI communication
- 1 module allowing MyHome scenario management
- 1 MyHome energy meter module
- 1 MyHome actuator with 2 adjustable light outputs
- 1 MyHome actuator with 4 On/Off control lighting outputs (2A)
- 1 MyHome actuator with 2 On/Off control of a convector outputs
- 1 MyHome actuator with 1 rolling shutter control output

INTRODUCTORY CASE FOR NETATMO TECHNOLOGY

Learn about NETATMO building automation technology quickly and easily with this simple, intuitive case.

This instructional solution enables acquisition and validation of the skills for the diploma in Electricity & Connected Environments, in a simple home automation environment.

Ideal for introducing your students quickly and clearly!

Case with ergonomic handle.
Dimensions 534 x 374 x 190mm.
Power supply 230V-2P + E.

ref. VALDOM-NET

Safe wiring on 4mm terminals.
Identifying information for components and other technical features are printed on the sides. Operational status of NETATMO Céliane™ components (rolling shutter and lighting) are displayed directly on 5W lamps integrated in the case.
An energy meter integrated in the system can indicate the power consumed by the spotlight and display it directly on your tablet or smartphone through the cloud via the 4G WiFi router.
The WiFi network is created from a 4G WiFi router (delivered without SIM card) in order to have a local network specific to the model and isolated from your institution's WiFi network.

VALDOM-NET is delivered wholly configured with a set of 4mm safety leads and a 4G WiFi router (without SIM card). Android 5.0 or iOS9.0 minimum.

Teaching instructions on DVD in Instructor / Student format, including:
- Technical instructions, manufacturer resources for NETATMO Céliane™ components
- Layout diagram of the components.
- Electrical wiring diagram
- 6 learning activities that allow you to create scenarios in order to optimise the installation's operation, while preserving the occupant's comfort.
- Video tutorials to teach programming simply.

EDUCATIONAL OBJECTIVES

- To learn about the HOME AUTOMATION environment of an electrical installation
- Learn and study the features of a NETATMO Céliane™ home automation installation
- To understand the specifications of an electrical installation
- To produce electrical diagrams
- To create a parts list of components and analyse manufacturer technical data sheets
- Configure NETATMO Céliane™ components
- Put the VALDOM-NET installation into service
- Configure a network through a 4G router for control via a tablet or smartphone. Requires a SIM card, not provided with the case.

TEACHING RESOURCES WITH PRACTICAL WORKS

COMPOSITION OF THE CASE

On upper side
- 2 wireless switches connected with NETATMO Céliane™ technology
- 1 wireless rolling shutter switch connected with NETATMO Céliane™ technology
- 1 wireless outlet/inlet switch connected with NETATMO Céliane™ technology
- 1 spotlight for energy consumption.
- A set of LED indicator lights and 1 lamp for displaying control status for various module outputs, such as the rolling shutter or light variation
- 4mm safety terminals to wire together all components.

On lower side
- 1 socket unit module for connecting to 230VAC Ph+N+T mains, protected by 10A fuse
- 1 Ph+N residual current circuit-breaker 10A-30mA
- 2 wired switches connected with NETATMO Céliane™ technology
- 1 wired socket connected with NETATMO Céliane™ technology
- 1 wired switch for wired rolling shutter connected with NETATMO Céliane™ technology
- 1 wired socket connected with integrated energy meter, NETATMO Céliane™ technology
- 3 wired micromodules connected with NETATMO Céliane™ technology
- 4mm safety terminals to wire together all components.

1 4G WiFi router (delivered without SIM card)

RADIO TECHNOLOGY - INTRODUCTORY MODEL

Learn about radio Delta Dore® building automation technology quickly and easily with this simple, intuitive model. This instructional solution enables acquisition and validation of the skills for the diploma in Electricity and Connected Environments, in a simple home automation environment. Ideal for introducing your students quickly and clearly!

OBJECTIFS PÉDAGOGIQUES

- Découvrir l'environnement DOMOTIQUE d'une installation électrique
- Découvrir et étudier les fonctionnalités d'une installation domotique Radio
- Comprendre le cahier des charges d'une installation électrique
- Réaliser des schémas électriques
- Réaliser une nomenclature de composants
- Analyser les fiches techniques constructeurs
- Paramétrer des composants Delta Dore® et la passerelle dédiée à son exploitation
- Réaliser la mise en service de l'installation
- Réaliser un paramétrage réseau WIFI pour commande sur tablette ou Smartphone

Dims : H780 x 210 x 280mm

All the modules, as well as the configurable pushbuttons and room thermostat, are integrated in a modular panel fixed to an aluminium frame easy to set up on a table. A connection interface with 4mm safety terminals can connect 2 230V bulkhead lights provided with the model. Statuses of component operation are displayed directly on each module. Two other terminals enable connection of a convector or any other load (not supplied). The power will display directly on your tablet or smartphone. A WiFi switch + IP interface unit lets the student measure consumption and control the installation from a tablet or smartphone. The WiFi network created locally is specific to the model,so it is isolated from your institution's WiFi network.

A translucent, removable plate covers the connections and protects against electrical contacts. Only the programming buttons remain accessible.

COMPOSITION DE LA MAQUETTE

- 1 Tableau électrique
- 1 disjoncteur 10 A avec son bloc différentiel de 30 mA
- 2 récepteurs modulaires radios (contrôle 1 éclairage fixe et 1 variable)
- 2 prises modulaires 230V 2P +T pour connecter le switch wifi et la passerelle IP/radio
- 1 récepteur radio pour convecteur électrique
- 1 thermostat radio
- 1 détecteur d'ouverture de porte radio
- 1 récepteur variateur d'éclairage + minuterie radio pilotable par détecteur de mouvement (simulé par cavalier)
- 1 récepteur radio volet roulant
- 1 émetteur radio 2 voies
- 1 télécommande 4 touches radio
- 1 interrupteur double type habitat
- 1 interrupteur 2 touches radio pour éclairage fixe ou variable
- 1 interrupteur radio pour volet roulant
- 2 Hublots avec lampes variables
- **1 Routeur WIFI configuré**

ref. MAQ-DD

SUPPLIED FULLY WIRED AND SET | AUTONOMOUS WIFI NETWORK | TEACHING RESOURCES STUDENT / TEACHER

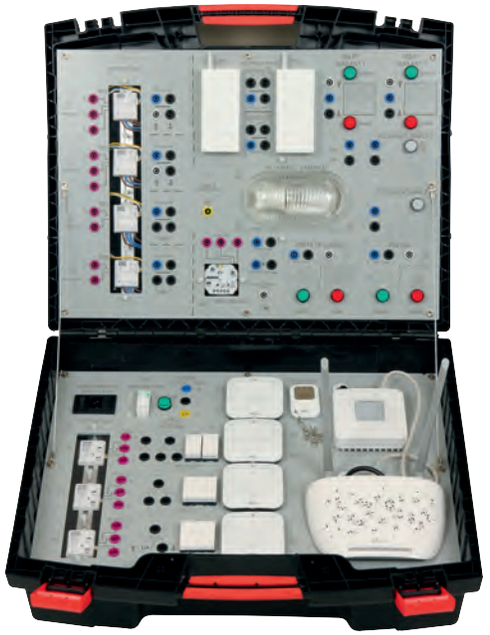
MAQ-DD is delivered completely configured.
Teaching instructions on DVD in Instructor / Student format, including:

- Technical instructions, manufacturer resources for KNX components
- Excerpts of electrical standards
- Layout diagram of the components
- Electrical wiring diagram
- Learning activities that allow you to create scenarios in order to optimise the installation's operation, while preserving the occupant's comfort.
- Excel question / answer skills assessment forms. An administrator password allows the teacher to correct the student's assessment and modify the questions / answers if necessary.

DELTA DORE TECHNOLOGY - INTRODUCTORY CASE FOR RADIO INSTALLATION

The radio switches and the remote control are very easily removable thanks to a gripping band.

Case with ergonomic handle.
Dimensions 534 x 374 x 190mm.
Supply by power cord 230V-2P + E.



The micromodules are protected behind a transparent plate that covers the connectors and protects electrical contacts.
Only the programming buttons remain accessible.

NEW

Learn about Delta Dore® radio home automation technology quickly and easily with this simple, intuitive case. This instructional solution enables acquisition and validation of the skills for the diploma in Electricity & Connected Environments, in a simple home automation environment.
Ideal for introducing your students quickly and clearly! The configurable radio modules (transmitter / receiver) and habitat type switches are integrated on both sides of the case.

Safe wiring on 4mm terminals (safety leads supplied).
Identifying information for components and other technical features are printed on the sides. A Delta Dore® / IP radio gateway + Wifi Switch is integrated into the case. It is removable thanks to a gripping band to facilitate the update. The gateway allows the student to control the installation from a tablet or Smartphone. The application is downloadable for free from '' Play Store '' or '' Apple Store ''.
The WIFI network created locally is specific to the system and isolated from the Wifi network of your building.

VALDOM-DD is delivered completely configured.
Teaching instructions on DVD in Instructor / Students format, including:
- Technical instructions, manufacturer resources for Delta Dore® components
- Excerpts of electrical standards
- Layout diagram of the components
- Electrical wiring diagram
- Learning activities that allow you to create scenarios in order to optimise the installation's operation, while preserving the occupant's comfort.
- Tutorials sheets for skills assessment.

OPTION TABLET WIFI 9,6'' CONFIGURED

Samsung® tablet
- Wifi 9.6 inch touch screen Full HD
- 1.3Ghz / 1.5Gb RAM
- 8GB

ref. TAB-97

ref. VALDOM-DD

SUPPLIED FULLY WIRED AND CONFIGURED | AUTONOMOUS WIFI NETWORK | TEACHING RESOURCES STUDENT / TEACHER | SIMULATED ELECTRICAL COMPONENTS

EDUCATIONAL OBJECTIVES

- **To learn about the HOME AUTOMATION environment of an electrical installation**
- **To learn about and study the features of a radio home automation installation**
- **To understand the specifications of an electrical installation**
- **To produce electrical diagrams**
- **To create a parts list of components**
- **To analyse manufacturer technical data sheets**
- **To configure the radio components**
- **Carry out wiring and connection of electrical components in flying wires**
- **To put the radio installation into service**
- **To configure a Wifi network for control via a tablet or smartphone.**

COMPOSITION OF THE CASE

On upper side
- 1 LED wall light for lighting variation
- 10 LED lights of simulation: 2 simple lights, 2 roller shutters, 1 gate, 1 garage
- 2 opening / closing control receivers for a gate / garage
- 4 micromodules radio receiver: 2 for simple lights, 2 for roller shutter
- 1 micromodule radio receiver for variable lighting

On the lower side
- 1 circuit breaker 10A Ph+N, Habitat type
- 1 power socket module for power supply (protected by 10A fuse).
- 1 radio remote control 4 keys
- 1 two-ways switch, 1 habitat type module
- 1 push button, 1 habitat type module
- 1 two-ways switch, 2 habitat type modules
- 1 roller shutter switch, 2 habitat type modules
- 2 double radio transmitter switches, type On / Off
- 2 double radio transmitter switches, type roller shutter
- 3 micromodules radio transmitter for push button and switch
- 1 radio / IP gateway for Wifi communication

1 configured WIFI router (system-specific local WIFI)

COMPATIBLE PRODUCT
The VALDOM-DD case is compatible with the study case of a radio alarm.

ref. VALDOM-ALR

DELTA DORE TECHNOLOGY - INTRODUCTORY CASE FOR RADIO ALARM

ref. VALDOM-ALR

SUPPLIED FULLY WIRED AND CONFIGURED | AUTONOMOUS WIFI NETWORK | TEACHING RESOURCES STUDENT / TEACHER

The infrared detectors and door detector are very easily removable thanks to a gripping band.

Case with ergonomic handle.
Dimensions 534 x 374 x 190mm.
Supply by power cord 230V-2P + E.

COMPATIBLE PRODUCT
The VALDOM-ALR case is compatible with the study case of a radio installation.

ref. VALDOM-DD

Learn about Delta Dore® radio home automation technology quickly and easily with this simple, intuitive case. This instructional solution enables acquisition and validation of the skills for the diploma in Electricity & Connected Environments, in a simple home automation environment. Ideal for introducing your students quickly and clearly!
The Delta Dore® configurable radio alarm modules and radio fire detector are integrated on both sides of the case.

A Delta Dore® / IP radio gateway + Wifi Switch is integrated into the case. It is removable thanks to a gripping band to facilitate the update. The gateway allows the student to control the installation from a tablet or Smartphone. The application is downloadable for free from '' Play Store '' or '' Apple Store ''.
The WIFI network created locally is specific to the system and isolated from the Wifi network of your building.

VALDOM-ALR is delivered completely configured.
Teaching instructions on DVD in Instructor / Students format, including:
- Technical instructions, manufacturer resources for Delta Dore® components
- Excerpts of electrical standards
- Layout diagram of the components
- Electrical wiring diagram
- Tutorials sheets for skills assessment.

EDUCATIONAL OBJECTIVES

- ***To create a parts list of components***
- ***To understand and set up a radio intrusion alarm management***
- ***To understand and learn programming of radio components***
- ***To program the various components of an intrusion alarm such as the central unit, the detectors, the informative code keypad, the remote controls, the siren.***
- ***To understand the setting and use of a radio fire detector***

Practical works

- Identification and functionality of each component
- Implantation of components on the architectural plan of an apartment.
- Programming of the alarm unit with a presence detector, fire detector and remote control.
- Programming of the alarm unit with the addition of the information keyboard and a second presence detector.
- Troubleshooting the installation.

COMPOSITION OF THE CASE

On upper side
- 2 open contacts for opening protection
- 2 infrared detectors. Range 12m.
- 1 radio fire detector
- 1 outdoor siren (Decibel level reduced)

On the lower side
- 1 radio alarm unit with 2 zones
- 1 radio keyboard with information reception and remote control, with LCD display, switching On and Off. Full and partial operation with 3 access codes: 1 master, 2 users. History of the last 200 events. Information on the state of the system: on and off, open doors, etc ... siren test. System configuration.
- 2 radio remote controls. 4 keys. Range 100m to 300m.
- 1 radio / IP gateway for WIFI communication.

1 configured WIFI router (system-specific local WIFI)

OPTION TABLET WIFI 9,6'' CONFIGURED

Samsung® tablet
- Wifi 9.6 inch touch screen Full HD
- 1.3Ghz / 1.5Gb RAM
- 8GB

ref. TAB-97

RADIO TECHNOLOGY - STUDY OF PROGRAMMING

1 PANEL SYSTEM - 2 SCREEN PRINTED FACES

Dining room side

CONVECTORS, ROLLING SHUTTERS AND LIGHTING ARE REPRESENTED BY SERIGRAPHY ON THE DIFFERENT PANELS. THEIR OPERATION IS SIMULATED BY 230V LED INDICATORS.

DELTA DORE
Smart is the new power

Entryway side

ref. DP1-3D

DELIVERED WIRED AND SET | AUTONOMOUS WIFI NETWORK | TEACHING RESSOURCES STUDENTS / TEACHER | SIMULATED ELECTRICAL COMPONENTS

ref. DP1-3D-SV **version without vidéo**

EDUCATIONAL OBJECTIVES

- ***Understand and set an anti-intrusion alarm system***
- ***Program different components of an anti-intrusion radio alarm***
- ***Configure a Home automation software on a touch tablet.***

CHARACTERISTICS OF THE FRAME

- Frame in matte anodized aluminum.
- On rollers. With handles for easy movement.
- Overall dimensions: L x w x h: 1200 x 600 x 1840mm.
- Mains power supply lead 2P+E, 3 meters.

OPTION TABLET WIFI 9.6'' CONFIGURED

ref. TAB-97

Software installed and configured

Samsung® Tablet
Minimum features:
- Wifi 9.6 inch full HD touch
- 1.3Ghz
- 1.5GB RAM
- 8GB storage

DP1-3D is an automated radio alarm panel, double-sided. This learning solution's goal is to excite the interest of students in allowing them to discover radio automation programming with a touch tablet in an environment very close to reality. The 2 3D visual faces represent an entryway and a dining room, uniting the main components of a communicating alarm.

Composition of the entryway

- 1 anti-intrusion radio alarm center, 2 areas, with siren
- 1 radio keyboard to receive information and for remote control, with an LCD display, starting and stopping service. Total and partial operation, 3 access codes (1 master, 2 users). Log of the last 200 events.
  Information on system status: enabled and disabled, doors open, etc.
  Siren test. System configuration.
- 1 infrared sensor. Range 12m.
- 1 radio remote control. 4 keys.
- 1 opening contact to protect openings (doors, windows, etc.)
- 1 radio switch for opening/closing the roller shutter.
- 1 radio switch to control lighting.
- 1 radio/RJ45 center to control all components from a touchpad or a smartphone (must download the application from the Apple or Android store).
- 1 WiFi switch.
- 1 2P+E 230VAC plug.
- 1 light to simulate lighting.
- 2 lights to simulate the opening/closing of the roller shutter.

Composition of the dining room side

- 1 infrared sensor. Range 12m.
- 1 camera with infrared radio sensor to visualize the image on a tablet or smartphone. Range 12m. (Ref. DP1-3D only)
- 1 radio switch for opening/closing the roller shutter.
- 1 radio switch to control lighting.
- 1 opening contact to protect openings (doors, windows, etc.)

RADIO TECHNOLOGY - STUDY OF WIRING AND PROGRAMMING

3-PANEL SYSTEM - 3 SCREEN PRINTED FACES

Dimensions fully unfolded: L 4400mm x D 400mm x H 1800mm

Dimensions folded: L 1500mm x D 1800mm x H 1800mm

ref. DP3-DD

DELIVERED WIRED AND SET | AUTONOMOUS WIFI NETWORK | TEACHING RESSOURCES STUDENTS / TEACHER | REAL ELECTRICAL COMPONENTS

EDUCATIONAL OBJECTIVES

- **To learn about the HOME AUTOMATION environment of an electrical installation**
- **To learn about and study the functionalities of a radio home automation installation**
- **To understand the specifications of an electrical installation**
- **To produce electrical diagrams**
- **To create a parts list of components & analyse manufacturer technical datasheets**
- **To install electrical equipment, route conductor cables, electrical ducts, etc.**
- **To wire and physically connect different electrical components**
- **To configure the radio components**
- **To perform commissioning of the installation**
- **To perform electrical consumption measurements**
- **To remote control of the various components from a tablet or Smartphone**
- **To perform electrical troubleshooting**

The aluminium structure of the frame allows ICTA ducts to run the whole height of the panel. The surfaces (12mm thick) of a panel are separated by 120mm which is very convenient for integrating the electrical components, partition pots 50mm and other embedded connection boxes. The different panels are fixed using a ¼ turn screw system for easy mounting/dismounting of the teaching sequences.

Screenprinted panel 1 : indoor wall of dwelling entrance
Screenprinted panel 2 : living room wall of a dwelling
Screenprinted panel 3 : outer wall of dwelling with window

Foldable and mobile structure for a storage in a minimum of space. Disassembly of plates easy and fast. Easy ICTA sheaths passing.

Specially designed for study and training in the radio automation technology present in residential and tertiary premises as part of RT2012, these instructional solutions enable the acquisition and validation of the skills in a realistic eco-responsible environment.

DELTA DORE
Smart is the new power

COMPOSITION OF THE SYSTEM

3-panel aluminium structure

Mobile structure on pivoting casters with brake and locking, composed of three screenprinted panels 1200 x1600mm. Hinges allow the assembly to be opened and closed like a screen. You can position the assembly to allow for your room constraints, each panel can be oriented separately from the others.

A set of electrical protection devices

- 1 RC circuit-breaker 30mA
- 1 thermal-magnetic circuit-breaker Uni+ Neutral rated 2A.
- 2 thermal-magnetic circuit-breakers Uni+ Neutral rated 10A.
- 2 thermal-magnetic circuit-breakers Uni+ Neutral rated 16A.

A set of RADIO DELTA DORE® components

- 1 touch screen for managing heating, shutter, lighting, energy consumption measurement and display as bargraphs, etc.
- 2 radio switches, 2 buttons
- 5 radio receiver modules
- 4 radio transmitter modules

- 1 radio control module for roller shutter
- 1 data transmitter module with off-peak hour control
- 1 module, 3 current transformers (max 60A) for measuring 3 different circuits
- 1 radio module, outside temperature sensor
- 1 module, power interface technical unit for touch screen
- 1 set of 4 conventional switches

A set of electric components

- 1 building technical duct with modular panel with 4 rows of modules and VDI unit with space for broadband box.
- 2 mains power outlets 2P+E modular
- 5 lights 230V including 2 with LEDs.
- 2 halogen type outdoor lights
- 1 convector 500W.
- 1 electric roller shutter 230V.
- 1 mains power outlet 2P+E for flush-mounting.
- 100m of ICTA duct D16mm
- 100m of ICTA duct D20mm
- 4 reels of 100m rigid wire 1.5mm² (Blue, Black, Red, G/Y)
- 4 reels of 100m rigid wire 2.5mm² (Blue, Black, Red, G/Y)
- 5 junction boxes.
- 5 pots for hollow partitions.
- 2 flush mounting boxes, weatherproof.
- 1 set of WAGO terminal blocks

One WiFi router specific to the system for connected device use

DELTA DORE RADIO TECHNOLOGY - COMPLETE CONNECTED HOUSE

A chassis with wheels in aluminum profile
• Dimensions: (W)1200 x (D)700 x (H)1700mm - Weight: 84 kg

ref. MCP-DD-R	Version with wheels

DELIVERED WIRED AND SET | AUTONOMOUS WIFI NETWORK | TEACHING RESSOURCES STUDENTS / TEACHER

DELTA DORE
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A chassis in aluminum profile to put on a table
• Dimensions: (W)1200 x (D)410 x (H)845mm - Weight: 60 kg

ref. MCP-DD	Version to put on a table

DELIVERED WIRED AND SET | AUTONOMOUS WIFI NETWORK | TEACHING RESSOURCES STUDENTS / TEACHER

Discover Delta Dore® radio home automation technology quickly and easily with this complete model of a connected home. This educational solution allows the acquisition and the validation of the skills of the radio technology in a simple environment of the home automation.

EDUCATIONAL OBJECTIVES

- *Discover the Home Automation environment of a simulated electrical installation.*
- *Discover and study the features of a Delta Dore home automation system*
- *Understand the specifications of an electrical installation*
- *Make electrical diagrams*
- *Produce a components nomenclature*
- *Analyze the manufacturer datasheets*
- *Perform parameter setting of Delta Dore components*
- *Carry out the wiring and the connection of the electrical components to flying wires*
- *Perform the commissioning of the installation*
- *Perform a WIFI network setting for control on tablet or Smartphone*

COMPOSITION

Front face
- 5 switches radio transmitter with 2 keys of type On / Off
- 3 switches radio transmitter for roller shutter
- 1 double switch (standard home type)
- 2 simple push buttons (standard home type)
- 2 switches for roller shutter (standard home type)
- 5 micromodules radio transmitter for push button, switch and roller shutter
- 5 micromodules radio receiver type On / Off
- 5 micromodules radio receiver for roller shutter
- 1 micromodule radio receiver for variable lighting
- 1 opening / closing control receiver for a gate / garage
- 1 ON / OFF control receiver for convector
- 1 radio thermostat for the control of a convector
- 1 radio remote control with 4 keys
- 1 Radio / IP gateway for WIFI communication. It allows the student to control the installation since a tablet or Smartphone. The free application is available on "Play Store" or "Apple Store". The WIFI network is unique to the model and isolated from the Wifi network of your building.
- 1 configured WIFI router (system-specific local WIFI)
- 1 AC power cord
- 1 screenprint of a connected house composed of:
  - 1 LED light for simulating a strike
  - 2 LED lights simulating the opening / closing of a garage door
  - 2 LED lights simulating the opening / closing of a gate
  - 1 LED light simulating the running a watering pump
  - 8 LED lights for simple lighting simulation
  - 8 LEDs lights simulating opening / closing of 4 roller shutters
  - 1 LED light simulating the functioning of a convector
  - 1 simulation lamp with variable lighting
- 1 modular board panel composed of:
  - 1 differential circuit breaker 20A - 30mA
  - 2 circuit breakers – 16A (sockets circuit, heating circuit)
  - 3 circuit breakers - 10A (lighting circuit, roller shutter circuit, opening circuit and watering)
  - 2 modular jacks
  - 5 modular On / Off control receivers

Back side
- 1 removable side with warning
- 1 transmitter terminal block
- 1 receiver terminal block
- 1 power terminal block
- 1 modular receiver terminal block
- 1 wiring diagram

TEACHING FILE SUPPLIED

Teaching instructions in Instructor / Students format (supplied on DVD), including:

- Educational activities to create scenarios in order to optimize the operation of the installation while preserving the comfort of the occupant
- Tutorials sheets for skills assessment + Technical instructions, manufacturer resources for Delta Dore components + Excerpts of electrical standards + different wiring diagrams according to the progress of the Practical Work + Layout diagram of the components + Electrical wiring diagram

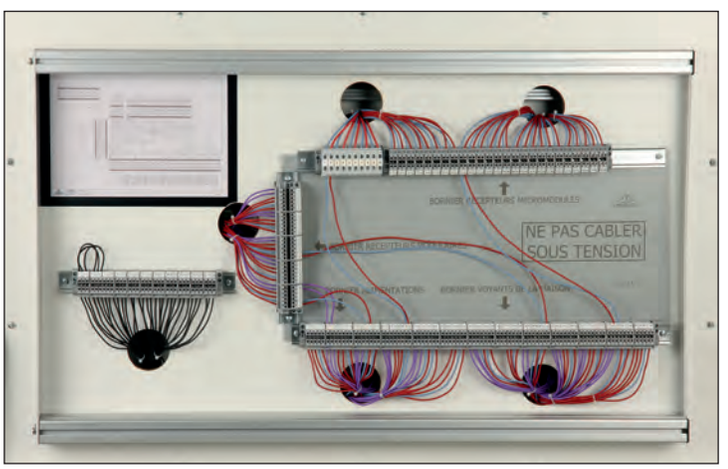
Front side

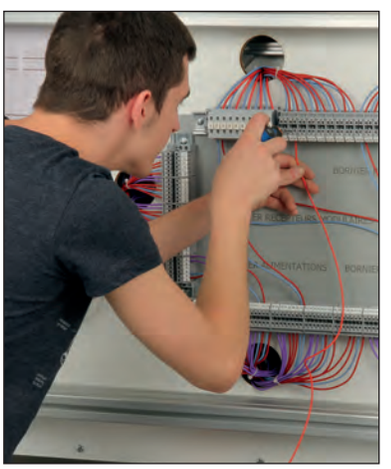
Profil view

All Delta Dore radio transmitter / receiver modules and home type switches are integrated on the front panel.
A translucent, removable plate covers the connectors and protects electrical contacts. Only the programming buttons remain accessible.
The radio switches and the remote control are very easily removable thanks to a gripping band.

The components are wired on the rear panel via industrial terminals to prevent wear of the component terminals.

A housing protects access to industrial terminals during tests with power on. Removable wiring diagram.





Rear panel with protective cover removed for wiring.

DELTA DORE RADIO TECHNOLOGY - CONNECTED HOUSE

The educational panel study of home automation systems of KNX type is a habitation of house type. Simple and intuitive, it makes it easy to discover this technology.
It offers educational features allowing the student:
- To observe, manipulate, assemble and disassemble
- To measure, evaluate characteristics
- To reproduce industrial schemes
- To understand and to interpret the mechanical, electrical, electronic operations...

ref. MC-DD-1

SUPPLIED FULLY WIRED AND CONFIGURED | AUTONOMOUS WIFI NETWORK | TEACHING RESOURCES STUDENT / TEACHER

EDUCATIONAL OBJECTIVES

- **Discovery of the Delta Dore radio protocol**
- **Getting started with the installation**
- **Installation of equipment**
- **Setup and maintenance of equipment**
- **Installation of a home automation box and a wifi router (networking, programming of the box, taken in hand via an Android application).**

TEACHING FILE SUPPLIED

Teaching instructions in Instructor / Students format (supplied on DVD and paper support), including:
- Educational activities to create scenarios
- Tutorials sheets for skills assessment.
- Technical instructions, manufacturer resources for Delta Dore components
- Excerpts of electrical standards
- Layout diagram of the components
- Electrical wiring diagram

COMPOSITION

An aluminum profile frame
- Profile section 30 x 30mm
- Frame dimensions: 650 x 700 x 350mm

1 silkscreened front panel equipped with:
- 1 residual current circuit breaker 25A of habitat type
- 1 16A circuit breaker of habitat type
- 1 LED lighting spot for variable lighting
- 1 micromodule radio receiver Delta Dore for variable lighting
- 1 single touch switch
- 1 micromodule radio receiver Delta Dore for roller shutter
- 1 roller shutter switch
- 1 radio switch 2-button Delta Dore
- 1 Delta Dore radio opening receiver module for managing gate strike
- 1 LED indicator simulating the gate strike
- 1 Delta Dore radio room thermostat
- 1 Delta Dore radio connected heating receiver module for the management of a convector
- 1 LED indicator simulating a convector

1 white back side equipped with:
- 1 roller shutter
- 1 radio / IP home automation box for the communication in Wifi.
- 1 Wifi router to create a local Wifi network and control the installation from a Smartphone application
- 2 power sockets 230V 2P+E to connect the Wifi router and the Wifi box

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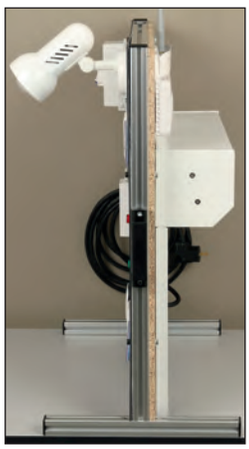
The micromodule is protected behind a transparent plate that covers the connectors and protects electrical contacts. Only the programming button remains accessible without disassembly. It allows safe working with power on.

Front side



Profil view

Back side

"INTELLIGENT HOME" ENERGY CONTROL SYSTEM

ref. QUICK-NRJPLUS

ref. QUICK-NRJ **without frame and console**

ref. QUICK-NRJPLUS-C

Communicating version tablet & smartphone

Autonomous integrated Wifi network

Sockets on the back of the console for connecting the modules

EDUCATIONAL OBJECTIVES

- **Study a measurement system for energy consumption according to new standard for energy saving.**
- **Study the principle of a home control installation equipped with DELTA DORE® radio components**
- **Parameter the DELTA DORE® radio components (RF technology)**
- **Produce wiring for home components.**
- **Learn how to use a clamp ammeter.**

TEACHING RESOURCES STUDENT & TEACHER

Proposed Practical Works

- Production of the complete wiring diagram.
- Study of the production of the wiring and programming of the components from the DELTA DORE touch screen module
- Study and production of radio commands for lighting, roller blinds and heating.
- Reading of power according to the heating operating cycles.
- Comparison of the power displayed on screen with that calculated from the different readings.
- Creation of scenarios according to the outside temperature and sunshine.

More and more standards and directives require individual homes to be equipped with a system enabling energy consumption to be measured or estimated. QUICK-NRJ groups all the DELTA DORE® components needed to learn about electrical energy consumption.
A colour touch screen module displays all the energy use information as graphs.
The different components are prepared in plastic housings engraved and equipped with 4mm terminals to facilitate and make safe the wiring using safety leads.
The modules are very easy to install on the aluminium wheeled frame.

Comprises

- 1 Module - data transmitter with off-peak hours control
- 1 Module - colour touch screen displaying all the detail of consumption, for controlling heating (pilot wire and load shedding), lighting and roller blinds.
- 1 Module - 3 current transformers (max 60A) for measuring 3 different circuits.
- 1 Module - power interface technical unit for touch screen.
- 1 Radio module - sunlight sensor.
- 1 Radio module – outside temperature sensor
- 2 Radio modules – roller blind control
- 1 Simulation module - 2 blinds.
- 1 Radio module – lighting variation.
- 1 Radio module - lighting variation, off/on, timing
- 2 Modules – bulkhead lights 230V AC – 60 W
- 3 Modules – load 320 W + indicator lights
- 1 Simulation module - 3 pilot wire convector heaters,1 hot water tank and 1 pellet burner.
- 1 frame with wheels (H x W x D): 1610 x 940 x 500mm equipped with rack for cords (30 fingers)
- 1 single-phase power console:

- 1 thermal magnetic circuit breaker (16A)
- 1 Emergency stop push button with key
- 1 Push button + LED indicator
- 1 230V single-phase output on 4mm safety terminals
- 2 230Vac sockets (2P + E) + 12 230Vac sockets (2P + E), at the back

- 1 set of safety leads for carrying out the different practical works.

The colour touch screen module displays all the detail of consumption, for controlling heating (pilot wire and load shedding), lighting and roller blinds.

STUDY OF ELECTRICAL RADIO INSTALLATION – COMPLETE SOLUTION

Set of modules (H 250mm) for studying home automation with DELTA DORER® radio components.
For the student to learn about radio configuration, the transmitter and receiver modules are instructively put in plastic boxes with the fronts engraved and equipped with terminals diameter 4mm.
The various components of the lighting and opening controls are controlled by conventional domestic switches and pushbuttons and by radio switches.

EDUCATIONAL OBJECTIVES

- ***To learn about home automation.***
- ***To study the compatibility of conventional lighting controls with radio controls.***
- ***To study the wiring and configuration of communicating components.***
- ***To study the programming of and the DELTA DORE radio solution***

TEACHING RESOURCES STUDENT & TEACHER

Réf. QUICK-PPLUS

Réf. QUICK-PPLUS **without frame and console**

DELTA DORE
Smart is the new power

Sockets on the back of the console for connecting the modules

Proposed Practical Works

- Radio programming of four lighting circuits by pushbutton, two-way and double lighting.
- Wiring of four lighting circuits with conventional and radio switches.
- Radio programming of opening and closing of two roller blinds, gate and garage.
- Creation of several operating scenarios.

Comprises

- 1 domestic double pushbutton and double switch module.
- 1 module with 2 double transmitter switches.
- 1 module with 2 lighting control receivers.
- 1 module with 2 double transmitter switches for roller blinds.
- 1 transmitter module for roller blinds with domestic pushbutton.
- 1 module with 2 domestic two-way switches.
- 1 transmitter module for garage opening with domestic pushbutton.
- 1 module with 2 lighting variation control receivers.
- 2 modules with 2 transmitters for pushbutton and switch.
- 1 module with 2 receivers of gate and garage opening/closing controls.
- 1 simulation module of gate and garage opening/closing with diagram and indicator light signalling
- 1 simulation module of 2 roller blinds with diagram and indicator light signalling
- 1 module with 2 receivers of roller blind controls.
- 4 lighting modules with Bulkhead lights 60W – 230VAC
- 1 frame with wheels (H x W x D): 1610 x 940 x 500mm equipped with rack for cords (30 fingers)
- 1 single-phase power console:

- 1 thermal magnetic circuit breaker (16A)
- 1 Emergency stop push button with key
- 1 Push button + LED indicator
- 1 230V single-phase output on 4mm safety terminals
- 2 230Vac sockets (2P + E) + 12 230Vac sockets (2P + E), at the back

- 1 set of safety leads for carrying out the different practical works.

ADD COMMUNICATING MODULE FOR SMARTPHONE AND TABLET

Wi-Fi / Radio Interface Set with RJ45 Wifi Switch. Allows to communicate from a tablet or Smartphone a RADIO Delta Dore set.
Connection to 2P + T 230VAC socket.

ref. COM-DEL

Autonomous subassemblies of radio installation

On frame ref. SUP-AK. Height 610mm – Width 590mm.

DELTA DORE
Smart is the new power

Study of radio lighting control

- 1 single-phase power module with MT circuit-breaker 16A.
- 1 domestic double pushbutton and double switch module.
- 1 module with 2 transmitters for pushbutton and switch.
- 1 module with 2 double transmitter switches.
- 1 module with 2 lighting control receivers.
- 1 lighting module with 2 Bulkhead lights 60W – 230VAC.

ref. QUICK-AK6 with frame

ref. QUICK-AK6-N without frame

Study of radio lighting variation control

- 1 single-phase power module with MT circuit-breaker 16A.
- 1 module with 2 domestic double pushbuttons.
- 1 module with 2 transmitters for pushbutton
- 1 module with 2 double transmitter switches.
- 1 module with 2 lighting variation control receivers.
- 1 lighting module with 2 Bulkhead lights 60W – 230VAC.

ref. QUICK-AK7 with frame

ref. QUICK-AK7-N without frame

Study of radio roller blind control

- 1 single-phase power module with MT circuit-breaker 16A.
- 1 simulation module of 2 roller blinds with diagram and indicator light signalling
- 1 module with 2 double transmitter switches for roller blinds.
- 1 module with 2 receivers of roller blind controls.
- 1 transmitter module for roller blinds with domestic pushbutton.

ref. QUICK-AK8 with frame

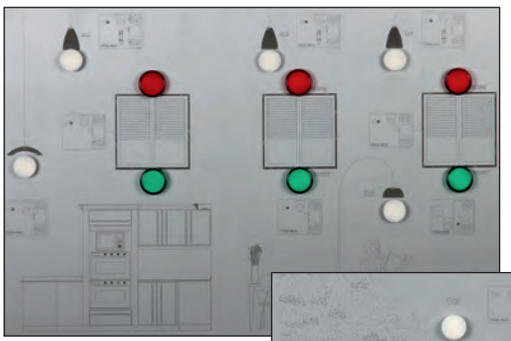
ref. QUICK-AK8-N without frame

CREATING A COMPLETE RADIO INSTALLATION

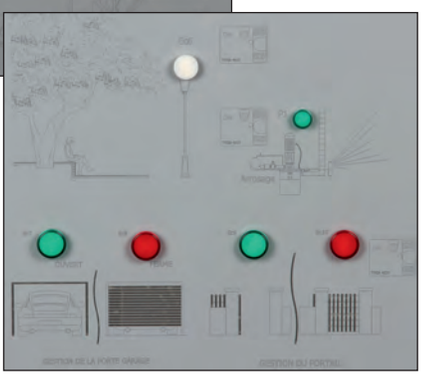
ref. DOMORADIO-C

LIVRÉ CABLÉ ET PARAMÉTRÉ | RÉSEAU WIFI AUTONOME | TABLETTE FOURNIE | DOSSIER PÉDAGOGIQUE ÉLÈVES / ENSEIGNANT | COMPOSANTS ÉLECTRIQUES SIMULÉS

DOMORADIO is a panel of home automation components generally used in housing (switches, pushbuttons, communicating radio components).
To familiarize the student with the radio configuration, the transmitter and receiver micromodules are flush-mounted behind two large PVC panels. Each micromodule is shown on the panels with specific diagrams for the student to recognize them quickly and configure them safely.
A silkscreen represents the different rooms of the house, the garden, as well as the garage and the electric gate.Indicator lights show:
- the operating state of the lamps of the different rooms
- opening/closing of roller blinds, gate and garage door.
- operation of the sprinkler pump.



Screen printed PVC faces representing different parts.



Controlled electrical components are simulated by LEDs

EDUCATIONAL OBJECTIVES

- **To learn about home automation.**
- **To study the compatibility of conventional lighting controls with radio controls.**
- **To study the configuration of communicating components by creating several home automation scenarios.**
- **To study the programming of and the DELTA DORE radio solution**

Proposed practical works

- Radio programming of lighting circuits by pushbuttons, two-way and double illumination.
- Radio programming of opening and closing of three roller blinds, gate and garage.
- Creation of several operating scenarios using the touchscreen.

Comprises

- 1 set of WIFI components to communicate with the delivered tablet.
- 1 Wifi touch tablet that can manage radio components of the home with integrated application to configure the components.
- 1 modular panel with thermal magnetic circuit-breakers
- 1 mechanical "up-down" pushbutton for roller blinds
- 2 double mechanical switches
- 2 double mechanical pushbuttons
- 2 radio pushbuttons
- 2 radio switches
- 1 set of radio micromodules
- 1 PVC panel with diagram of the kitchen and dining room
  - 5 indicator lights to simulate the kitchen and dining room lights
  - 6 indicator lights to signal the up and down of three roller blinds
- 1 PVC panel with diagram of the garden, garage and gate
  - 1 indicator light to simulate the garden lighting
  - 1 indicator light to signal operation of the sprinkler pump
  - 4 indicator lights to signal the opening and closing of the garage and shutter.

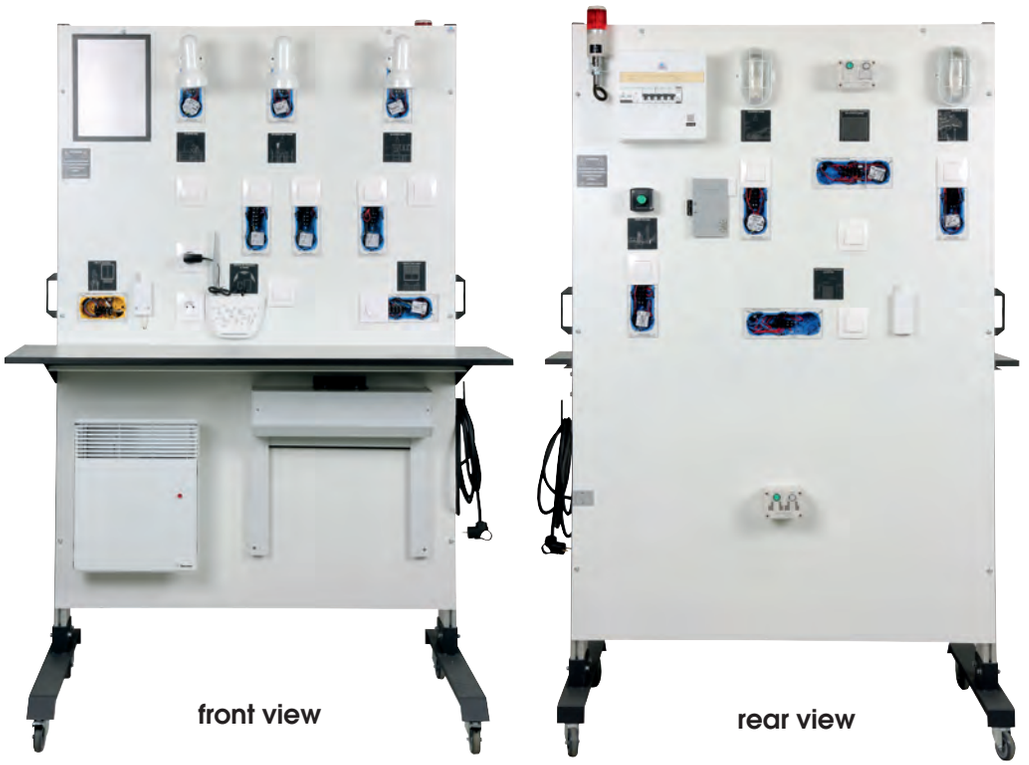
Wifi / radio interface with RJ45 Wifi switch. Allows communicating from the delivered tablet Delta Dore RADIO elements. Connection to 2P+E 230VAC socket.

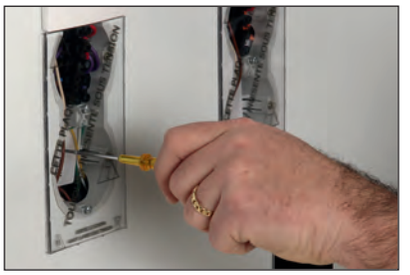
Samsung® 9.6 '' Touch Tablet supplied

Characteristics of the frame

- Frame of matt anodized aluminium, double sided on casters.
- 2 panels of melamine 19mm with area 1400 x 670 mm
- Dimensions H1840 x W750 x D750 mm. Weight 87kg
- Mains power supply lead 2P+E, 3 metres

RENOVATION OF A CLASSIC RADIO INSTALLATION





Coupling a receiver + transmitter pair through the protection window by pressing a contact.

Wifi / radio interface with RJ45 Wifi switch. Allows communicating from the delivered tablet Delta Dore RADIO elements. Connection to 2P + E 230VAC socket.

Samsung® 9.6 '' Touch Tablet Delivered

ref. DOMOPLUS-C

SUPPLIED FULLY WIRED AND CONFIGURED | AUTONOMOUS WIFI NETWORK | TOUCH TABLET SUPPLIED | TEACHING RESOURCES STUDENT / TEACHER | REAL ELECTRICAL COMPONENTS

The various components (lighting, opening, heating, watering, etc ...) are controlled by switch, remote telephone or via a touch pad delivered. To familiarize students with the wiring, each electrical component is connected using a terminal strip to its control or receiver module. A removable translucent plate covers the connectors and protects the electrical contacts.

EDUCATIONAL OBJECTIVES

- ***Understanding of the housing automation made for the housing renovation***
- ***Understanding of a real and complete solution for a flat***
- ***Studying the wiring and settings of communicating components***
- ***Studying the programming and the DELTA DORE solution***

Proposed Practical Works

- Renovation of different circuits (lightings, thermal circuit ...)
- Programming according different imposed scenarios

Composition

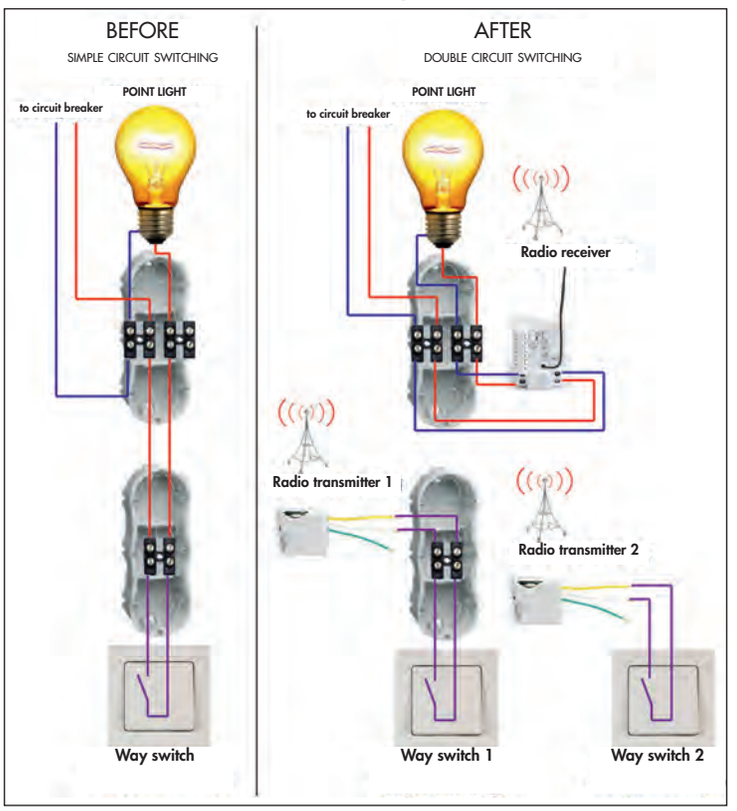
- 1 modular panel equipped with 5 circuit-breakers and one differential 30mA type.
- 5 lighting circuits "living room" "dinner room" "kitchen" "garage" "garden".
- 3 motor opening circuits: 1 motor roller shutter - 1 garage door - 1 gate (simulated by 2 boxes withindicator lights)
- 1 heater 500W + 1 radio receiver.
- 1 sprinkler pump (simulated by indicator light) + 1 radio receiver.
- 1 remote control by telephone controlling 2 lighting sets or the roller shutter.
- 1 set of WIFI components to communicate with smartphone or tablet.

All these components are associated with radio transmitters & or receivers

- 1 Wifi touch tablet that can manage radio components of the home with integrated application to configure the components

Features of the basement

- Base on large wheels. Weight : 100kg.
- Dim L x l x H : 1200 x 730 x 1950mm.
- Melamine surface : 1200 x 1750mm.



COMMUNICATING ANTI-INTRUSION ALARM MANAGEMENT PANEL

Overall dimensions
W x D x H : 750 x 730 x 1840mm.

ref. TAG-12
Communicating version Tablet & Smartphone

Tertiary-based surveillance of two areas by two infrared sensors and one area by camera PAL / Ethernet IP. The student must complete the interconnections between the various components. Through the delivered software (in French), students will be able to configure all the parameters of the central unit as management of detection areas, event groups, the engagement scenarios, operating schedules, key code programming, the management of the surveillance camera ...
The student will also be able to set up a wireless router in association with the IP camera and then view the camera image on a smartphone or a tablet. (Free app available on AppStore or Android).

EDUCATIONAL OBJECTIVES

- ***Understanding and setting of an intruder alarm management***
- ***Understanding the setup and software programming***
- ***Understanding of an IP Ethernet network***
- ***Setting an IP camera Ethernet and a WIFI router***

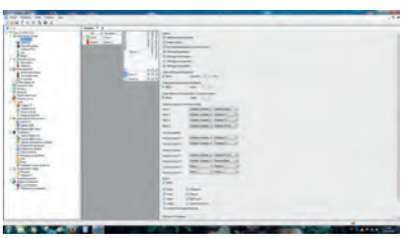
TEACHING RESOURCES STUDENT & TEACHER

Proposed Practical Works

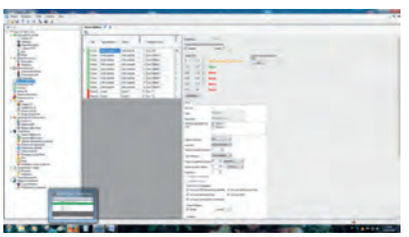
- Setting the alarm unit via the configuration software.
- Creating an IP Ethernet network.
- Setting the PC and the IP camera on the Ethernet network.
- Configurion of the wireless router.
- Realization of complete wiring.

Composition of the model

- 1 alarm unit with 8 areas self-powered by batteries, equipped with a USB port for connecting a PC via the supplied software.
- 1 siren with flash, auto-powered by battery.
- 1 code keypad with customizable display from software or locally.
- 2 infrared detectors.
- 1 Adjustable color camera PAL / IP.
- 1 230V WIFI router.



Keypad configuration from the programming software.



Setting the alarm unit from the configuration software.

CHARACTERISTICS OF THE FRAME

- Frame of matt anodized aluminium, double sided on casters.
- 2 panels of melamine 19mm with area 1400 x 670 mm
- Shelf of grey melamine 19mm, depth 400mm.
- Dimensions H1840 x W750 x D750 mm. Weight 87kg
- Mains power supply lead 2P+E, 3 metres.

Characteristocs of the electrical cabinet

- Dimensions 500 x 400 x 200mm

CONTROL PANEL FOR WIRELESS ANTI-INTRUSION ALARM

DELTA DORE
Smart is the new power

Composition

- 1 radio unit, 2 areas.
- 1 external siren.
- 1 radio keypad for data reception and remote control, with LCD display, enabled and disabled. Full and partial operation. 3 access codes: 1 master, 2 users. Log of the last 200 events. Information on system status: enabled and disabled, doors open, etc... Siren test. System configuration.
- 4 infrared detectors. Range 12m.
- 1 fire detector.
- 1 mains disconnection detection unit.
- 2 radio remote controls. 4 keys. Range 100-300 m.
- 2 break contacts for protecting openings (doors, windows, etc.)
- 1 GSM phone transmitter (supplied without SIM card) performs all alarm transmission and reception functions. Voice assistance, interphone communication. 4 programmable phone numbers. Message which can be personalized. You can insert your SIM card easily and safely for call transfer. All operator compatible.
- Chassis on wheels in matt anodized aluminum profile.
  Overall dimensions: L x W x H: 750 x 730 x 1840mm.
  19mm gray melamine shelf: 750 x 400mm.
  Power supply by 2 meter + 3 meter power cord.

ref. TAG-3

SUPPLIED FULLY WIRED AND CONFIGURED | TEACHING RESOURCES STUDENT / TEACHER

ref. TAG-3-C — **Version communicante**

SUPPLIED FULLY WIRED AND CONFIGURED | AUTONOMOUS WIFI NETWORK | TEACHING RESOURCES STUDENT / TEACHER

EDUCATIONAL OBJECTIVES

- ***To understand and configure an anti-intrusion alarm unit***
- ***To program the different parts of an anti-intrusion alarm such as the central unit, detectors, code keypad, siren, remote controls***

Practical work

- Location and functionality of each component.
- Implantation of components on the architectural plan of an apartment.
- Programming of the alarm center with a presence detector and remote control.
- Programming of the alarm center with addition of the information keyboard and second presence detector.
- Troubleshooting the installation.

OPTION TABLET WIFI 9.6'' CONFIGURED

Samsung® Tablet
Minimum features:

- Wifi 9.6 inch full HD touch
- 1.3Ghz
- 1.5GB RAM
- 8GB storage

ref. TAB-97

Software installed and configured

JUMPER LEAD PANEL

ref. TAG-2

EDUCATIONAL OBJECTIVES

- **Theoretical study of wiring of usual home components and creation via the secure technique of jumper leads**

TEACHING RESOURCES

Proposed practical works

- Simple introduction to circuit protection
- Wiring of single lighting and phase and neutral tapping
- Wiring of energy sensor
- Wiring of two-way lighting
- Wiring of lighting with timer switch, dusk switch, remote switch
- Wiring of lighting with presence selector
- Wiring of lighting variation
- Creation of circuits controlled by the timer switch (clock)
- Creation of sockets circuit
- Power supply of radiator with built-in thermostat
- Up/Down control of roller blind

Characteristics of the frame

- Frame of matt anodized aluminium, double sided on casters.
- 2 panels of melamine 19mm with area 750 x 400 mm
- Dimensions H1840 x W750 x D730 mm. Weight 89kg
- Mains power supply lead 2P+E, 3 metres.

Panel supplied with a complete wiring diagram and all detailed instructions for each component. The panel elements can differ from one series to another depending on manufacturer changes.

Components present on the panel

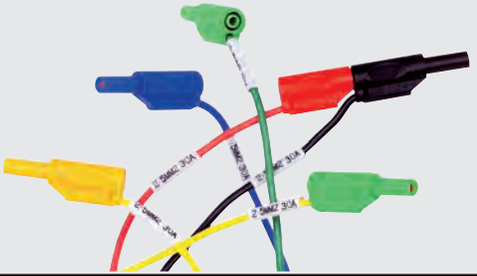
- 1 RC device 30mA mono + 2 circuit-breakers 10A + 1 circuit-breaker 16A
- 1 dusk switch with photocell
- 1 timer
- 1 remote control switch
- 1 clock
- 3 bulkhead lights 40W
- 1 single lighting switch
- 2 two-way switches
- 1 single pushbutton
- 1 socket 2P+E 16A
- 2 controls for roller blinds
- 2 connection terminal blocks
- 2 modular contactors
- 1 convector 500W
- 1 energy meter
- 1 simulation module, 2 roller blinds
- 1 light dimmer
- 1 presence detector

Other components: on request

Information common to the 3 references

These panels are supplied with a complete wiring diagram and detailed instructions for each component. The elements of the panels may be different from one series to another depending on the evolutions of the manufacturers.

Supplied with a lot of safety leads.



BASIC TABLE MODEL

This compact model can be placed on a table; it brings together the same components as the TAG-2 reference model on a frame with rollers (the convector is found on the back).
It therefore satisfies the same teaching goals, and can perform all the practical works.
Dimensions: L x w x h : 730 x 450 x 900mm.

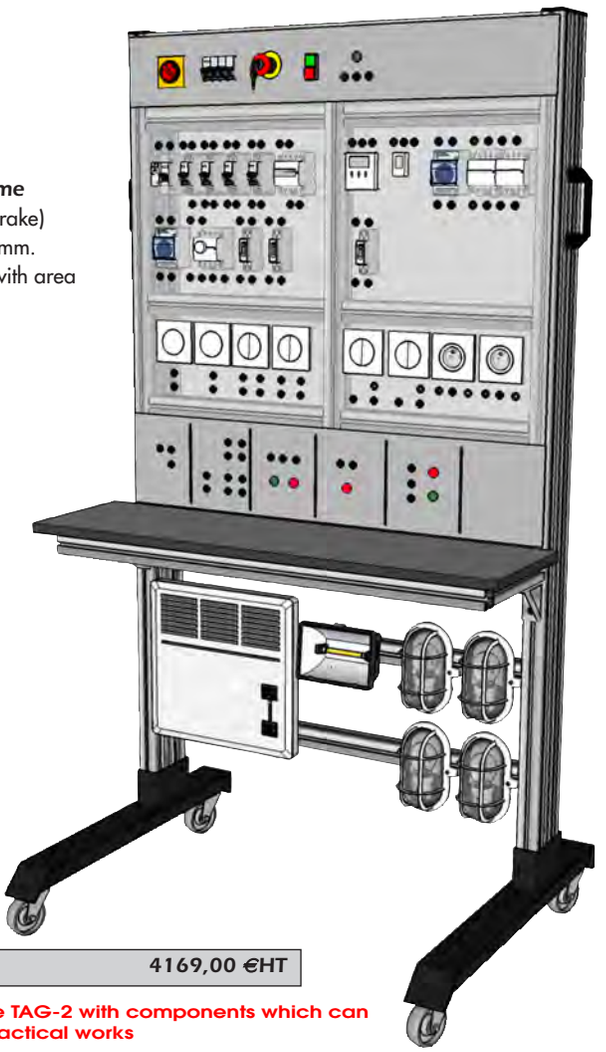
ref. TAG-2-P	2962,00 €HT

Very instructive panel with elements fixed on unbreakable Perspex sheets for a clear view of the components.

EXTENDED MODEL ON THE ROLLER FRAME

Characteristics of the frame
- Frame on wheels (2 with brake)
- Dim : 1000 x 730 x 1770mm.
- Shelf of melamine 19mm with area 750 x 400 mm

NEW



ref. TAG-2-MAX	4169,00 €HT

Model equivalent to the TAG-2 with components which can perform 4 additional practical works

Additional practical works

- Wiring a circuit with jettison
- Control a two-speed VMC. (VMC with simulation on terminals and lights)
- Control a hot water electric circuit with a HC/HP relay. (VMC with simulation on terminals and lights)
- Cabling an outside lighting projector

Components present on the worktop

- 1 single-phase 30mA diff circuit breaker
- 2 10A circuit breaker
- 1 16A circuit breaker
- 1 dusk-to-dawn circuit breaker with cell
- 1 timer
- 1 remote control switch
- 1 clock
- 4 bulkhead lights 40W
- 2 simple lighting circuit breakers
- 2 two-way switches
- 1 single pushbutton
- 2 16A 2P+E sockets
- 1 roller-blind control
- 2 connection terminal blocks
- 1 modular contact
- 1 convector 500W
- 1 energy meter
- 1 roller shutter simulation module
- 1 light rheostat
- 1 cut-off device
- 1 low/full time relay
- 1 simulation module, electric water heater with light
- 1 two-speed VMC control circuit breaker
- 1 2-speed VMC simulation module with 2 lights
- 1 exterior lighting projector

Other components: on request

STUDY OF DIFFERENT LIGHTS WIRINGS

ref. QUICK-APLUS

ref. QUICK-A **without frame and console**

Sockets on the back of the console for connecting the modules

Set of modules (H-250mm) for studying the different types of wiring of lights. The modules are cabled using safety leads Ø4mm.

EDUCATIONAL OBJECTIVES

- **Study of house wiring diagrams.**
- **Study and operation of a single lighting circuit.**
- **Study and operation of a double lighting circuit.**
- **Study and operation of a two-way circuit.**
- **Study and operation of a remote control switch circuit**
- **Study and operation of a timer circuit.**
- **Study and operation of a dusk switch circuit.**
- **Study and operation of an energy meter.**

TEACHING RESOURCES STUDENT & TEACHER

Proposed Practical Works

- Creation of house lights wiring diagrams.
- Creation of different light wiring such as single, double, two-way, timer, remote control, dusk switch.
- Creation of energy meter wiring.
- Creation of reading of light power consumption.

Comprises

- 1 Module – Two pushbuttons
- 1 Module – Two-way switch
- 1 Module - Two single lighting switches
- 1 Module – Two double lighting switches
- 1 Module – Single phase energy meter 63A
- 1 Module – Circuit-breaker 1P+E 16A
- 1 Module – Residual current circuit-breaker 30mA
- 1 Module – Timer, coil 230VAC-50Hz
- 1 Module – Remote control switch, coil 230VAC-50Hz
- 1 Module – Dusk switch + photocell
- 1 Module – Analogue ammeter 2.5A and Analogue voltmeter 250VAC
- 4 Modules – Bulkhead lights 230VAC-40W
- 1 set of safety leads for carrying out the different practical works.
- 1 frame with wheels (H x W x D): 1610 x 940 x 500mm equipped with rack for cords (30 fingers)
- 1 single-phase power console:

- 1 thermal magnetic circuit breaker (16A)
- 1 Emergency stop push button with key
- 1 Push button + LED indicator
- 1 230V single-phase output on 4mm safety terminals
- 2 230Vac sockets (2P + E) + 12 230Vac sockets (2P + E), at the back

Lights wirings - Autonomous sub-assemblies

Height 610mm – Width 590mm.
Each reference is delivered with a set of safety ropes to wire different modules.
General power supply with 230VAC 1.5m mains wires.

Study a double lighting circuit with switches
- 1 230V power module on 4m terminals with a 16A magneto-thermal circuit breaker and viewing window.
- 2 switch modules
- 2 lighting modules with windows, 60W-230VAC.

ref. QUICK-AK11 with frame

Study a lighting circuit with a push-button and contactor
- 1 230V power module on 4m terminals with a 16A magneto-thermal circuit breaker and viewing window.
- 2 push-button modules.
- 1 contactor module, 230V.
- 2 lighting modules with windows, 60W-230VAC

ref. QUICK-AK12 with frame

Study a lighting circuit with back-and-forth switches
- 1 230V power module on 4m terminals with a 16A magneto-thermal circuit breaker and viewing window.
- 2 back-and-forth switch modules.
- 2 lighting modules with windows, 60W-230VAC

ref. QUICK-AK13 with frame

Study a lighting circuit with a timer-type staircase
- 1 230V power module on 4m terminals with a 16A magneto-thermal circuit breaker and viewing window.
- 2 push-button modules.
- 1 timer module, 230V, timer-type staircase.
- 1 lighting module with 1 window, 60W-230VAC.

ref. QUICK-AK14 with frame

Study a lighting circuit with a dusk-to-dawn switch
- 1 230V power module on 4m terminals with an MT16A circuit breaker and viewing window.
- 1 switch module.
- 1 dusk-to-dawn switch, 230V, with a sensor.
- 1 lighting module with 1 window, 60W-230VAC.

ref. QUICK-AK15 with frame

Study a two-roller shutter
- 1 230V power module on 4m terminals with an MT16A circuit breaker and viewing window.
- 2 switch modules for two-roller shutter control.
- 1 simulation module of two-roller shutter with elevate and descent viewing windows.

ref. QUICK-AK16 with frame

SINGLE LIGHTING CIRCUIT LEARNING PANEL

ref. TAE-2-M

This electrical training panel allows the study of different types of lightings wirings. TAE-2-M is a system to lay on a table. It's equipped with 2 unfoldable mobile arms allowing an inclination of 70° and a great stability.
Dimensions: 700 x 600 x 400 mm (wheelbase with unfolded arms).
Delivered with a set of safety leads of 4mm.

EDUCATIONAL OBJECTIVES

- **Study wiring schemes for a simple lighting circuit.**
- **Study wiring schemes for a double ignition circuit.**
- **Study wiring schemes for a back-and-forth circuit.**
- **Study wiring schemes for a contactor circuit**
- **Study wiring schemes for a 230V 2P+T plug**

TEACHING RESOURCES STUDENT & TEACHER

Practical works

- Perform different schemes to wire lighting circuits
- Perform different wiring exercises.

COMPRISES

- 1 differential circuit breaker, 30mA – 16A type AC.
- 1 bipolar magnetothermal circuit breaker, 10A.
- 1 bipolar magnetothermal circuit breaker, 16A.
- 1 contactor , 230V.
- 2 two-way switches.
- 1 double pushbutton.
- 1 simple breaker.
- 1 230V – 2P+T plug
- 3 40W portholes.

VERSION ON PLATE FOR INSTALLATION ON WIRING WORKSTATION

ref. TAE-2

Version compatible with our wiring solutions equipped with rails which can receive plates of 12mm.
Dimensions: 700 x 640 x 220mm

SINGLE LIGHTING CIRCUIT CONTROL LEARNING PANEL

ref. TAE-3-M

This electrical training panel allows the study of different types of lightings wirings. TAE-3-M is a system to lay on a table. It's equipped with 2 unfoldable mobile arms allowing an inclination of 70° and a great stability.
Dimensions: 700 x 600 x 400 mm (wheelbase with unfolded arms).
Delivered with a set of safety leads of 4mm.

EDUCATIONAL OBJECTIVES

- **Study wiring schemes for a dusk-to-dawn switch**
- **Study wiring schemes for a timer**
- **Study wiring schemes for a rheostat**
- **Study wiring schemes for a contactor circuit**
- **Study wiring schemes for a presence detector**

TEACHING RESOURCES STUDENT & TEACHER

Practical works

- Perform different schemes to wire lighting circuits controls
- Perform different wiring exercises.

COMPRISES

- 1 differential circuit breaker, 30mA – 16A type AC
- 1 bipolar magnetothermal circuit breaker, 10A
- 1 dusk-to-dawn switch
- 1 timer, staircase type
- 1 remote control switch
- 1 rheostat (change luminosity)
- 1 double pushbutton
- 1 simple breaker
- 3 40W portholes

VERSION ON PLATE FOR INSTALLATION ON WIRING WORKSTATION

ref. TAE-3

Version compatible with our wiring solutions equipped with rails which can receive plates of 12mm.
Dimensions: 700 x 640 x 220mm

MOVABLE ELECTRICAL WIRING TRAINING PANEL FOR LIGHTINGS AND DOORBELL

ref. TAE-1-M

This electrical training panel allows the study of different types of lightings and doorbell wirings. TAE-1-M is a system to lay on a table. It's equipped with 2 unfoldable mobile arms allowing an inclination of 70° and a great stability.
Dimensions: 700 x 600 x 400 mm (wheelbase with unfolded arms).
Delivered with a set of safety leads of 4mm.

EDUCATIONAL OBJECTIVES

- ***Study of single lighting circuit wiring diagrams***
- ***Study of double lighting circuit wiring diagrams***
- ***Study of two-way circuit wiring diagrams***
- ***Study of remote control switch circuit wiring diagrams***
- ***Study of timer circuit wiring diagrams***
- ***Study of doorbell circuit wiring diagrams***

TEACHING RESOURCES STUDENT & TEACHER

Practical works

- Making different house lights wirings
- Making a doorbell wiring diagram
- Setting of a timer for a lighting

COMPONENTS PRESENT ON THE PANEL

- 1 connecting circuit breaker – 500mA
- 1 30mA residual current circuit breaker – 25A, AC type
- 1 thermal-magnetic bipolar circuit breaker – 2A
- 1 thermal-magnetic bipolar circuit breaker – 10A
- 1 M bipolar circuit breaker – 16A
- 1 one-way switch
- 2 push-buttons
- 2 two-way switches
- 1 timer 230VAC
- 1 remote control switch 230VAC
- 2 light bulbs 40W
- 1 doorbell with transformer and push-button
- 1 standard socket 2P+E – 230V

VERSION ON PLATE FOR INSTALLATION ON WIRING WORKSTATION

ref. TAE-1

Version compatible with our wiring solutions equipped with rails which can receive plates of 12mm.
Dimensions: 700 x 640 x 220mm

Example of an installation on a wiring workstation. ref. BOR-SUP1-O.

SIMULATOR FOR CHECKING CONTROLLER (PLC) PROGRAMMING

Checking a PLC program requires the connection of an operative part.
PUP-PLC groups together a set of actuators, power supplies and components required for checking programs.
Its complete composition provides great comfort for this check.

ref. PUP-PLC

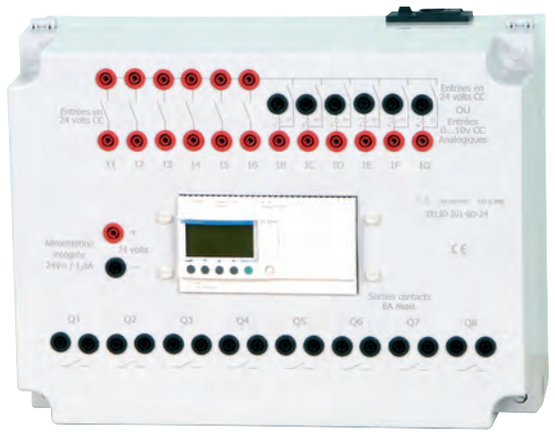
Features
- 3-metre power cord for power supply 230V-50/60Hz single phase.
- Console dimensions: 1000 x 160 x h 300mm. Weight: 14kg.

Composition of the console
- 1 Start / Stop button with indicator light (general control)
- 1 thermal magnetic + RC circuit-breaker 30mA
- 3 pushbuttons NO
- 3 pushbuttons
- 2 ON/OFF switches NO
- 2 ON/OFF switches
- 1 wind sensor, binary contact
- 1 light sensor, binary contact
- 3 limit switches NO
- 1 Temperature sensor PT100, 3-wire output
- 1 voltage generator adjustable by potentiometer from 0 to 10VDC
- 1 current generator adjustable by potentiometer from 4 to 20mA
- 1 dimmer 230VAC with control 0-10VDC
- 1 dimmer 230VAC with control 4-20mA
- 1 buzzer 24VDC
- 2 3-pole contactors 24VAC + 2 auxiliary contacts NO
- 3 green indicator lights 24VAC
- 3 red indicator lights 24VAC
- 1 source of fixed voltage 230VAC 50Hz
- 1 source of fixed voltage 24VDC
- 1 source of voltage 24VAC 50Hz
- 1 carrying handle

PROGRAMMABLE CONTROLS SYSTEM

Schneider Electric

BASIC MODEL

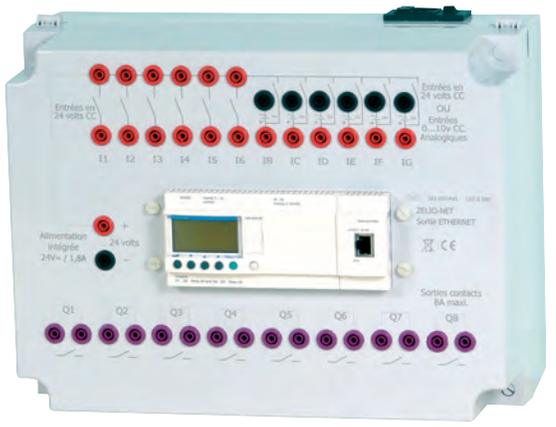


ref. ZELIO-201-24

This unit is a programmable interface working as a PLC with orders (inputs) and contacts (outputs). Its particularity is to integrate a clock which sets controls. Its programming software is very easy to use. Among its various and user-friendly functions, the function "SIMULATION" which allows to check the program before using it in real condition.
Dimensions of the box: 360 x 270 x 170mm

Sum up of functions and possibilities of the unit and its software:
- 12 inputs 24V DC, 6 can be wired in analog inputs 0-10V
- 8 dry contacts outputs
- a display indicating state and local programming
- 6 keys for local programming

MODEL WITH TCP-IP ETHERNET MODULE



ref. ZELIO-NET

We have added to the ZELIO-201-24 (opposite) a network communication module which can be used to connect the ZELIO to the Ethernet using the Modbus TCP protocole

Ethernet module features:
- direct connection to the ZELIO
- female RJ45 reinforced cable
- a communication display LED (LK/ACT 10/100)
- a STATUS display LED (STS)

SOFTWARE SUPPLIED WITH ZELIO-NET

INTEGRATED PLC UNITS

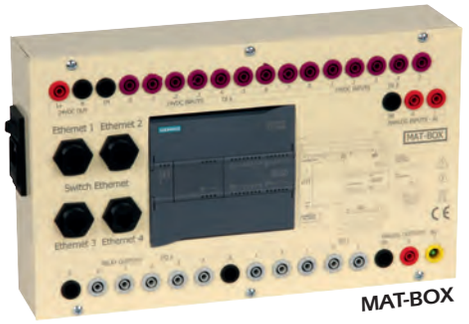
Ref.	MAT-BOX	AUTO-221	AUTO-221-A	221-MAX	
Brand	**SIEMENS**	**SCHNEIDER**			
Model	**SIMATIC S7-1200**	**M221**			
Software	**LOG-STEP (in option)**	**SoMachine Basic (supplied)**			
Number of intputs	14 inputs 24VDC			30 inputs 24VDC	
Number of outputs	10 All or Nothing outputs 2A max on resistive load	10 All or Nothing outputs 2A max		26 All or Nothing outputs 2A max	
Analog	2 inputs 0-10VDC 1 output 0-10VDC or 4-20mA	no	2 inputs PT100 1 output 0-10VDC or 4-20mA	2 analog inputs 0-10V	
Ethernet	yes + 1 mini switch 4 ports RJ45	yes			
Power supply	230VAC-50/60Hz by means of socket unit+ switch				
Dimensions	330 x 200 x 80mm	330 x 200 x 80mm		380 x 280 x 180mm	
Supplied with	1 Ethernet RJ45 3-m cable. 6 detailed practical works (PLC configuration, use and programming.)	1 Ethernet RJ45 3-m cable. 1 USB cable PC/PLC			

Ref.	API24-BOX	API26-BOX
Brand	**CROUZET**	
Model	**eM4**	**Millenium 3-XD26**
Software	**eM4 Soft (supplied)**	**M3 Soft (supplied)**
Number of intputs	4 configurable ones for coder (20kHz) or quick counter (60kHz) 12 including 4 configurable ones in analog	16x in 24Vdc including 4 configurable ones in analog
Number of outputs	2 statics PWM 8 all or nothing (2x6A / 6x8A)	10 all or nothing (8x8A / 2x5A)
Analog	4 inputs (0-10V/0-20,4-20mA)	6 inputs (0-10Vdc, CTN, potentiometer)
Ethernet	no	yes - RJ45
Power supply	230V-50/60Hz by power cord	
Dimensions	330 x 200 x 80mm	
Supplied with	Practical works for the settings, the use and the programming of the PLC	1 Ethernet RJ45 3-m cable Practical works for the settings, the use and the programming of the PLC

API24-BOX

API26-BOX

	AUTO-PRO	AUTO-PROA
	SCHNEIDER	
	MODICOM M340	
	UNITY SMALL (in option)	
	16 insulated inputs 24Vcc	
	16 All or Nothing outputs 2A max	
	no	4 voltage / current inputs ±10V / 0-10V / 0-5V / 1-5V / ±5V 0-20mA / 4-20mA / ±20mA 2 voltage / current outputs ±10V / 0-20mA / 4-20mA
	Ethernet module TCP/IP on RJ45	
	230VAC-50/60Hz by means of socket unit + switch	
	360 x 270 x 170mm	
	1 ethernet RJ45 3-m cable.	

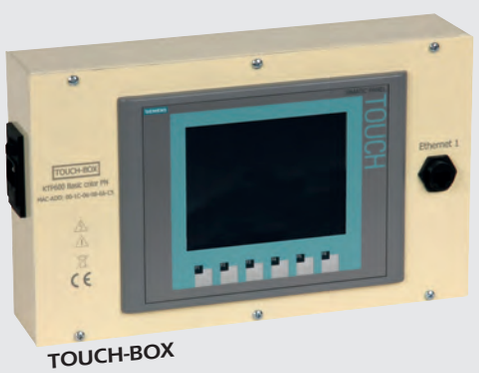


MAT-BOX

AUTO-PRO-A

INTEGRATED TOUCHSCREEN UNITS

Ref.	TOUCH-BOX	STU-BOX4	STU-BOX6
Brand	SIEMENS	SCHNEIDER	
Model	Simatic KTP600	HIMISTU	
Software	LOG-STEP (in option)	VijeoDesigner (supplied)	
Touchscreen	5,7" TFT 256 colours	3,5" 65536 colours	5,7" 65536 colours
Resolution	320 x 240 pixels		
Ethernet	1 RJ45 connector	6 RJ45 connectors (Including 1 5-ports switch)	1 RJ45 connector
USB	-	1 USB connector	
Power supply	230VAC-50/60Hz by means of socket unit + switch		
Dimensions	330 x 200 x 80mm		
Supplied with	1 Ethernet RJ45 3-m cable. User's manual with tutorials.	1 Ethernet RJ45 3-m cable.	



TOUCH-BOX

STU-BOX4

STU-BOX6

AUTOMATED INDUSTRIAL BELT CONVEYORS

ref. CONV-1S

ref. CONV-1S-C
Communicating version
Tablet & Smartphone

ref. CONV-2S

ref. CONV-2S-C
Communicating version
Tablet & Smartphone

The industrial belt conveyors include the components required for understanding electric conveyance. They will allow students to perform wiring, measurement, maintenance and supervision in the industrial field.
Mounted on aluminium frame with large diameter casters for easy movement.

The assembly is supplied fully functional with examples of programming. A CD contains the user instructions, tutorials and the controller, HMI and speed variator programs.

- Overall dimensions: H 2000 x W 2000mm
  (the aluminium pole that supports the light column is 1000mm high)
- Height of the conveyor: 1000mm (1070mm for CONV-2S)
- Useful dimensions of the conveyor: 1400 x 370mm (x2 on CONV-2S version)
- Dimensions of the belt inlet/outlet trays: 300 x 370mm.

EDUCATIONAL OBJECTIVES

- ***To observe and understand the operation of an industrial belt conveyor.***
- ***To take industrial measurements of electrical values.***
- ***To study the operation of inductive and photo-electric sensors.***
- ***To study the reversal of the rotation direction of an asynchronous motor.***
- ***To study the speed control of an asynchronous motor.***
- ***To learn how to wire the different components available on a belt conveyor (detector and light column).***
- ***To study the programming of a controller (PLC) with analogue output signal 4-20mA/0-10V.***
- ***To study the programming of an HMI screen with supervision software.***
- ***To study Ethernet / IP addressing***
- ***To perform industrial maintenance operations.***

USER'S MANUAL + PRACTICAL WORKS

Practical works

- Study and identification of the different components of the conveyor.
- Measurement of the current, voltage and power absorbed by the motor.
- Study of the operating principle of the inductive and photo-electric sensors.
- Test of the motor in the two rotation directions.
- Programming of a speed variator locally & from a computer using the Somove® software.
- Production of the complete diagram and wiring of the conveyor.
- Production of the program of a Schneider® M221 controller.
- Production of the supervision program from the Vijeo Designer® software.

Supervision enables viewing of

- Operation of the conveyor (CONV-1S) or the two conveyors (CONV-2S).
- The direction of operation of the conveyor (CONV-1S) or the two conveyors (CONV-2S).
- The detection and state of each sensor.
- The speed of rotation of the conveyor (CONV-1S) or the two conveyors (CONV-2S).
- The operation of the lamps of the light column.
- Jam at the belt end.
- The passing of a high or low part.
- The counting of parts.

Supervision enables control of

- Forward/backward operation of the conveyor (CONV-1S) or the conveyors (CONV-2S).
- Variable speed of rotation of the conveyor in manual or automatic.
- The three lamps of the light column.
- The automatic/manual/maintenance modes.

NEW

Composition

- Industrial belt conveyor driven by three-phase asynchronous gear motor 3x400VAC. Useful surface area of the conveyor 1400x370mm (x1 for CONV-1S / x2 for CONV-2S)
- Photo-electric sensors with adjustable fixing. The sensors can be moved along the conveyor. Output with DRY, NO contact (x3 for CONV-1S / x5 for CONV-2S)
- Inductive sensor with adjustable fixing. The sensor can be moved along the conveyor. Transistor output (x1 for CONV-1S / x2 for CONV-2S)
- One light column with three colours.
- One electrical cabinet equipped with a wiring frame composed of:
  - one set of circuit-breakers
  - one set of contactors
  - one Schneider® M221 controller with analogue board 4-20mA and 0-10V. Ethernet RJ45.
  - one Schneider speed variator equipped with its Somove software
  - one set of terminal blocks
  - one Ethernet switch
- One Ethernet colour HMI touch screen 5.7" with its Vijeo Designer® software. Mounted on an easy-to-move arm. The screen is easy to unplug from its support for easy storage.
- Tray at start and end of conveyor to collect the conveyed articles (x2 for CONV-1S / x3 for CONV-2S)

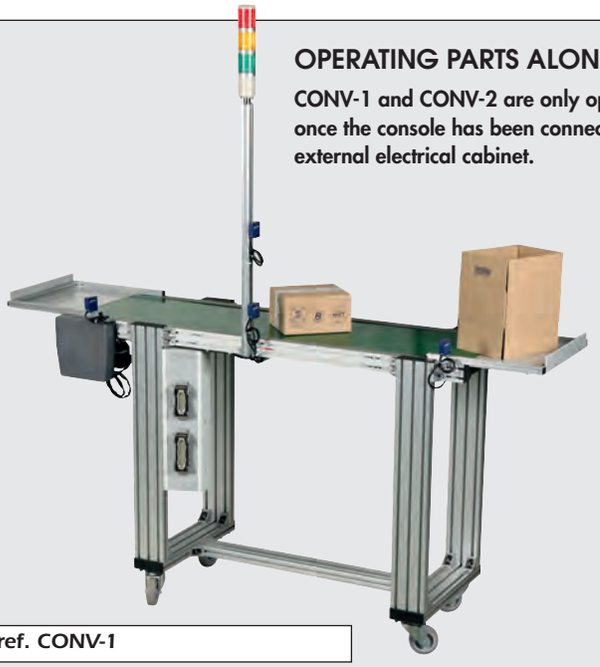
OPTION OF VISION SENSOR

ref. CONV-VISION

Vision sensor combined with configuration software for part surveillance and recognition by video. The part conveyed under the camera by the conveyor is checked and compared with the image recorded in the memory of the video sensor. If the part does not conform, the conveyor stops and an indicator signals the fault.

OPERATING PARTS ALONE

CONV-1 and CONV-2 are only operational once the console has been connected to an external electrical cabinet.



ref. CONV-1

Composition

- Industrial belt conveyor driven by three-phase asynchronous gear motor 3x400VAC. Useful surface area of the conveyor 1400x370mm (x1 for CONV-1 / x2 for CONV-2)
- Photo-electric sensors with adjustable fixing. The sensors can be moved along the conveyor. Output with DRY, NO contact (x3 for CONV-1 / x5 for CONV-2)
- Inductive sensor with adjustable fixing. The sensor can be moved along the conveyor. Transistor output (x1 for CONV-1 / x2 for CONV-2)
- One light column with three colours.
- One console with two Harting® industrial connectors grouping the wiring of the motor, the sensors and the light column.
- Tray at start and end of conveyor to collect the conveyed articles (x2 for CONV-1 / x3 for CONV-2)
- 3m cable with Harting® industrial connectors for connecting the conveyor to your electrical cabinet (x2 for CONV-1 / x3 for CONV-2)

ref. CONV-2

CONVEYOR BELT

ref. MAQ-CONV

Dimensions: 875 x 320 x 141mm.
Weight 10.5kg.

Operative part reproducing a conveyor belt.
In addition to studying the various sensors, many scenarios of programming are possible, depending on, the weight of the piece, its height, its material. The accuracy of an optical fiber can also detect any defects. MAQ-CONV has 9 inputs and 12 digital outputs, as well as a 4-20 mA analog output.

On-off inputs / outputs being dry contacts, this model is controllable by any type of programmable logic controller (PLC) positive or negative, by microcomputer or sequential system. The connection is made via Ø4 mm safety terminals, with orange signage for the actuator inputs, blue for the sensor outputs.

PLC OPTION

ref. 221-MAX

Number of inputs	30 inputs 24VDC
Number of outputs	26 digital outputs 2A max
Analog	2 analog inputs 0-10V
Ethernet	Yes
Power supply	230VAC-50 / 60Hz by plug socket + switch
Dimensions	380 x 280 x 180mm
Delivered with	1 RJ45 Ethernet cord of 3m. 1 USB link PC / PLC

Practical works
- Conversion of weight into 4-20mA signal according to the characteristics of the strain gage
- Detection accuracy of single photocells and optical fiber
- Detection distances of objects by L and C sensors according to the material of the item
- Using the meter
- Using the conveyor to sort

SUPPLIED WITH PRACTICAL WORKS

INPUTS
- 1 start of the drive motor of the belt
- 4 cylinders marked V1 to V4.
- V1 pushes the item on the carpet, V2 to V4 eject it
- 1 input incrementation of the counter (0 to 99)
- 1 counter reset input
- 2 LED indicators : PASS and FAIL

ON-OFF OUPUTS
- 6 photocells, including 1 barrier, 2 mirror reflection, 2 simple reflections, 1 optical fiber.
- 1 capacitive sensor for detecting non-metallic parts
- 1 inductive sensor for detecting metal parts
- 1 SET NUMBER makes a contact when the counter reaches the preset value
- 3 START / STOP / RESET buttons control the set

An LED next to each sensor lights up if detected

4-20mA OUTPUTS
Placed in front of the cylinder V1 a scale weighs the item, and displays its weight in grams.
The image of the weight is converted into a 4-20mA signal.
The automaton then actuates the cylinder V1 to push the item on the band, or actuates V2 to eject it.

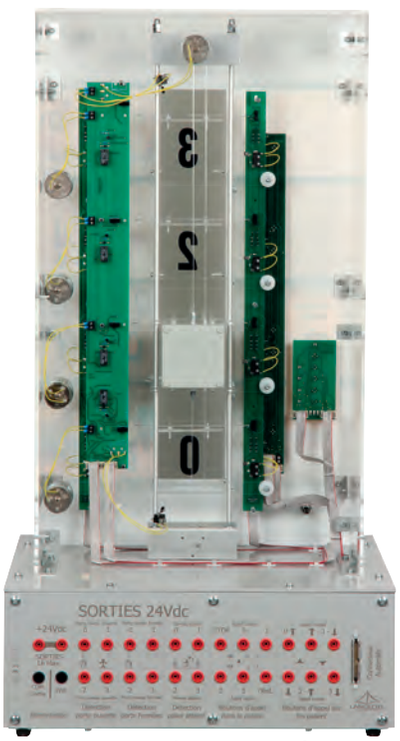
VARIOUS
Supplied: a set of 6 pieces of different weights, shapes and materials.
Dimensions conveyor belt: 590 x 60mm
MAQ-CONV is integrated in a case that protects the components during transport.
Dimensions: 875 x 320 x 141mm. Weight 10,5kg.
Switching capacity of the input / output contacts: 30Vpp-1A.
220VAC power supply.

DIDACTIC LIFT

USER'S MANUAL + 7 PRACTICAL WORKS

Front view with inputs interface

ref. ASC19



Rear view with outputs interface

The ASC19 lift is a model which may be connected to a PLC or any microprocessor system.
It comprises 24 outputs and 21 inputs.
You can only use a part of input/outputs if you want to do easy programmes

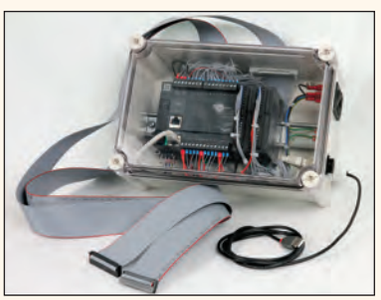
MAIN FEATURES :

- Opening and closing of the doors on each floor is done by electric servo motors.
- The rear of the lift is visible through the sides and the bottom which are transparent
- The route of the lift is sensed at each floor by a photo-detectors.
- Limit switches (without program control) stop the lift if there is an error in the program.
  These mechanical stops are present on all movement axes of motor.
  A key switch can return to a position called "normal"
- All of the buttons and switches are fitted with de-bounce circuits.
- The outputs are protected against the possibility of a short-circuit.
- The rear sliding door is of a transparent Plexiglass design and there is no manual access possible, as there is risk of damaging the servomotor.
- On Input / Output side a 24Vdc power supply is available. An overload and short circuit protection is integrated to the system.

The mechanical controls are sturdy and can withstand any likely faults.

4 LEVELS EACH LEVEL HAS	1 electrically opening door - 1 photo-detector for 'door closed' 1 photo-detector for 'door-open' 2 safety limit switches for door open/close (No control from the program possible) 1 button to call the lift 'up' (except the 3rd floor) with indicator lamp. 1 button to call the lift 'down' (except the ground floor) with indicator lamp 1 lamp to indicate the presence of the lift - 1 photodetector to indicate the presence of the lift
CONTROLS INSIDE THE LIFT	4 buttons for each floor - 1 stop button 1 switch to simulate a blocked door 4 lights for each floor - 1 light inside the lift (simulating the lighting)
UNIT SUPPLIES POWER TO	the motors - the LED - internal logic to the unit.
OTHERS SPECIFICATIONS	Dims 900 x 480 x 410mm Weight 18kg Supply 230V 50Hz Driving logic values 24V. Power supply : 230V - 50Hz (protected by fuse)

PLC OPTION WITH PRE-WIRED CLAMP CONNECTORS



Interface designed to be connected to the ASC19 lift.
Comprises one PLC 30 inputs 26 outputs dry contacts, one USB connection with the PC and all cables to the lift, mains cable.
Dimensions : 250 x 180 x 175mm.
Weight : 2.7kg

ref. AUTOMASC

PLC OPTION TO CONNECT WITH SAFETY LEADS 4MM

ref. 221-MAX

Nb inputs	30 inputs 24VDC
Nb outputs	26 outputs TOR 2A max
Analog	2 analog inputs 0-10V
Ethernet	yes
Power supply	230VAC-50/60Hz by means of socket unit + switch
Dimensions	380 x 280 x 180mm
Supplied with	1 ethernet RJ45 3-m cable. 1 USB cable PC/PLC

Lighting control system with PLC

This model is a room lighting unit comprising an electrical cabinet and a console fitted with low-voltage spotlights. Using a TCP/IP PLC and monitoring software, it is possible to control the model and view its operation on a computer.

ref. COFEC
THESE DIFFERENT EQUIPMENTS CAN BE SOLD SEPARATELY

OPERATING PART: ELECTRICAL CABINET + LIGHTING CONSOLE
- 1 32A rated 30mA residual current four-pole circuit breaker
- 2 double pole circuit breakers for protecting the 6 lighting circuits
- 6 double pole remote control switches.
- 1 double pole circuit breaker for protecting the PLC.
- 1 connection terminal block
- 6 24V LED lamps
- 6 push-buttons for manual lighting control
- 1 3m multiwire cable for connecting the lights to the electrical cabinet.

PLC
- with 10 relay outputs and 14 inputs, supplied with
- a cable for interconnection with the model
- programming software in English/French in ladder language.
- Dimensions: 170 x 130 x 130 mm. 220-240V AC

MONITORING
- Allows you to manage the lighting control model from a PC
- Offers the basic features of a graphical tool
- acquisition and display of PLC variables
- monitoring and control of lights (switching on, switching off and timer)
- The software's graphics editor supports many applications.

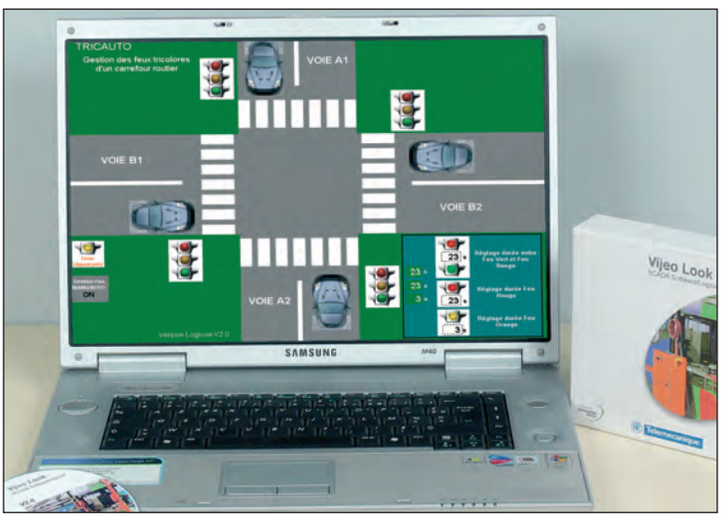
The user can modify the preloaded demo program or create a new one

FEATURES OF THE ASSEMBLY
- Powered by a 230V mains cable
- Metal industrial cabinet with a glazed door. Dims: 400 x 300 x 200 mm
- Lighting console: dim. 400 x 330 x 200mm
- The assembly is supplied already wired with a monitoring example and all mains leads necessary for proper operation

Traffic lights with plc

This model simulates a crossroad equipped with 4 traffic lights. Using a TCP/IP PLC and monitoring software, it is possible to control the model and view its operation on a computer.

ref. TRICAUTO
THESE DIFFERENT EQUIPMENTS CAN BE SOLD SEPARATELY



OPERATIVE PART
- 6 x traffic lights control INPUT by 24 VDC level
- 4 x car detection sensor OUTPUT by 24 VDC level (supplied by the PLC)
- 6 x traffic lights manual swith on/off
- Interconnection : DB25 plug
- Dimensions : 390 x 325 x 140 mm

PLC
- model : 9 output & 7 relay inputs, supplied with :
  - one interconnection wire plug link on the didactical model.
  - one programming software (english/french) based on "contact" language.
- Dimensions : 170 x 130 x 130 mm / 220-240 VAC

MONITORING
- Traffic lights system controlled from a computer
- Visual and intuitive display interface :
  - Acquisition of PLC parameters and visual control
  - Cars and traffic lights monitoring
  - Traffic lights control (switch on/off adjustement time, orange flashing)
- The software visual editor allowed to adapt the basic settings and to change software visual interface. Large possibility of use according to your particular teaching needs.

FEATURES OF THE ASSEMBLY
- Dim. 390 x 325 x 160mm
- The assembly is supplied already wired with a monitoring example and all mains leads necessary for proper operation

Pumping station

This model simulates a drinking water pumping station. Using a TCP/IP PLC and monitoring software, it is possible to control the model and view its operation on a computer.

OPERATING PART
- 3 push-buttons for On / Cycle Start / Cycle Stop
- 6 switches representing the water level sensors.
- 4 lamps representing the operation of the two pumps.

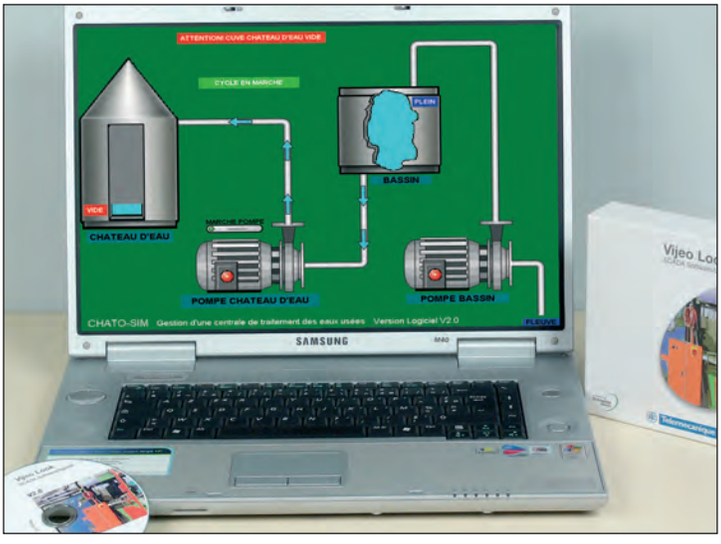
PLC
- with 7 relay outputs and 9 inputs, supplied with
- a TCP/IP interface for the Ethernet connection
- a 1.5m M/F DB25 cable for interconnection with the model.
- programming software in English/French in ladder language.
- Dimensions: 170 x 130 x 130 mm. 220-240V AC

MONITORING
- Multilingual software for controlling the lights using a PC
- Offers the basic features of a graphical tool
- acquisition and display of PLC variables
- monitoring and control of the station' operation (start-up and shutdown of the pumps and maintenance operations, etc.).)
- The software's graphics editor supports many applications.

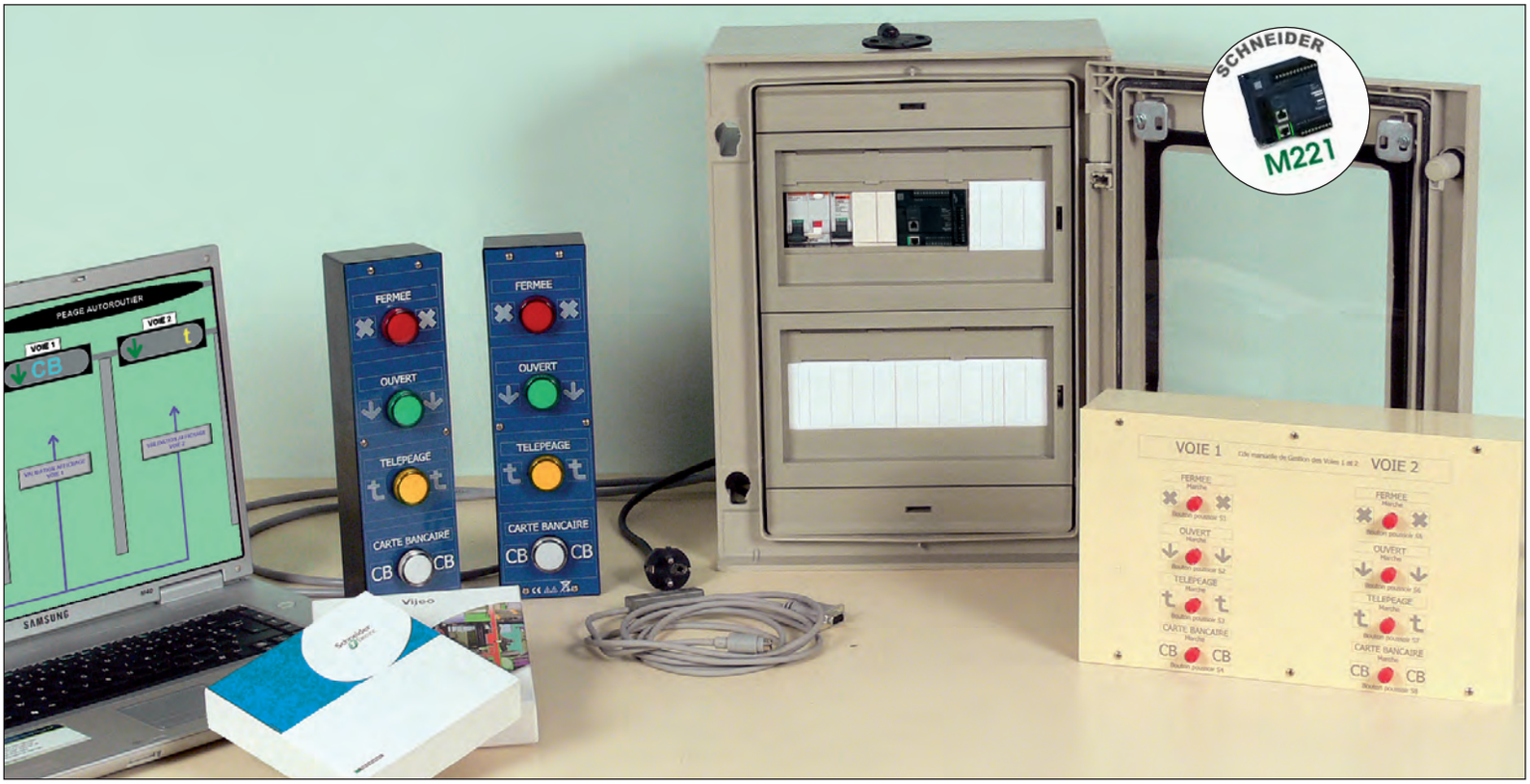
The user can modify the preloaded demo program or create a new one

FEATURES OF THE ASSEMBLY
- Dimensions: 330 x 200 x 80mm
- The assembly is supplied already wired with a monitoring example and all mains leads necessary for proper operation

ref. CHATO-SIM
THESE DIFFERENT EQUIPMENTS CAN BE SOLD SEPARATELY



Light signs system (for a motorway toll)



Simulates a motorway toll. Comprises 1 electrical cabinet and 2 toll lane indication signs. Using a TCP/IP PLC and monitoring software, it is possible to control the model and view its operation on a computer : opening/closure of lanes, management of banker's card or telepayment (electronic road pricing (ERP)) payments, manual or automatic function with time-stamp on the PLC, etc.

ELECTRICAL CABINET
- 1 32A rated 30mA residual current four-pole circuit breaker
- 1 single-pole circuit breaker for protecting the PLC and sign
- 1 set of junction boxes

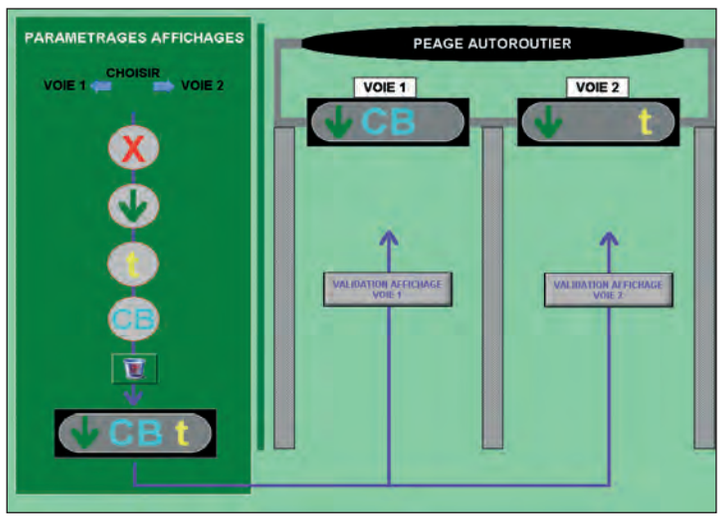
OPERATING PART, EACH CONSISTING OF
- 4 24V lamps (Open / Closed / Banker's card / Telepayment)
- 2 m of multiwire cable for connecting to the electrical cabinet.

PLC
- with 10 relay outputs and 14 inputs, supplied with
- 1 TCP/IP interface for Ethernet connection
- 2 1.5m multiwire cables for interconnection with the model
- programming software in English/French in ladder language.
- Dimensions: 170 x 130 x 130 mm. 220-240VAC

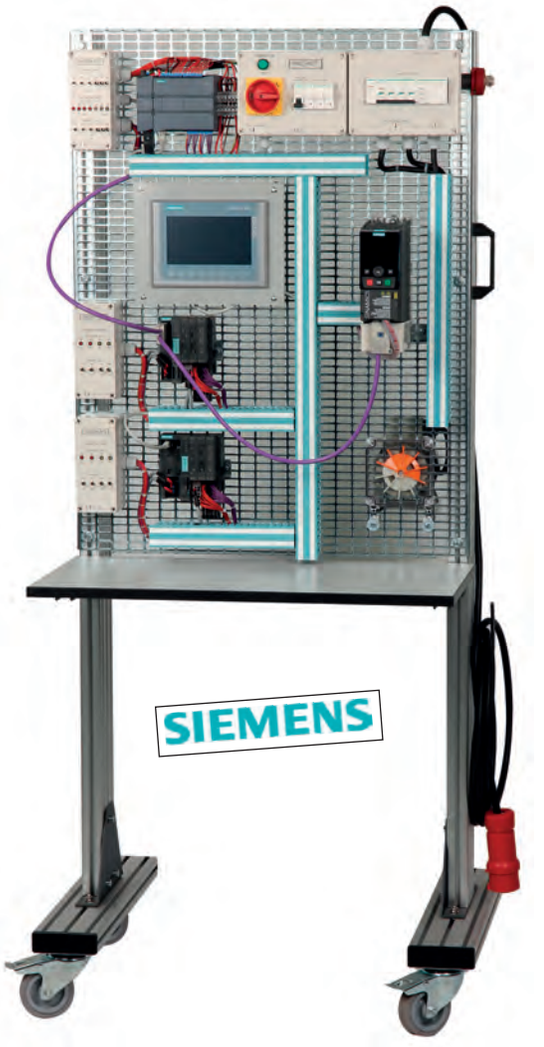
MONITORING
- Multilingual programming software for managing the toll indication cabinet from a PC.
- Offers the basic features of a graphical tool
- acquisition and display of PLC variables
- monitoring and control of the toll lane (lane open, lane closed, payment by BC or telepayment)
- The software's graphics editor supports many applications. The user can modify the preloaded demo program or create a new one

FEATURES OF THE ASSEMBLY
- Powered by a 230V mains cable
- Metal industrial cabinet with a glazed door
  Dimensions: 400 x 300 x 200 mm
- Indication sign: 420 x 80 x 70 mm
- The unit is supplied already wired with an example of monitoring and all the linking cables which are required for its proper operation

ref. AUTO-PEAG
THESE DIFFERENT EQUIPMENTS CAN BE SOLD SEPARATELY



FIELDBUS STUDY FOR PROFINET® & PROFIBUS® - SIEMENS® COMPONENTS



ref. MAQ-NET

EDUCATIONAL OBJECTIVES

- ***Studying of Fieldbus communication between different automatism components***
- ***Studying of Profinet® and Profibus® wiring***
- ***Settings of components Profinet® and Profibus®***
- ***Programming of the set***

TEACHING RESOURCES STUDENT & TEACHER / VIDEO

Features of the basement

- Base on wheels
- Dim L x l x H : 800 x 700 x 1800mm
- Weight : 67kg

Composition of the model

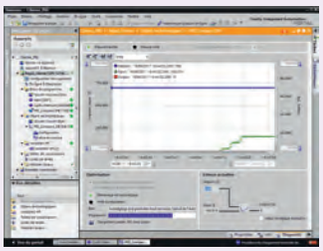
Power supply from three-phase mains 3 x 400V + N + E.

- 1 power supply unit with user and appliance protection (30mA)
- 1 "machine" box with 3 PB, 3 switches, 7 indicator lamps and 3 PB and 3 switches for simulating sensors.
- 2 "machine" boxes each with 4 indicator lamps and 2 PB and 2 switches for simulating sensors.
- 1 PLC SIMATIC S7-1200. 14I / 10O. Integral Ethernet port.
- 1 Profibus interface
- 1 ETHERNET switch 4 ports RJ45
- 1 HMI colour touchscreen 5.7" with Profinet RJ45 port
- 1 interface ET200S 4I/4O offset with Profinet coupler
- 1 interface ET200S 4I/4O offset with Profibus coupler
- 1 speed controller SINAMICS G120C 0.55kW with integral graphic terminal.
- 1 Asynchronous motor 230/400V- 0.12kW with fan for viewing rotation.
- 1 set of Profinet, Profibus leads.
- 1 set of Profinet, Profibus connectors for mounting.
- 20 metres of Profinet, Profibus cable.
- 1 Starter software for programming the speed controller.
- 1 CD includes the instructions for the different components and the practical assignments and programming examples for the PLC, the speed controller and the HMI*

*HMI : *Human Machine Interface*

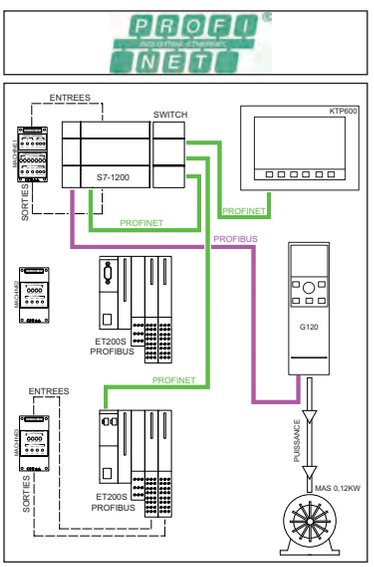
SOFTWARE OPTION

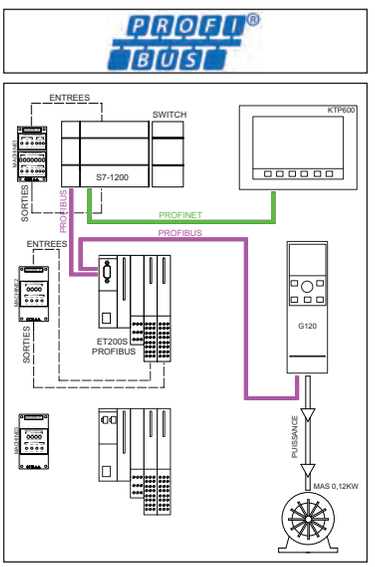
LOG-STEP is highly intuitive. On-line help and the practical assignments let students learn quickly with the different programming screens. Single workstation licence. Compatible with Windows XP Home/Pro, 7 Home/Pro 32bits.
Recommended PC configuration: Dual Core Processor 2Ghz or equivalent, RAM 2GB and screen resolution 1280x1024.
For programming the PLC and the touchscreen HMI.



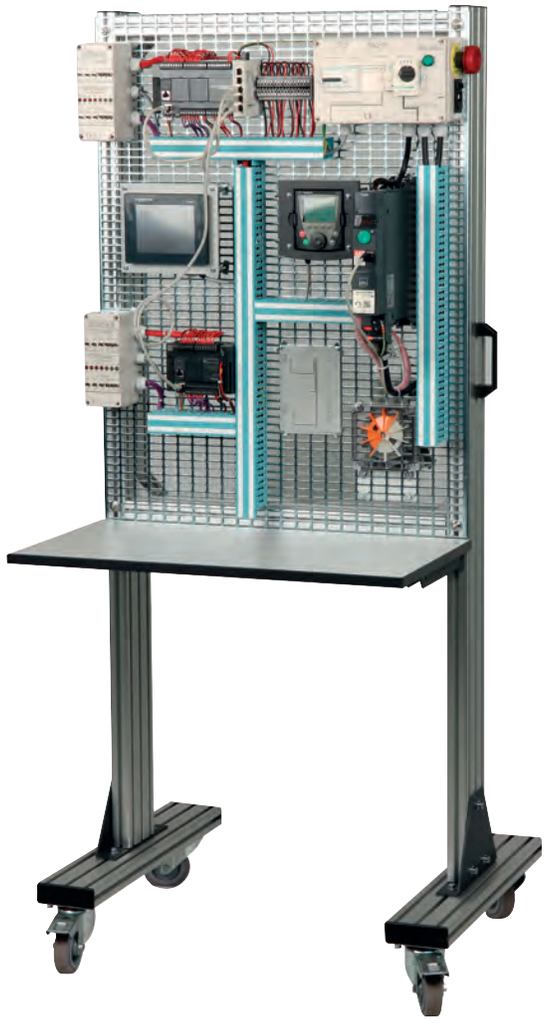
Programming of the PIF function

ref. LOG-STEP





FIELDBUS STUDY FOR ETHERNET - SCHNEIDER® COMPONENTS



EDUCATIONAL OBJECTIVES

- ***Studying of Fieldbus communication between different automatism components***
- ***Studying of the ethernet wiring and IP network creation***
- ***Settings of Ethernet components***
- ***Programming of the set***
- ***Configure a Wifi network and control the components from a tablet***

Features of the basement

• Base on wheels • Dim L x l x H : 800 x 700 x 1800mm • Weight : 63kg

ref. MAQ-IP	**on wheels**
ref. MAQ-IP-N	**version to put on table**

DELIVERED WIRED AND SET | AUTONOMOUS WIFI NETWORK | TEACHING RESSOURCES STUDENTS / TEACHER | SIMULATED ELECTRICAL COMPONENTS

Practical works

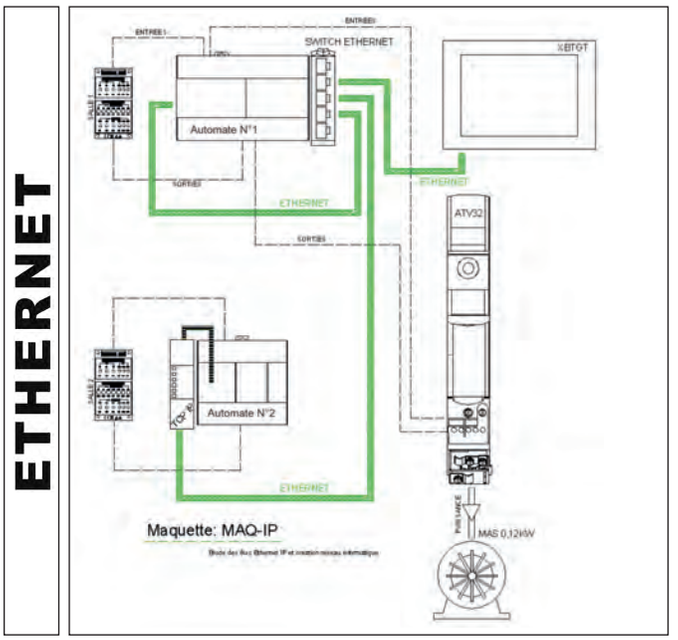
- Creating an company IP Ethernet network with multiple PCs
- Programming a PLC with a built-in or remote Ethernet bus on a TCP/IP interface
- Programming a HMI* interface, touch screen, with built-in Ethernet bus
- Programming of a speed converter from the So Move software
- Interconnecting and settings of components for a global operation
- Using the PLC programming software
- Carry out the WiFi configuration for ordering on a tablet or smartphone.

In the practical works, the sequences of programming of each components is provided in the form of video files for a better understanding of the student.

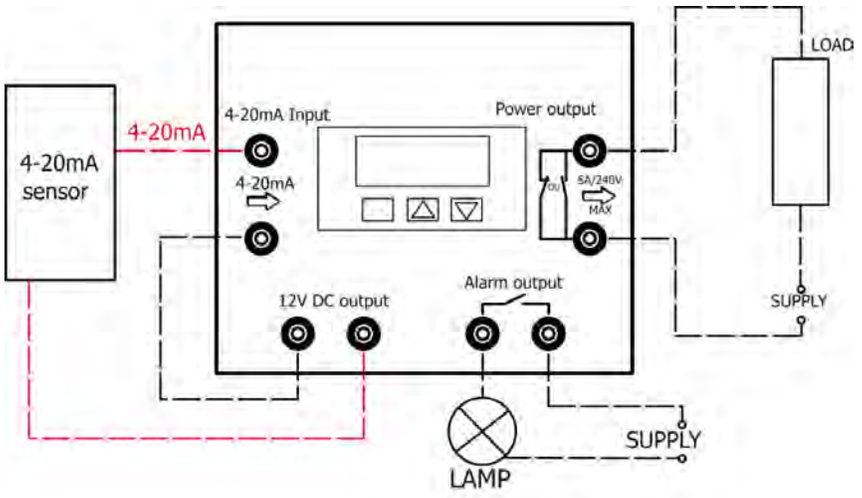
Composition of the model

Power supply from mains 230V-2P+E.

- 1 power supply unit with user and appliance protection (30mA)
- 2 "machine" boxes each with 3 PB, 3 switches, 7 indicator lamps and 3 PB and 3 switches for simulating sensors.
- 1 PLC Ethernet 24 inputs /16 outputs
- 1 PLC Ethernet 14 inputs /10 outputs
- 1 ETHERNET switch 5 ports RJ45
- 1 touchscreen HMI 3.8" with Ethernet ports
- 1 speed controller ATV32-0.18kW
- 1 asynchronous motor 230/400V- 0.12kW with fan for viewing rotation.
- 1 multifunction programming graphic terminal for the speed controller
- Software for programming (PLC, HMI, speed controller ATV32).
- 1 WiFi router configured (local WiFi specific to the system). Piloting via the free VijeoDesign'air application.
- 1 DVD includes the instructions, the practical assignments and videos.



All-or-nothing regulators for regulation



The regulator unit controls in all-or-nothing the supply of the load from a 4-20mA signal.
EXAMPLES OF USE Enter the order value directly in the regulator. When the 4-20mA signal from the sensor reaches the order value, the state of the dry contact changes and opens (or closes) the supply circuit of the load (programming of the contact state: NO or NC).
Supply of the unit in 230V (power cord)

The communicating version has the same features and includes in addition a possible programming by software and retrieving datas (files + curves).

STANDARD MODEL

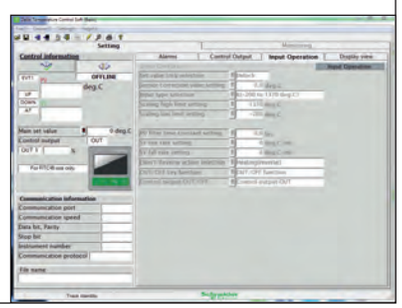
ref. TOR2002-BOX

- 4-20mA input on safety sockets 4mm
- 10 000 counts configurable display
- Settings of the display :
  - For 4mA input, the user can choose the value displayed between -1000 and 9999
  - For 20mA input, the user can choose the value displayed between 0 and 9999.
- Setting of the decimal point
- Example of a 5bars converter: :
  - For 4mA, display indicates 0.000
  - For 20mA, select 5.000 (for the maximum value)
- Output: 250VAC / 0.5A relay on safety sockets 4mm
- Output: 12VDC (allow the wiring a 4-20mA loop without an external supply)
- Alarms: high and low, relay output on safety sockets 4mm
- Settings: offset, hysteresis, gain, filter
- Dimensions: 145 x 185 x 100 mm

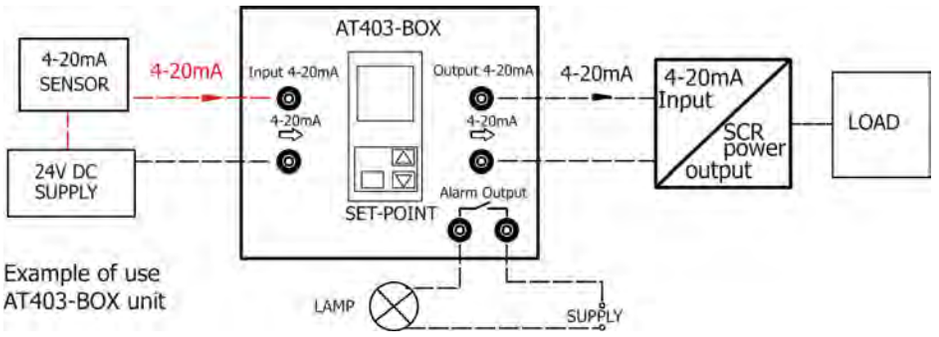
COMMUNICATING MODEL SCHNEIDER®

ref. TOR-COM

- LCD display in 11 segments of 3 colours (green, red, orange)
- 1 0-10V input, 4-20mA thermocouple on safety sockets configurable from the keyboard or the software.
- 1relay output dedicated to heating or cooling on safety sockets.
- 1 All-or-nothing alarm output on safety sockets
- Auto setting or automatic reset
- Hysteresis functions for the activation or deactivation control
- 230 VAC power supply by power cord
- ZELIO temperature software + connection cable to PC supplied
- Dims: 150 x 200 x 100 mm



PID regulators for regulation



The PID regulator is the correcting component into a regulation loop for the monitoring of a process (boiler, compressor, pump …). It receives a 4-20mA signal from the sensor which is the image of the value to regulate (temperature, pressure, flow…). It compares it to the set-point (programmed in the PID) and drive the process to reduce the difference "process variable / set-point"

The communicating version has the same features and includes in addition a possible programming by software and retrieving datas (files + curves).

STANDARD MODEL

ref. AT403-BOX

- Automatic tuning and manual PID
- 4 digits display for the instant value
- 4 digits display for the set-point
- Bar graph image of the power output
- 4-20mA input on safety sockets 4mm
- 4-20mA output on safety sockets 4mm
- 250V / 5A relay output on safety sockets 4mm
- Alarms output (high & low) on safety sockets
- Internal timer
- Supply: 240VAC - 50Hz
- Dimensions: 145 x 185 x 100mm

DC POWER SUPPLY

ref. AD1-24

24V / 2.2A DC Supply. Output on safety sockets 4mm. Protection: overload and short-circuit by electronic limitation

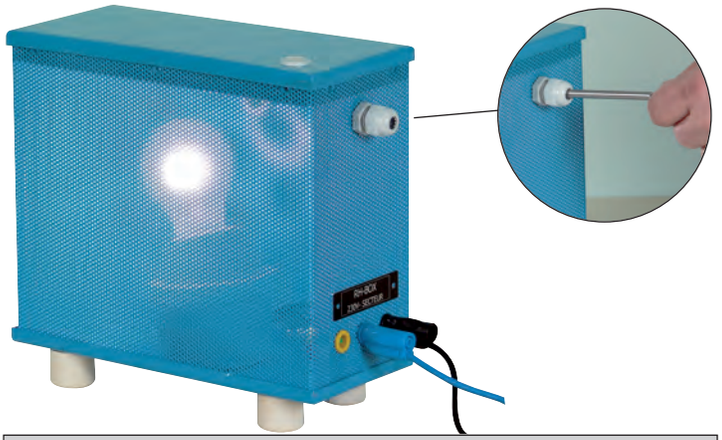
COMMUNICATING MODEL GEFRAN®

ref. PID-G

- Universal input on safety sockets
  Configurable according the different types of signals like thermocouple, thermoresistance, thermistance 0-10V and 4-20mA linear outputs.
- Configurable output in 0-10V and 4-20mA on safety sockets.
- All-or-nothing alarm relay output on safety sockets.
- The PID unit is fully configurable from the keys on the front panel or from the software.
- Power supply (230VAC – 50Hz) – power cord
- Programming software + connection lead to PC delivered with the unit
- Dims: 150 x 200 x 100 mm

SRC power control and loads for regulation

HEATING UNIT



ref. RH-BOX

230V power supply heating unit fitted with a 70W lamp. Completely safe thanks to two 4mm double channel terminals. The Pt100 temperature probe, with a maximum diameter of 7mm, can be inserted sideways (e.g. PT100-BOX).
Powered via 230V mains supply or SCR power unit (e.g. GRAD-BOX), which regulates the light intensity and therefore the temperature in the unit.
This temperature can be measured by a temperature probe (e.g. PT100-BOX)

Features

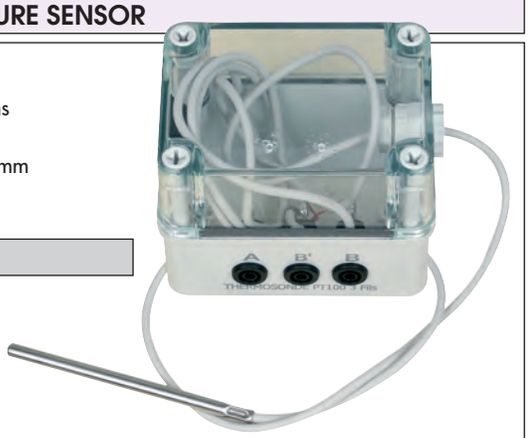
- 75W incandescent lamp – E27
- Mains power supply via 2 safety terminals
- Inlet port can accommodate temperature probe up to 7mm in Ø maximum
- Dim: 250 x 250 x 110mm

PT100 TEMPERATURE SENSOR

FEATURES

- Connection by means of safety leads.
- Dim: 100 x 80 x 90mm
- Cable length: 90cm

ref. PT100-BOX



SINGLE-PHASE SCR POWER CONTROL

Controls the power in the charge by varying the conduction angle of the thyristors according to the control current of 4-20mA.
Can be connected directly to the built-in PLC unit ref. AUTO-BOX-A.

FEATURES

- Connection by means of safety leads.
- Max. current output: 15A
- Dim: 100 x 80 x 90mm

ref. GRAD-BOX

SCR POWER CONTROLS

These SCR power units control the power in the charge by varying the conduction time of the thyristors according to the control current 4 – 20mA

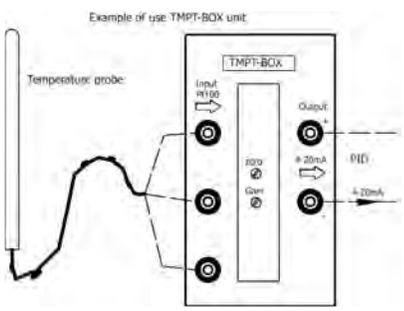
The power, the output power, the control input 4-20mA and the potentiometer can be used on 4mm safety terminals.

A potentiometer front allows to vary the conduction time.

Compatible with resistive loads only.

Ref.	CIA-GRA30M	CIA-GRA30T
Supply type	Single-phase	3-phase
Main supply	230VAC	3 x 400VAC
Auxiliary supply	-	220VAC from mains (for the cooling fan)
Output voltage	230VAC	3 x 400VAC
Max. output current	30A	30A
Control	4-20mA and/or potentiometer	4-20mA and/or potentiometer
Dimensions	290 x 190mm x 135mm	390 x 280mm x 185mm

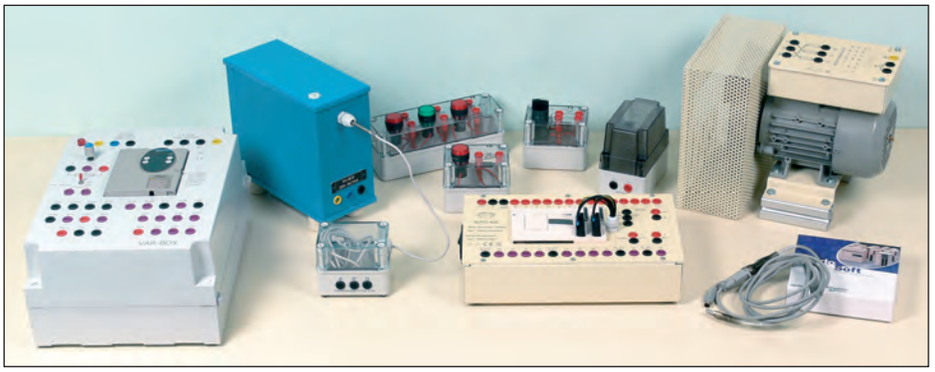
PT100 - 4-20mA TEMPERATURE CONVERTER



- This unit allows the connection of a temperature probe to the 4-20mA input of the PID.
- Adjustment of the signal gain & zero thanks 2 potentiometers
- Compatibility with the 2 or 3 wires temperature probes (see PT100-BOX)
- Input/output connection on safety sockets 4mm
- Works without any external supply
- DIMS: 77 x 106 x 92 mm

ref. TMPT-BOX

Temperature control by PLC



ref. REGULAIR

EDUCATIONAL OBJECTIVES

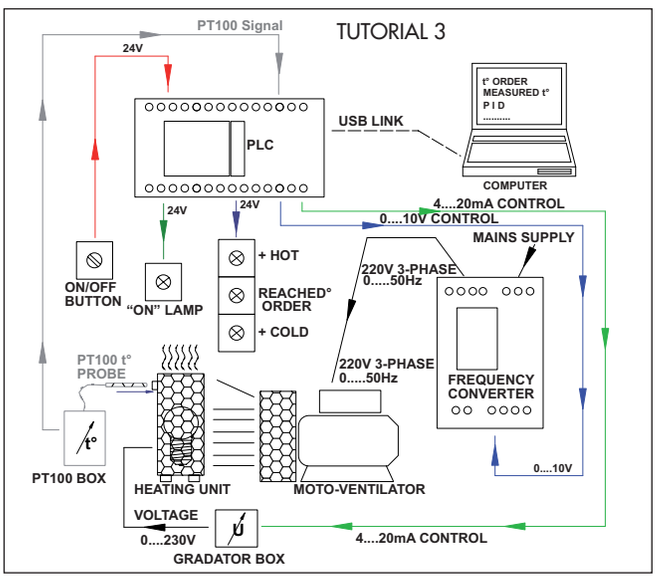
- ***Studying the analogical regulation loop***
- ***Studying the role of the frequency converter in a regulation system***
- ***Understanding the PID configuration by PLC***

USER'S MANUAL + PRACTICAL WORK

Practical works

TUTORIAL-1 STUDY OF THE 0-10V CONTROL
TUTORIAL-2 STUDY OF THE 4-20mA CONTROL
TUTORIAL-3 STUDY OF THE TEMPERATURE REGULATION BY PID

SUPPLIED READY FOR OPERATION WITH THE TECHNICAL INSTRUCTIONS, THE PROGRAMMING SOFTWARE AND THE PLC PROGRAMS WHICH CORRESPOND TO THE VARIOUS TUTORIALS TO BE UNDERTAKEN.
ALL OF THE COMPONENTS CAN BE SOLD SEPARATELY.



For each tutorial, students must:

- Develop the PLC program
- Configure the speed controller (tutorial-1 and tutorial-3)
- Produce the wiring diagram
- Wire the components
- Modify and observe the speed settings (tutorial-1), temperature settings (tutorial-2) and PID settings in order to regulate the temperature around a setting (tutorial-3)
- Using the PLC, measure on the PC the setting and instantaneous temperature curves (tutorial-3)

PID function from the PLC. The values of the settings, temperature, power output and the proportional and derived coefficients are completely configurable.

COMPONENTS OF THE REGULAIR SYSTEM

Moto ventilator
230/400V 3-phase asynchronous motor
Rated speed 1500 RPM
Power supply on safety sockets 4mm

Electric fan shown without its protection cover

- **SCR power unit**
  Single-phase SCR power unit
  Connection by means of safety leads
  4-20mA control
  1 max. output: 15A
  Dim: 100 x 80 x 90mm

- **Heating unit**
  230V mains power supply by means of safety terminals
  75W lamp
  Max. heating temperature of approximately 90°C
  Can accommodate temperature probes up to 7mm in Ø

- **Pt100 box**
  Pt100 Temperature Probe – 3 wires
  Connection by means of safety leads
  Cable length: 90cm
  Dim: 10x 80 x 90mm

- **PLC Unit**
  14 inputs (24V)
  10 binary outputs
  1 Pt100 analogue input
  2 outputs 0…10V and 4….20mA
  Mains power supply by means of socket unit + switch
  PLC programming software

- **Speed variator (frequency converter)**
  230V mains input
  Output to 230V three-phase motor
  1 input 0…10V
  Protection against short circuits
  Protection against overloads
  Protection against phase outages
  Connection by means of safety terminals

- **Control units + lamps**
  1 2-position switch
  4 24V lamps (3Red + 1Green)
  Connection by means of safety leads
  2 outputs 0…10V or 4….20mA
  Mains power supply by means of socket unit + switch

All or nothing temperature regulation

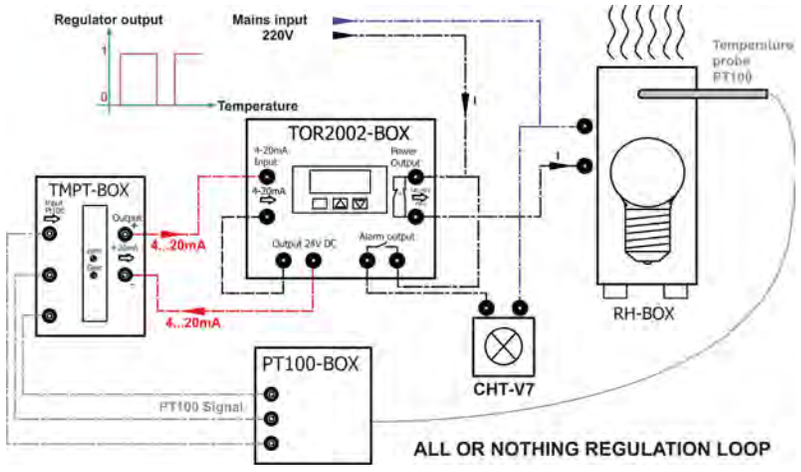
EDUCATIONAL OBJECTIVES

- **Understanding and wiring of a regulation chain All-Or-Nothing.**
- **Studying, setting, control of a All-Or-Nothing regulator.**
- **Understanding of the link resistance / temperature as measuring principle.**

USER'S MANUAL & THEORETICAL COURSES

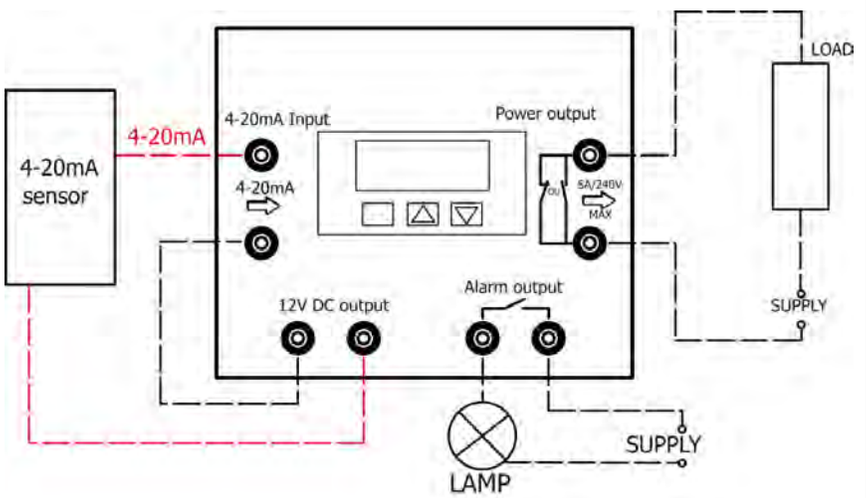
Set of components for the study of a All or Nothing temperature regulation loop with a PT100 temperature sensor and 4-20mA signal.

These solutions of regulation are delivered with all the necessary safety leads, a user's manual for each component and also wiring diagrams.



ref. REGULOR standard model

MAIN COMPONENT - REGULATOR

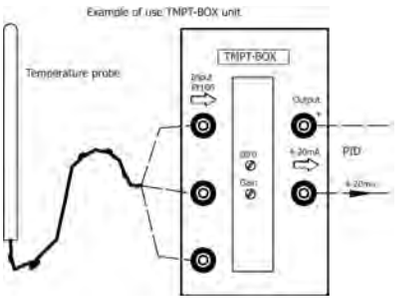


The regulator unit controls in all-or-nothing the supply of the load from a 4-20mA signal.
EXAMPLES OF USE Enter the order value directly in the regulator. When the 4-20mA signal from the sensor reaches the order value, the state of the dry contact changes and opens (or closes) the supply circuit of the load (programming of the contact state: NO or NC).
Supply of the unit in 230V (power cord)

The communicating version has the same features and includes in addition a possible programming by software and retrieving datas (files + curves).

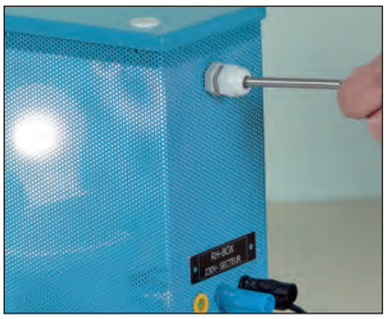
- 4-20mA input on safety sockets 4mm
- 10 000 counts configurable display
- Settings of the display :
  - For 4mA input, the user can choose the value displayed between -1000 and 9999
  - For 20mA input, the user can choose the value displayed between 0 and 9999.
- Setting of the decimal point
- Example of a 5bars converter: :
  - For 4mA, display indicates 0.000
  - For 20mA, select 5.000 (for the maximum value)
- Output: 250VAC / 0.5A relay on safety sockets 4mm
- Output: 12VDC (allow the wiring a 4-20mA loop without an external supply)
- Alarms: high and low, relay output on safety sockets 4mm
- Settings: offset, hysteresis, gain, filter
- Dimensions: 145 x 185 x 100 mm

PT100 - 4-20mA TEMPERATURE CONVERTER



- This unit allows the connection of a temperature probe to the 4-20mA input of the PID.
- Adjustment of the signal gain & zero thanks 2 potentiometers
- Compatibility with the 2 or 3 wires temperature probes (see PT100-BOX)
- Input/output connection on safety sockets 4mm
- Works without any external supply
- DIMS: 77 x 106 x 92 mm

HEATING UNIT



Heating unit fitted with a 75W lamp and completely safe 230V power supply, thanks to two 4mm double channel terminals. The Pt100 temperature probe, with a maximum diameter of 7mm, can be inserted sideways (e.g. PT100-BOX). Powered via 230V mains supply or SCR power unit (e.g. GRAD-BOX), which regulates the light intensity and therefore the temperature in the unit. This temperature can be measured by a temperature probe (e.g. PT100-BOX)

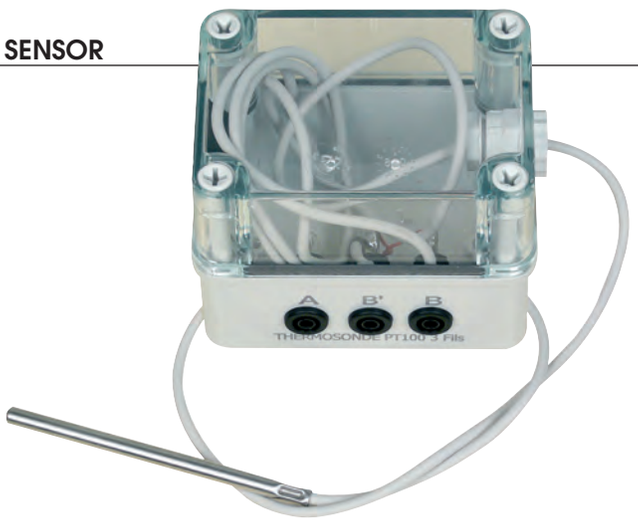
FEATURES

- 75W incandescent lamp – E27
- Mains power supply via 2 safety terminals
- Inlet port can accommodate temperature probe up to 7mm in Ø
- Dim: 250 x 250 x 110mm

PT100 TEMPERATURE SENSOR

FEATURES

- Connection by means of safety leads.
- Dim: 100 x 80 x 90mm
- Cable length: 90cm



HOUSING COMPONENT

- Green light: terminals - 5W lamp
- Double insulation
- Dimensions : 150 x 73 x 57mm

All or nothing temperature regulation

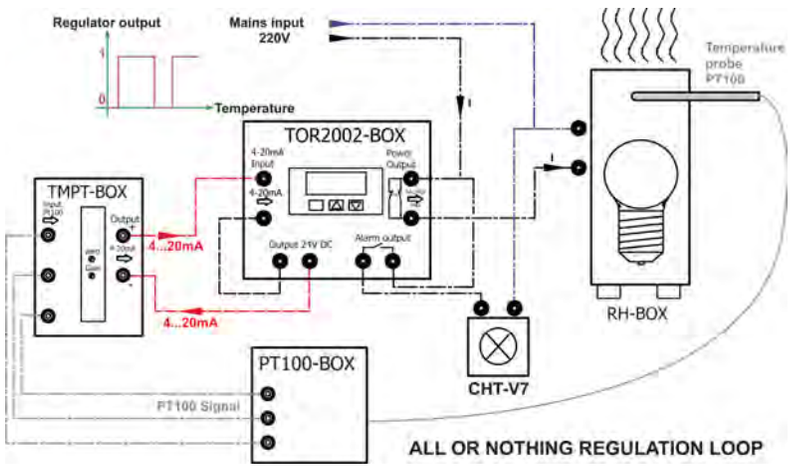
EDUCATIONAL OBJECTIVES

- **Understanding and wiring of a regulation chain All-Or-Nothing.**
- **Studying, setting, control of a All-Or-Nothing regulator.**
- **Retrieving information by computer.**
- **Understanding of the link resistance / temperature as measuring principle.**

USER'S MANUAL & THEORETICAL COURSES

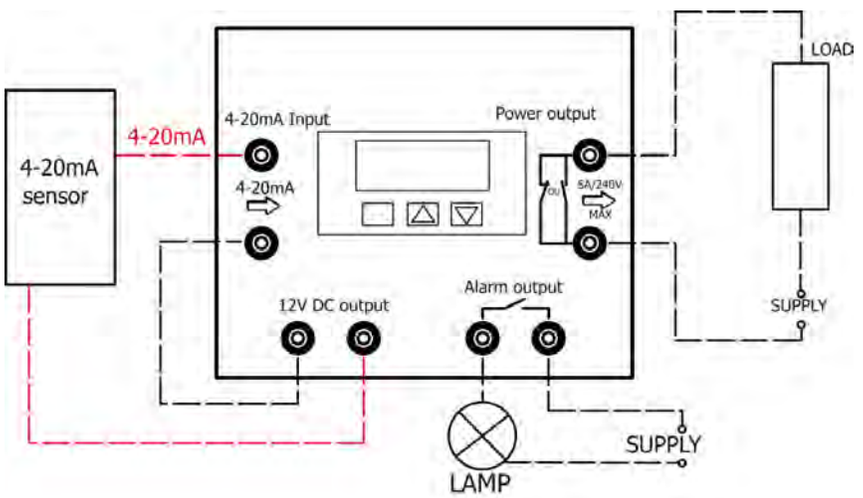
Set of components for the study of a All or Nothing temperature regulation loop with a PT100 temperature sensor and 4-20mA signal.

These solutions of regulation are delivered with all the necessary safety leads, a user's manual for each component and also wiring diagrams.



ref. REGUL-S communicating model

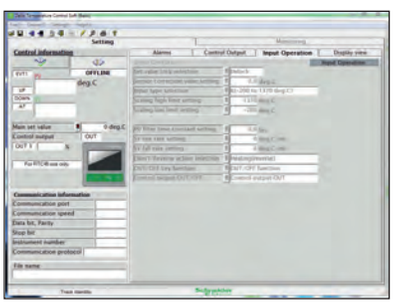
MAIN COMPONENT - REGULATOR



The regulator unit controls in all-or-nothing the supply of the load from a 4-20mA signal.
EXAMPLES OF USE Enter the order value directly in the regulator.
When the 4-20mA signal from the sensor reaches the order value, the state of the dry contact changes and opens (or closes) the supply circuit of the load (programming of the contact state: NO or NC).
Supply of the unit in 230V (power cord)

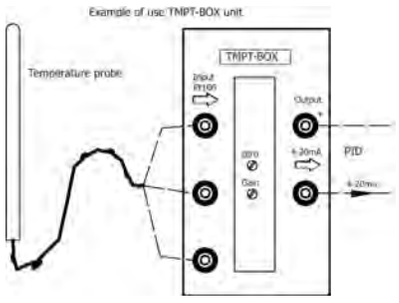
The communicating version has the same features and includes in addition a possible programming by software and retrieving datas (files + curves).

- LCD display in 11 segments of 3 colours (green, red, orange)
- 1 0-10V input, 4-20mA thermocouple on safety sockets configurable from the keyboard or the software.
- 1relay output dedicated to heating or cooling on safety sockets.
- 1 All-or-nothing alarm output on safety sockets
- Auto setting or automatic reset
- Hysteresis functions for the activation or deactivation control
- 230 VAC power supply by power cord
- ZELIO temperature software + connection cable to PC supplied
- Dims: 150 x 200 x 100 mm

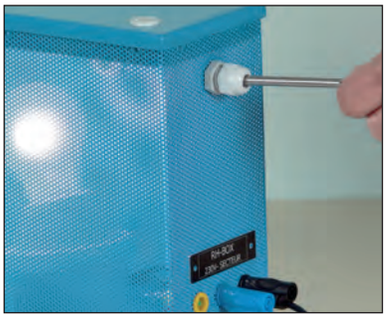


PT100 - 4-20mA TEMPERATURE CONVERTER

- This unit allows the connection of a temperature probe to the 4-20mA input of the PID.
- Adjustment of the signal gain & zero thanks 2 potentiometers
- Compatibility with the 2 or 3 wires temperature probes (see PT100-BOX)
- Input/output connection on safety sockets 4mm
- Works without any external supply
- DIMS: 77 x 106 x 92 mm



HEATING UNIT



Heating unit fitted with a 75W lamp and completely safe 230V power supply, thanks to two 4mm double channel terminals. The Pt100 temperature probe, with a maximum diameter of 7mm, can be inserted sideways (e.g. PT100-BOX). Powered via 230V mains supply or SCR power unit (e.g. GRAD-BOX), which regulates the light intensity and therefore the temperature in the unit. This temperature can be measured by a temperature probe (e.g. PT100-BOX)

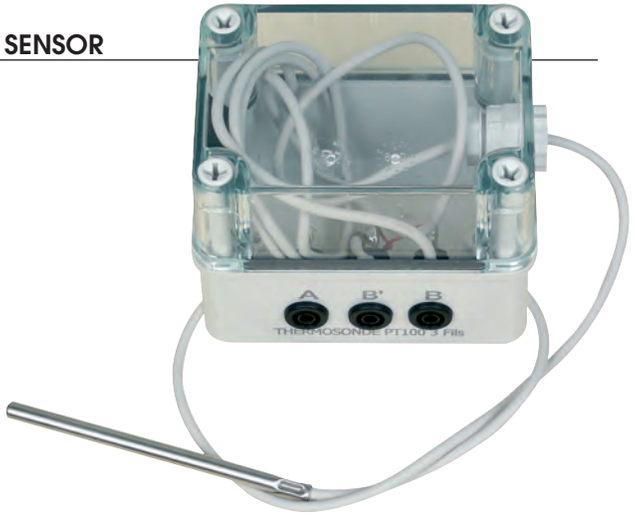
FEATURES

- 75W incandescent lamp – E27
- Mains power supply via 2 safety terminals
- Inlet port can accommodate temperature probe up to 7mm in Ø
- Dim: 250 x 250 x 110mm

PT100 TEMPERATURE SENSOR

FEATURES

- Connection by means of safety leads.
- Dim: 100 x 80 x 90mm
- Cable length: 90cm



HOUSING COMPONENT

- Green light: terminals - 5W lamp
- Double insulation
- Dimensions : 150 x 73 x 57mm

PID temperature regulation

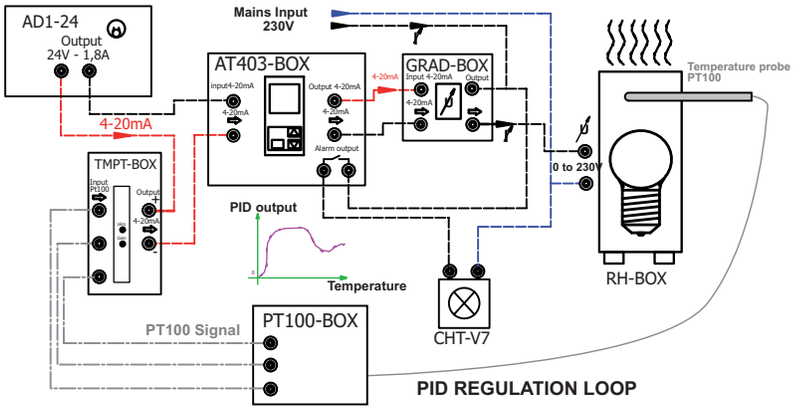
EDUCATIONAL OBJECTIVES

- **Understanding and wiring of a regulation chain of temperature by PID**
- **Studying, setting, control of a PID regulator**
- **Understanding of the link resistance / temperature as measuring principle.**

USER'S MANUAL & THEORETICAL COURSES

Set of components for the study of a 4-20mA temperature regulation loop with a PT100 temperature sensor and a dimmer switch, all controlled by PID regulator.

These solutions of regulation are delivered with all the necessary safety leads, a user's manual for each component and also wiring diagrams.



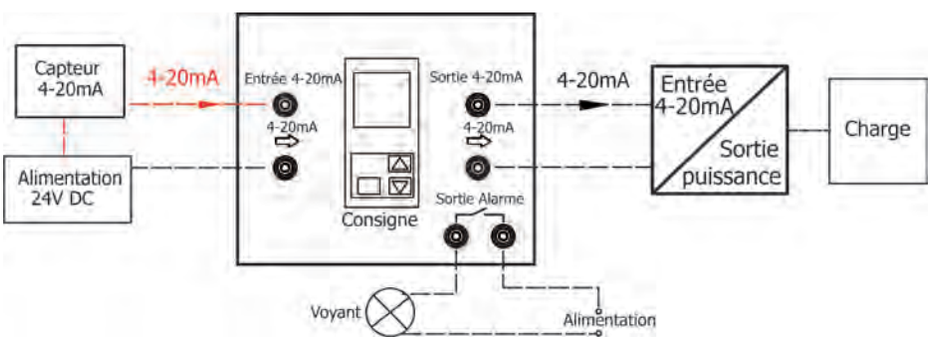
ref. REGULIDE standard model

MAIN COMPONENT - REGULATOR

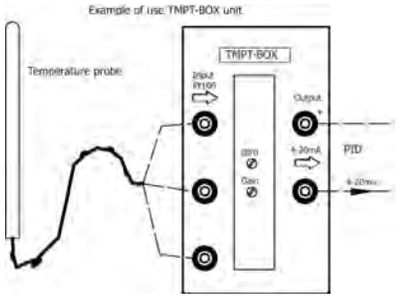
The PID regulator is the correcting component into a regulation loop for the monitoring of a process (boiler, compressor, pump …). It receives a 4-20mA signal from the sensor which is the image of the value to regulate (temperature, pressure, flow…). It compares it to the set-point (programmed in the PID) and drive the process to reduce the difference "process variable / set-point"

The communicating version has the same features and includes in addition a possible programming by software and retrieving datas (files + curves).

- Automatic tuning and manual PID
- 4 digits display for the instant value
- 4 digits display for the set-point
- Bar graph image of the power output
- 4-20mA input on safety sockets 4mm
- 4-20mA output on safety sockets 4mm
- 250V / 5A relay output on safety sockets 4mm
- Alarms output (high & low) on safety sockets
- Internal timer
- Supply: 240VAC - 50Hz
- Dimensions: 145 x 185 x 100mm

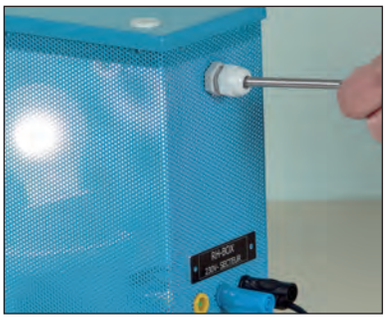


PT100 - 4-20mA TEMPERATURE CONVERTER



- This unit allows the connection of a temperature probe to the 4-20mA input of the PID.
- Adjustment of the signal gain & zero thanks 2 potentiometers
- Compatibility with the 2 or 3 wires temperature probes (see PT100-BOX)
- Input/output connection on safety sockets 4mm
- Works without any external supply
- DIMS: 77 x 106 x 92 mm

HEATING UNIT

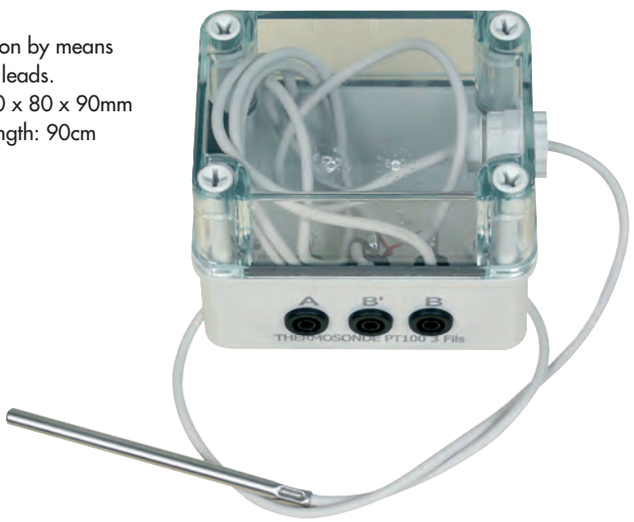


Heating unit fitted with a 75W lamp and completely safe 230V power supply, thanks to two 4mm double channel terminals. The Pt100 temperature probe, with a maximum diameter of 7mm, can be inserted sideways (e.g. PT100-BOX). Powered via 230V mains supply or SCR power unit (e.g. GRAD-BOX), which regulates the light intensity and therefore the temperature in the unit. This temperature can be measured by a temperature probe (e.g. PT100-BOX)

FEATURES
- 75W incandescent lamp – E27
- Mains power supply via 2 safety terminals
- Inlet port can accommodate temperature probe up to 7mm in Ø
- Dim: 250 x 250 x 110mm

PT100 TEMPERATURE SENSOR

FEATURES
- Connection by means of safety leads.
- Dim: 100 x 80 x 90mm
- Cable length: 90cm



SINGLE-PHASE SCR POWER CONTROL

Controls the power in the charge by varying the conduction angle of the thyristors according to the control current of 4-20mA.
Can be connected directly to the built-in PLC unit ref. AUTO-BOX-A.

FEATURES
- Connection by means of safety leads.
- Max. current output: 15A
- Dim: 100 x 80 x 90mm

DC POWER SUPPLY

24V / 1.8A DC Supply
Output on safety sockets 4mm
Protection: overload and short-circuit: by electronic limitation

HOUSING COMPONENT

- Green light: terminals - 5W lamp
- Double insulation
- Dimensions : 150 x 73 x 57mm

PID temperature regulation

EDUCATIONAL OBJECTIVES

- ***Understanding and wiring of a regulation chain of temperature by PID***
- ***Studying, setting, control of a PID regulator***
- ***Retrieving information by computer.***
- ***Understanding of the link resistance / temperature as measuring principle.***

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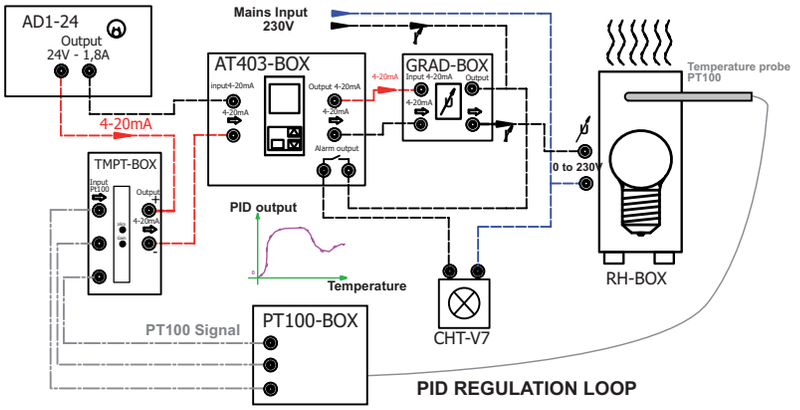


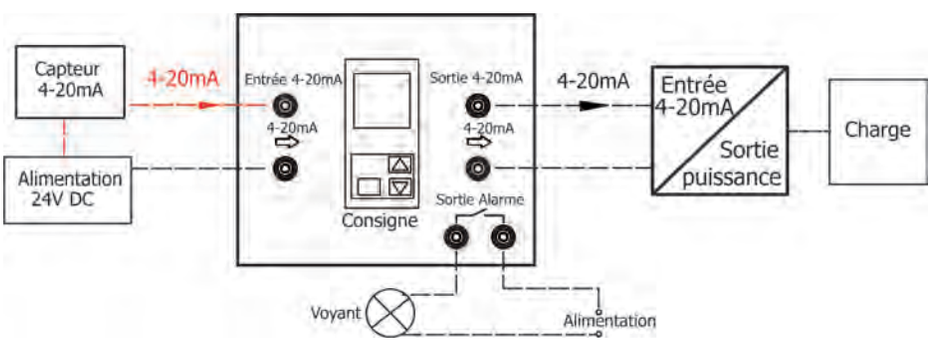
ref. REGUL-G communicating model

MAIN COMPONENT - REGULATOR

The PID regulator is the correcting component into a regulation loop for the monitoring of a process (boiler, compressor, pump …). It receives a 4-20mA signal from the sensor which is the image of the value to regulate (temperature, pressure, flow…). It compares it to the set-point (programmed in the PID) and drive the process to reduce the difference "process variable / set-point"

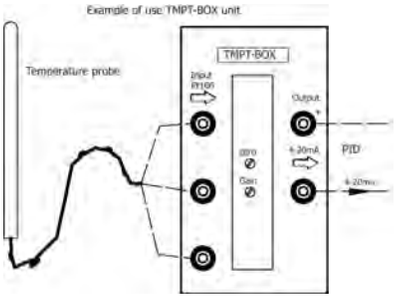
The communicating version has the same features and includes in addition a possible programming by software and retrieving datas (files + curves).

- Universal input on safety sockets
  Configurable according the different types of signals like thermocouple, thermoresistance, thermistance 0-10V and 4-20mA linear outputs.
- Configurable output in 0-10V and 4-20mA on safety sockets.
- All-or-nothing alarm relay output on safety sockets.
- The PID unit is fully configurable from the keys on the front panel or from the software.
- Power supply (230VAC – 50Hz) – power cord
- Programming software + connection lead to PC delivered with the unit
- Dims: 150 x 200 x 100 mm



PT100 - 4-20mA TEMPERATURE CONVERTER

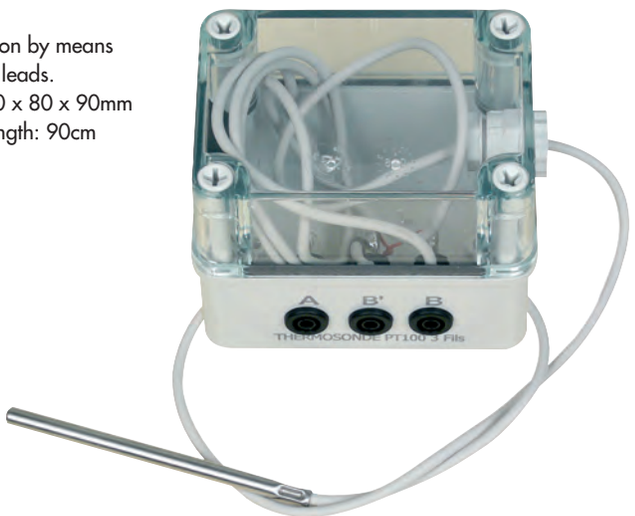
- This unit allows the connection of a temperature probe to the 4-20mA input of the PID.
- Adjustment of the signal gain & zero thanks 2 potentiometers
- Compatibility with the 2 or 3 wires temperature probes (see PT100-BOX)
- Input/output connection on safety sockets 4mm
- Works without any external supply
- DIMS: 77 x 106 x 92 mm



PT100 TEMPERATURE SENSOR

FEATURES

- Connection by means of safety leads.
- Dim: 100 x 80 x 90mm
- Cable length: 90cm



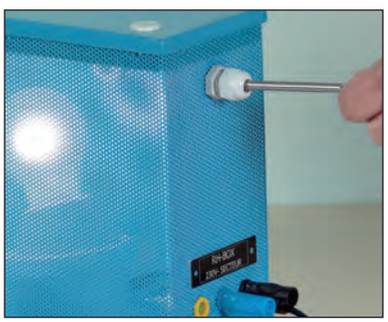
SINGLE-PHASE SCR POWER CONTROL

Controls the power in the charge by varying the conduction angle of the thyristors according to the control current of 4-20mA.
Can be connected directly to the built-in PLC unit ref. AUTO-BOX-A.

FEATURES

- Connection by means of safety leads.
- Max. current output: 15A
- Dim: 100 x 80 x 90mm

HEATING UNIT



Heating unit fitted with a 75W lamp and completely safe 230V power supply, thanks to two 4mm double channel terminals. The Pt100 temperature probe, with a maximum diameter of 7mm, can be inserted sideways (e.g. PT100-BOX). Powered via 230V mains supply or SCR power unit (e.g. GRAD-BOX), which regulates the light intensity and therefore the temperature in the unit. This temperature can be measured by a temperature probe (e.g. PT100-BOX)

FEATURES

- 75W incandescent lamp – E27
- Mains power supply via 2 safety terminals
- Inlet port can accommodate temperature probe up to 7mm in Ø
- Dim: 250 x 250 x 110mm

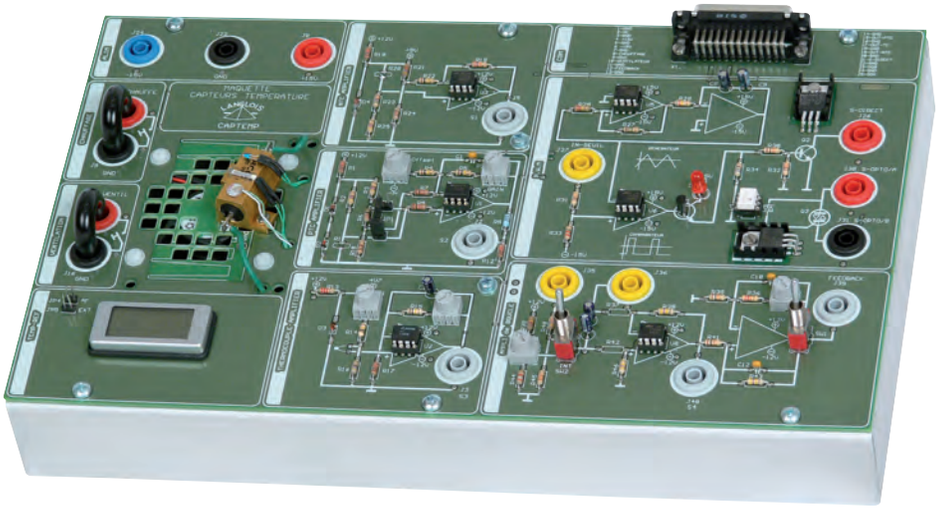
DC POWER SUPPLY

24V / 1.8A DC Supply
Output on safety sockets 4mm
Protection: overload and short-circuit: by electronic limitation

HOUSING COMPONENT

- Green light: terminals - 5W lamp
- Double insulation
- Dimensions : 150 x 73 x 57mm

Temperature sensors and heating control



ref. CAPTEMP

EDUCATIONAL OBJECTIVES

- ***Studying the regulation of temperature all or nothing***
- ***Studying the regulation of temperature with control loop with variable gain***
- ***Studying of thermal sensors: thermocouple, thermistor NTC and PTC.***

USER'S MANUAL + PRACTICAL WORKS

Proposed Practical Works

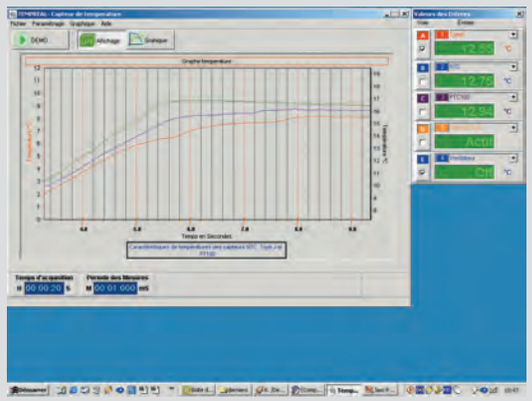
- Studying and calibration of a conditioner temperature sensor
  - Studying the gain of the amplifier sensor PTC100
  - Studying of the offset of the amplifier
  - Gain calibration by a standard 22 ohm resistor
  - Adjusting the offset of the amplifier
  - Thermocouple calibration
- Features of temperature transducers
- Control of the temperature by hysteresis
- Control of the temperature by feedback

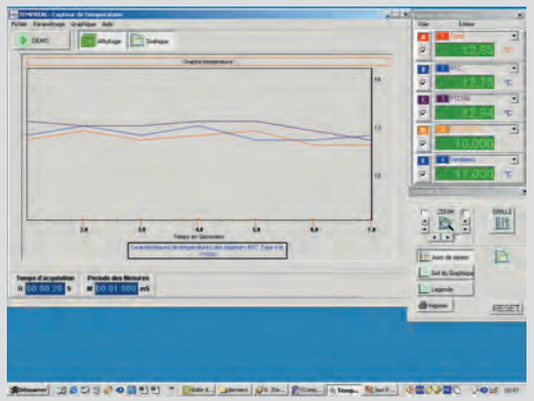
This model includes 3 temperature sensors: NTC thermistor – J thermocouple – PT100 platinum probe. These sensors are attached to a resistance or cooled by a built-in fan. The resistance and fan are controlled separately by short circuiting two terminals. The screen-printed front panel shows actual cabling of electronic circuits such as amplifiers and automated temperature control…. All the components are surface-mounted to facilitate signal capture.
Each of the three analog sensors is connected to an amplifier to suit its voltage, impedance, and linearity. The output levels of the three amplifiers are all calibrated at 10mV/°C to facilitate comparisons of accuracy and thermal inertia.
Two temperature control systems may be studied: all or nothing heating by hysteresis circuit or proportional heating with a variable gain automatic control loop. The heating " power " circuit is either powered by transistor-controlled direct current or by Triac-controlled 15VAC alternating current. A digital thermometer provides a continuous readout of heating element temperature.

CHARACTERISTICS

- +15V / -15V DC power supply
- Equipped with a DB25 male plug to connect to the PC interface.
- Dimensions : 330 x 200 x 50mm
- Weight : 1kg

DATA ACQUISITION SOFTWARE (OPTION)





ref. LOG-CAPTEMP

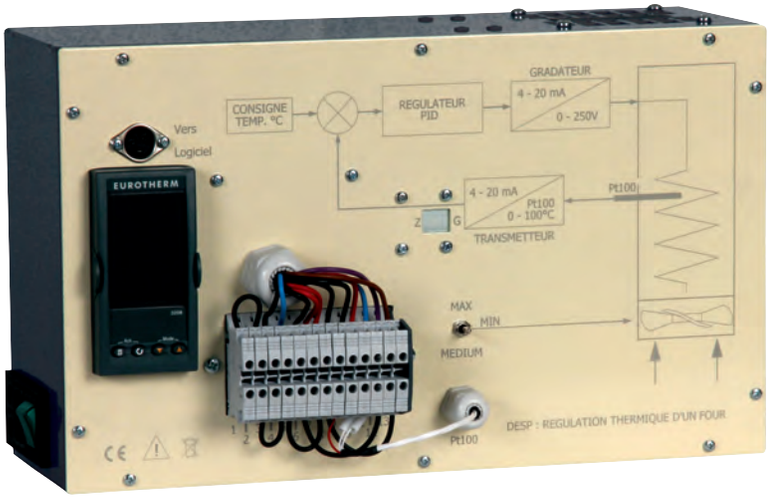
This option consists of an interface unit, a connecting cable, and software.
This software records the temperature readouts for the PT100, NTC, and J sensors on the SENSOR model and displays them on the computer screen. Characteristics such as the "all or nothing" setting for heating and fan power supply may also be displayed on the screen.

CHARACTERISTICS

- On-screen temperature display for the 3 sensors.
- On-screen display of the fan and heating control signal characteristics.
- Configurable acquisition time.
- Zoom function.
- Cursor function x and y axes configurable
- (Scale, notation, Max and Min values)
- Curve and background colours configurable.
- Print characteristics after page layout configuration.
- Acquisition data recovery in spreadsheet form

SOFTWARE AVAILABLE IN ENGLISH AND IN FRENCH

System for heat regulation by P.I.D.



ref. DESP

In aeronautics, gluing techniques between metals and composite materials require accurate temperature of polymerization glues, to ensure maximum grip.
This model of oven of glues polymerizing, which the airflow is used to carry the parts to be glued to the appropriate temperature, has a PID temperature regulation accurate to a tenth of a degree.

EDUCATIONAL OBJECTIVES

- **Understanding of the regulation principles by PID, from theory to practice.**
- **Wiring, calibration, loop measuring, statement of curves.**

USER'S MANUAL + 15 PRACTICAL WORKS

Practical works

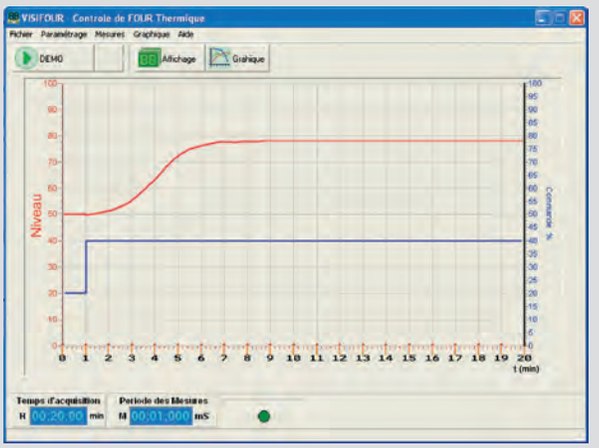
- Wiring of a measuring loop according the standard 4-20mA with Pt100 probe and transmitter
- Calibration of the converter Pt100 / 4-20mA with the help of a decade box (not supply)
- Establishing a calibration sheet, drawing the calibration curve
- Identifying and testing of a Pt100 probe. Calculation of the current through the Pt100 probe.
- Measuring of a loop current without opening the loop
- Using a 4-20mA calibrator
- Establishing the functional diagram and determining the role of different components
- Establishing the loop diagram of regulation and the wireline diagram
- Identifying the controlled value, the monitoring value, the disturbance values.
- Determining the direction of action of the regulator, according to the direction of the process and the direction of the correction member
- Determining the static characteristics of the process (static gain, timeout, time constant) in order to calculate the transfer function
- Determining the oscillations period and the gain of the critical loop, the integration factor. Determining using models Broida and Pessen correctors P, I and D
- Viewing of the response curves with 3 correctors: P, I and D
- Adjusting of the PID correctors and testing according two methods: enslavement and regulation
- Testing of different empirical methods for adjusting PID correctors
- Troubleshooting training by fault simulation

FEATURES

- Supply : 230VAC
- Dimensions : 350 x 200 x 122 mm
- Weight : 3.7kg

This small oven, where an air stream is used to bring the parts to the correct temperature, is equipped with PID to control the temperature accurately to within a tenth of a degree. The DESP model uses only industrial components. The PID control system - 4-20mA standard for measuring input and output - controls air stream temperature. To prevent any risk of burning, oven power has been limited to 250W and air temperature to 100°C. The student wires the Pt100 3-wire probe, 4-20mA measuring loop, 4-20mA control loop, temperature transmitter, and loop power supply to the terminal strip. Current is measured at the conversion resistance using a multimeter, without opening the loops. Maximum accessible voltage (without dismantling the apparatus): 24VDC. The system operates in two modes: automatic and control. In the latter case, an adjustable-speed fan sets up a disturbance. The terminal strip and components are suitable for demonstrating all types of wiring errors and troubleshooting. The temperature and thermostat control current graphs (used to determine static, loop, and critical gains, as well as dead time, and the time constant) are produced either manually (possible due to the slow changes in temperature), or on a PC using LOGIFOUR software (option) and PC interface.

OPTION INTERFACE & LOGIFOUR SOFTWARE



ref. LOGIFOUR

This PC interface – connected to the DB9 outlet – and software are used to record and draw graphs of temperature and heating control directly on PC. The connection to PC is made by USB.

ADDITIONAL FUNCTIONS

- Digital display of the two variables
- Cursor function
- Data transfer to plotter
- Zoom function

OPTION 4-20mA LOOP CALIBRATOR

- Programming in % of the output span to supply a typical intensity like 4 – 8 – 12 – 16 or 20mA
- linear ramps, manual ramps, auto ramps
- Display: 5 digits
- Carry case, user's manual, external battery Pack (for 6x 1.5V AA batteries)
- Input for mains adapter DC 12V (not included)
- Dimensions : 88x168x26mm Weight : 330g

ref. VA100

RANGE	RESOLUTION	ACCURACY
4 - 20 mA	1µA	0.025% + 5µA
0 - 20mA	1µA	0.025% + 5µA
0 - 24mA	1µA	0.025% + 10µA
4 - 20V	1mV	0.05% + 5mV
0 - 20V	1mV	0.05% + 5mV
0 - 24V	1mV	0.05% + 10mV

SYSTEM FOR WATER LEVEL & FLOW REGULATION BY PID

- Power supply : 230VAC
- Overall dimensions: 1100 x 670mm Height 1980mm. Weight 104kg.

ref. DESNIV

OPERATING PRINCIPLE

The objective is to adjust the water-level in a transparent polycarbonate column –diameter 160mm, height 1370mm. A pump draws the water from a 50-litre tank at the bottom of the column. The water constantly flows through the setting valve from the column towards the tank under gravity.

The PID regulator receives the "water-level" information from a 4-20mA sensor. It compares this signal with the level reference and controls the pump delivery via a frequency variator.

The system operates in two modes: servo control and regulation.

In regulation mode, a manual valve creates the disturbance.

SUPPLIED WITH A 4-20MA LOOP CALIBRATOR

- Programming in % of the output span to supply a typical intensity like 4 – 8 – 12 – 16 or 20mA
- linear ramps, manual ramps, auto ramps
- Display: 5 digits
- Carry case, user's manual, external battery Pack (for 6x 1.5V AA batteries)
- Input for mains adapter DC 12V (not included)
- Dimensions : 88x168x26mm Weight : 330g

EDUCATIONAL OBJECTIVES

- ***Studying, putting into service, getting started and setting of the system***
- ***Understanding and setting of the PID level regulation***
- ***Calculating the span & zero offset of a level measurement by hydrostatic pressure of wet column. Adjust the level transmitter***
- ***Wiring, putting into service & adjustment of components: transmitter, regulator …***
- ***Make current measurements as in industry, without opening loops, with the help of a multimeter.***
- ***Taking in hand the setting software of the frequency converter.***

TEACHING RESOURCES – 19 PRACTICAL WORKS

PRACTICAL WORKS ON THE MEASURING CIRCUIT

- Wiring the measuring loop which comprises the 4-20mA output differential pressure transmitter, a 24V DC power supply and the PID.
- Calibrating the level transmitter Dry column method.
- Calibrating the level transmitter Wet column method.
- Producing a calibration sheet for the transmitter, and a calibration curve.
- Calculating the scale range of the transmitter.
- Measuring the current in the loop, without opening it.
- Using a calibrator for measuring the transmitter current or generating a 4-20mA current on the PID input.

PRACTICAL WORKS OF REGULATION

- Producing a regulation loop diagram, with a view to wiring the correction component and the measuring circuit
- Producing an operating diagram through the identification of various components, namely: the regulator, the correction component and the process.
- Identifying the quantities at play, namely: the adjusted quantity, controlled variable, correcting variable and disturbances
- Determining the direction of the regulator depending on the direction of the process and the correction component
- Determining the static features of the procedure, with a view to calculating the following adjustments: integration constant, dead time
- Implementing various empirical methods for setting PID correctors
- Testing the performance of the loop, in servo-control mode and in regulation mode
- Displaying on a flatbed plotter or PC, or by manual measuring, the responses of the PID adjusters, by requesting the measurement input by position or speed level
- Implementing and verifying a level measurement for a dry column or a wet column

DESIGN

The DESNIV model uses only industrial components.

- A PID regulator – 4-20mA standard on the measuring input and on the output.
- An industrial three-phase pump, with a bronze body
- A differential pressure level sensor
- An industrial frequency variator

The column is large in size, as is the volume of water it contains. Therefore, it has high inertia. This means that the physical phenomena are very similar to those for high-capacity tanks used by the pharmaceutical and oil industries. Pressure differences due to the significant height of the water column can be used to adjust the water-level to the nearest 5mm.

The inputs and outputs for the following are grouped together on a terminal block which is separate from the electrical cabinet: sensor, regulator, variable speed drive and 24V DC power supply. Students wire up the control and measuring loops on this terminal block. They cannot come into contact with dangerous voltages, as these are confined to the electrical cabinet. The maximum voltage that can be accessed on the student terminal block is 24V DC.

The terminal block and the components allow all wiring errors and fault finding exercises.The "water-level" and "pump delivery" curve charts (curve charts used to determine the static gain, loop gain and critical gain, the dead time and the time constant) are noted either manually (the slow speed of the phenomena means that this procedure is possible), or using a PC combined with LOGINIV software (option) and the associated interface, or by using general software.

The DESNIV model does not need to be connected to the water network. In order to prevent any overflow, a binary level sensor stops the pump if the water rises up to the top section of the column.

LEVEL CONTROL SYSTEM BY MEANS OF PLC & TOUCHSCREEN

EDUCATIONAL OBJECTIVES

- ***Studying, putting into service, getting started and setting of the system***
- ***Understanding the setting and the programming by PLC***
- ***Understanding the PID level regulation, probes and sensors***

TEACHING RESOURCES – PRACTICAL WORKS

Practical works

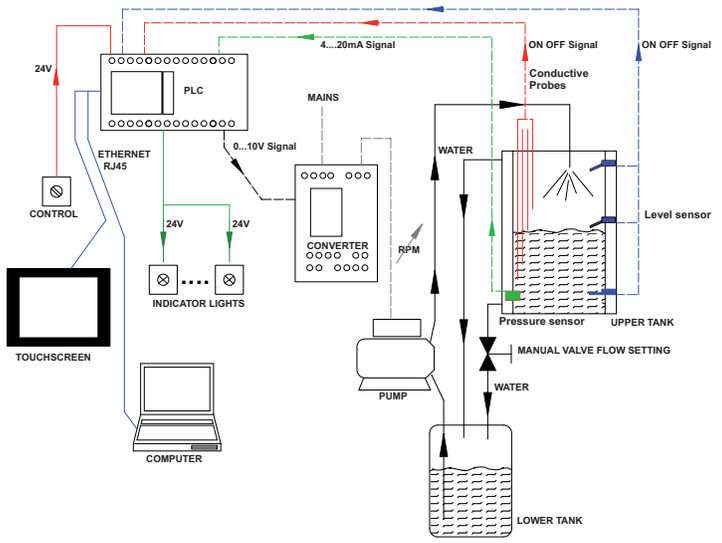
- Drawing of wiring diagrams
- Setting and programming the PLC
- Configuration of the PC Ethernet links / PLC / Touch Screen
- Configuration and setting of the touch screen
- Setting the 4-20mA water level regulation with the PID of the programmable PLC
- Wiring the grid
- Understanding the functioning of the level regulation by PID, probes and sensors

REF. REGULEAU

REGULEAU is a level control system relying on a PLC and touchscreen, which can be used in three detection modes, using

- 3 binary floats
- 4 height-adjustable conductive probes
- 1 4-20mA hydrostatic pressure sensor

The water drawn from the lower tank supplies the upper tank (where the sensors are located) before running away via a manual valve.
The PLC's PID and the variable flow pump allow a level control.



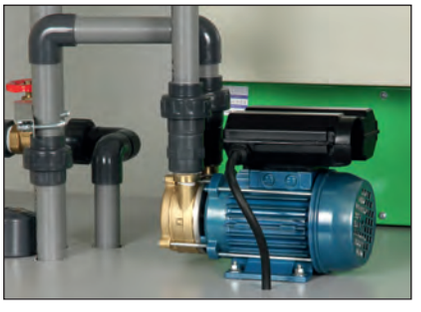
COMPONENTS PARTS OF THE MODEL

- 1 100L lower tank
- 1 transparent 60L upper tank, graduated in cm
- 3 level sensors with binary float (24V-3A).
- 4 immersed conductive probes.
- 1 hydrostatic pressure sensor.
  Rating: 4-20mA output for 0-600mm water level
- Cabinet and console
- 1 5.7" TFT touchscreen
- 1 4-port RJ45 Ethernet hub
- 1 three-phase speed controller
- 1 PLC with software, fitted with a TCP/IP interface
  for the RJ45 link to a PC and the touchscreen.
  14 Inputs + 10 Binary Outputs (24V)
  1 analog input 4-20mA
  1 analog output 4-20mA and 0-10V
- 1 Vijeo Designer® software with a complete monitoring program
- 1 30mA residual current circuit breaker. thermal-magnetic circuit breakers
- 230V power supply
- Base with wheels + brake. 1500 x 750mm - Weight 144kg

ACTION OF THE MONITORING

- starting and stopping the system
- choice of level control type
- water level and settings bargraphs
- display and adjustment of the PID parameters
- display of the speed controller's power in correlation with the pump delivery
- adjusting the settings

REGULEAU IS SUPPLIED ALREADY WIRED AND READY FOR USE WITH TUTORIALS, INSTRUCTIONS, SOFTWARE PLC AND MONITORING PROGRAMS.



Removable grid quickly taken through Harting ® plugs.

REGULATION OF LEVEL AND FLOW RATE BY PID

Hydrostatic pressure level sensor and 4-20mA flow rate sensor.

OPERATING PRINCIPLE

MAQ-ND groups two types of regulation:

- Regulation by PID of water level with 4-20mA hydrostatic pressure sensor.
- Regulation by PID of water flow rate with 4-20mA analogue flowmeter.

Thanks to a jumper set, the student selects the type of regulation required. They can then enter the set point value directly on the PID regulator. This, thanks to a speed variator, automatically adjusts the speed of rotation of the motor pump to control the flow rate or the water level according to set point value. The different signals used in the regulation system are analogue 4-20mA. MAQ-ND is fully autonomous and operates in a closed circuit as soon as the bottom tank is filled with water.

Réf. MAQ-ND

Version without flow rate regulation

Réf. MAQ-NIV

EDUCATIONAL OBJECTIVES

- ***Putting an electrical installation into service.***
- ***To learn about and use a PID regulator, a hydrostatic sensor, and a 4-20mA flowmeter.***
- ***To use a regulation system for water level and flow rate by analogue signal 4-20mA.***
- ***To use and configure a speed variator locally and from programming software.***
- ***To measure, analyse and interpret analogue signals.***
- ***To learn industrial maintenance.***

TEACHING RESOURCES STUDENT & TEACHER + PRACTICAL WORKS

Practical works

- General theoretical lessons on regulation
- Identification of the different components of the regulation system for water level and flow rate
- Configuring the variable-frequency drive
- Configuring the PID regulator
- Configuring the flowmeter
- Measuring the current 4-20mA at the input of the PID and at the output of the variable-frequency drive
- Maintenance on the flowmeter

PID COMMUNICATING OPTION

PID communicating with software for drawing curves. Contact us.

FLOW INDICATOR WITH FLOAT

A moving float in a transparent tube indicates the pump's water flowrate in cubic meter/hour

Features

- Upright fitting
- Measuring scale: 0.6 to 6 cubic meter/hour
- Ascending fluid
- Float and stop
- PVC connection Diam: 40mm (to be stuck on)

ref. FLO-DEB

COMPUTER HOLDER OPTIONS

SCREEN/KEYBOARD SUPPORT

- Screen support arm
- 3 rotation points on 2 ball joints
- Supports one screen up to 12kg
- With shelf for keyboard and mouse

ref. QUICK-ECRAN

CENTRAL UNIT SUPPORT

- Wire mesh 45x45mm
- Cabling space to rear
- Epoxy paint
- Dimensions: 400x400x195mm

ref. QUICK-UC

COMPRISES

Frame made of matt anodized aluminium mounted on four casters, two with brakes.
Easy to move and very stable.

- A bottom tank of 100L.
- One top tank of 60L with 2 transparent sides.
  One tape rule on one side for monitoring the water level.
  One inner wall of the tank for preventing eddies.
- One three-phase motor pump 230V/400V with a power of 750W.
- One rotary valve for manually adjusting the water flow rate at the pump outlet.
- One rotary valve for adjusting the water leak level at the tank outlet.
- One ¼ turn valve for rapid draining of the tank.
- One 4-20mA flowmeter with integrated digital display.
  Pushbuttons on the front of the sensor enable its programming.
- One hydrostatic pressure sensor 4-20mA directly mounted on the tank wall.
  Measuring range 0-600mm.
- One electrical console composed of:
  1 thermal-magnetic circuit-breaker
  1 emergency stop button
  1 main On/Off button
  1 speed variator 3x230V. RJ45 connector for connection using a PC with SoMove configuring software
  1 PID regulator 4-20mA with integrated programming console and large display
  2 230V sockets with indicator light
  1 set of safety terminals for selecting the type of regulation to be studied
  1 set of safety terminals for measuring analogue currents
- Melamine shelf with dimensions 1000 x 400 mm.

The model is supplied configured and operational with a CD containing the technical instructions, a lesson on regulation as well as the tutorials in the form of the Student/Instructor teaching manual.

- Mains power supply 230V with 5m cable and 2P+E plug
- Dimensions: H 2100 x 1100 x 950mm

OPERATIVE PART ONLY

- 1 aluminum frame on wheels with dimensions: H 2100 x 1100 x 950mm
- 1 lower tank of 100 liters.
- 1 tank of 60L higher with 2 transparent faces.
  - A tape measure on one side makes it possible to follow the water level.
  - A wall inside the tank allows to avoid the eddies.
- 1 230V / 400V three-phase motor pump with a power of 750W.
- 1 rotary valve to manually adjust the water flow at the pump outlet.
- 1 rotary valve to adjust the level of water leakage at the tank outlet.
- 1 ¼ turn valve for quick emptying of the tank.
- 1 hydrostatic pressure sensor 4-20mA.
  - 0-600mm measuring range directly mounted on the tank wall.
- One hydrostatic pressure sensor 4-20mA directly mounted on the tank wall.
  Measuring range 0-600mm.
- 1 electrical panel equipped with 4mm terminals for connecting the modules using 4mm safety leads.

ref. MAQ-ND-OP

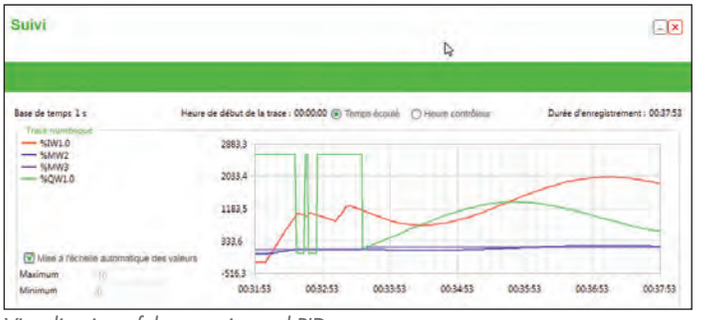
PUMPING SYSTEMS WITH SUPERVISION AND REGULATION

STANDARDS MODELS : 3-PHASE 400V
Available on single-phase 230V
Add -230 at the end of the references

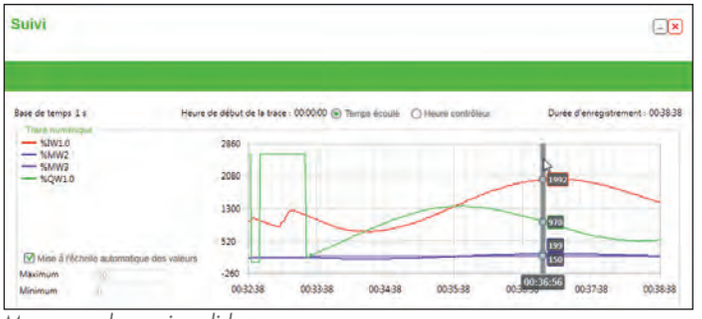
These 4 versions of pumping systems are supplied wired and configured. According to the model selected, the student can study supervision, level regulation and flow rate regulation. System supplied fully functional with examples of programming.
A CD contains the user instructions, tutorials and the controller (PLC), HMI and speed variator programs.

Supervision enables viewing of:
- The water level in each tank
- Detection and the state of each all or nothing sensor
- Pump operation
- The tank level messages
- The control of the speed variators (as per reference)
- The signals 4-20mA of the analogue sensors (as per reference)
- Observation of the total operation of the pumping station

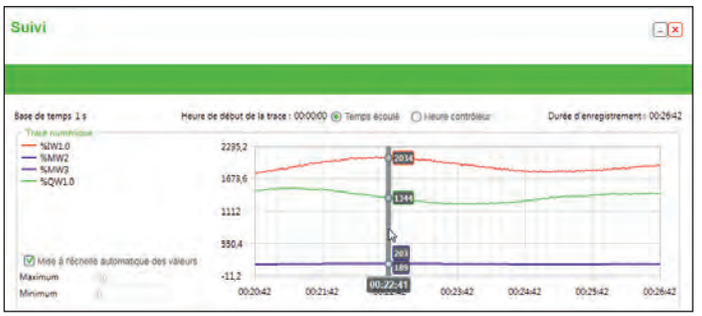
Supervision enables control of:
- Switching the system on/off
- Switching the motor pumps on/off
- Starting in manual mode
- Starting in automatic mode
- Maintenance mode
- Interacting on the total operation of the pumping station



Visualization of the setpoint and PID output curves



Measure values using sliders



Visualization of the flow and analog input curves of the VFD

OPTIONS DISPONIBLES

Flowmeter (included on HYDRO-1 and HYDRO-3)
Hydraustatic pressure sensor (included on HYDRO-1 and HYDRO-2)
Pallet flow controller
Float flow indicator
Breakdown box

OPERATING PART ALONE

- 1 aluminium frame with casters
- 1 bottom tank of 150L
- 2 top tanks (transparent sides) each with :
  - 3 float level sensors
  - 1 multiple turn draining valve
  - 1 overflow safety system
- 2 three-phase motor pumps 230/400V (1hp).
  Safety device for no load pumping and reversal of rotation direction.
  Equipped with 2 multiple turn valves.
- 1 console equipped with 2 Harting® industrial connectors
  grouping the wiring of the motor pumps and all-or-nothing level sensors

ref. HYDRO-OP

Réf.	HYDRO-1	HYDRO-2	HYDRO-3	HYDRO-4
Communicating models Tablet & Smartphone Autonomous integrated Wifi	Versions communicantes Tablette & Smartphone			
	HYDRO-1-C	HYDRO-2-C	HYDRO-3-C	HYDRO-4-C

User's manual + Practical Works

EDUCATIONAL OBJECTIVES	HYDRO-1	HYDRO-2	HYDRO-3	HYDRO-4
Study of the supervision of an industrial pumping station	✔	✔	✔	✔
Study of the regulation of water level by all-or-nothing float sensor	✔	✔	✔	✔
Study of the regulation of water level by hydrostatic sensor 4-20mA	✔	✔		
Study of the regulation of water flow rate by flowmeter 4-20mA	✔		✔	
To understand the operation of an industrial pumping system	✔	✔	✔	✔
To take industrial measurements of electrical values	✔	✔	✔	✔
To produce a PID program with a controller PLC	✔		✔	
To produce a PID program with a 4-20mA regulatotr	✔	✔		
To study Ethernet / IP addressing	✔	✔	✔	✔
To learn how to use and configure a speed variator	✔	✔	✔	
To perform industrial maintenance operations	✔	✔	✔	✔
To study the analogue signal 4-20mA	✔	✔	✔	

PRACTICAL WORKS	HYDRO-1	HYDRO-2	HYDRO-3	HYDRO-4
Study and identification of the components of a pumping station	✔	✔	✔	✔
Measurement of the voltages, currents, and powers of the motor pumps	✔	✔	✔	✔
Configuration of the speed capacitor according to the pump	✔	✔	✔	
Configuration of the IP addresses of the PLC, the screen and a computer	✔	✔	✔	✔
Production of automation programs	✔	✔	✔	✔
Production of HMI programs	✔	✔	✔	✔
Performance of industrial maintenance operations	✔	✔	✔	✔
Measurements of an analogue signal 4-20mA and 0-10V	✔	✔	✔	
Production of regulation supervision with all-or-nothig sensors	✔	✔	✔	✔
Production of level regulation supervision with the controller (PLC) of the PID	✔		✔	
Production of regulation supervision of flow rate with PID regulation	✔	✔		

COMPONENTS	HYDRO-1	HYDRO-2	HYDRO-3	HYDRO-4
Aluminium frame with casters	✔	✔	✔	✔
1 bottom tank of 150L	✔	✔	✔	✔
2 top tanks (transparent sides) each with: 3 float level sensors, 1 multiple turn draining valve. 1 overflow safety system.	✔	✔	✔	✔
2 three-phase motor pumps 230/400V (1hp). Safety device for no load pumping and reversal of rotation direction. Equipped with 2 multiple turn valves.	✔	✔	✔	✔
1 electrical cabinet with residual current and thermal-magnetic protective devices	✔	✔	✔	✔
1 Schneider® controller M221(PLC) with integrated PID and analogue board	✔	✔	✔	✔
1 Ethernet colour touch screen 5.7". Attached to a rotating arm. The screen can be removed easily for easy storage	✔	✔	✔	✔
1 Vijeo Designer® supervision program	✔	✔	✔	✔
1 three-phase speed variator with its programming software Somove® (configured for level regulation)	✔	✔		
1 three-phase speed variator with its programming software Somove® (configured for flow rate regulation)	✔		✔	
1 water level sensor 4-20mA – Configured for water height of 600mm	✔	✔		
1 flowmeter 4-20mA – Display and programming buttons on front	✔		✔	
1 PID regulator with screen and programming buttons on front.	✔		✔	

OPTIONS FOR PUMPING SYSTEMS

FLOWMETER (INCLUDING ON HYDRO-1 AND HYDRO-3)

ref. HYDRO-DEB

INCLUDED WITH HYDRO-1 AND HYDRO-3

This option is driven by the controller (PLC) and the supervision software.
It allows to display the real flow according the position of one of the valves. The controller (PLC) processes the signal 4-20mA for an easy supervision.

HYDROSTATIC PRESSURE SENSOR

ref. HYDRO-NIV

INCLUDED WITH HYDRO-1 AND HYDRO-2

This option, supported by the PLC and the monitoring program, measures the water level. The monitoring screen displays the levels in the tanks proportionally to the pressure. Possibility to install 2 sensors, one on each tank (Basin / Water tower).

- Piezoelectric measuring cell
- Scale precision +/- 0.5%
- 4-20 mA

INDICATEUR DE DEBIT A FLOTTEUR

A moving float in a transparent tube indicates the pump's water flowrate in cubic meter/hour

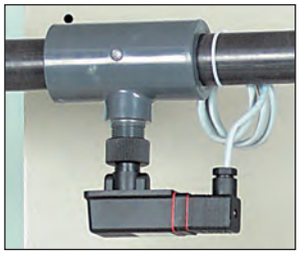
Features

- Upright fitting
- Measuring scale: 0.6 to 6 cubic meter/hour
- Ascending fluid
- Float and stop
- PVC connection Diam: 40mm (to be stuck on)

ref. FLO-DEB

ALL OR NOTHING FLOW SENSOR

Detects water flowing in the PVC pipe of the circuit. An NO or NC contact at the sensor output sends information to a PLC or a contactor.



Features

- Can be fitted in any position
- PVC connection Diam: 40mm to be stuck on
- Switchable, potential-free contact
- NO or NC 1A/230VAC
- Electrical connection via a DIN connector

ref. CO-DEB

BREAKDOWN BOX

ref. HYDRO-PAN

Fault simulation box for HYDRO models
Ten key switches allow you to choose the type of fault.
Thanks to the case cover, the choice of the fault is not visible to the student.

List of breakdowns

- Fault 1: General Fault
- Fault 2: HMI power supply fault
- Fault 3: PLC supply fault
- Fault 4: Float Fault 1
- Fault 5: Float Fault 2
- Fault 6: 4-20mA signal fault of water level control (except HYDRO-3 / HYDRO-4)
- Fault 7: Flow control 4-20mA signal fault (except HYDRO-2 / HYDRO-4)
- Malfunction 8: motor pump fault 1
- Fault 9: Motor pump fault 2
- Fault 10: PID output signal fault (except HYDRO-3 / HYDRO-4)

COMPACT MODEL FOR ELECTRICAL AUTHORIZATION

ref. HABILIT6

Dimensions: (W)430 x (D)405 x (H)745mm - Weight: 12 kg

Portable model for the implementation of electrical hazards authorization (B0 / B0V / BE maneuver / BS) in a housing type environment.

The 24VAC service voltage protected by fuses, makes the use of the model completely secure.

The component marking information and other technical features are screen printed on PVC faces.

EDUCATIONAL OBJECTIVES

- **Application of knowledge, rules and methods for certification to electrical hazard clearance**
- **Perform practical work related to electrical qualification B0 / B0V / BE maneuver / BS**
- **Perform electrical equipment logging operations**
- **Take measurement readings using a multimeter (not supplied)**

SUPPLIED WITH PRACTICAL WORK

Practical work provided

- Reminder on electrical authorization
- Logging a circuit breaker
- Completing the documents of registration and authorization
- Verification of the good use of Personal Protective Equipment (PPE)
- Voltage measurement and continuity test with a multimeter (not supplied)

Examples of interventions

- Power off and logging
- Replacement of a Low Voltage fuse
- Replacement of a lamp
- Removing and installing a socket outlet
- Removing and installing a light switch
- Connecting an item of electrical equipment to a waiting circuit
- Reset on instruction of a protection device
- Replacement of an accessory of a lighting (bulb ...)

Composition

- A socket module allowing the power supply of the model in 230Vac / 50Hz 2P + T (power cord supplied)
- 1 differential switch ahead of installation in 40A-30mA (housing type)
- 1 lighting circuit consisting of a fuse holder with 10A fuse, a switch, a recessed pot and a porthole with a 3W LED lamp
- 1 circuit consisting of a circuit breaker 16A of housing type, a recess pot and a socket.
- 1 rolling shutter circuit consisting of a 10A circuit-breaker of housing type, a roller shutter switch, an installation socket, a junction box and 2 LEDs simulating a rolling shutter for testing.
- 1 circuit breaker locker + 1 padlock + 1 condemnation signaling badge (" CONDEMNED DEVICE - DEFENSE TO USE")

CABINET FOR ELECTRICAL AUTHORIZATION

HABILIT24-CA model

HABILIT24-S model

The service voltage of 24VDC, protected by fuse and circuit-breaker, makes use of the cabinet completely safe. The integrated load, comprised of six 60W lamps, enables a sufficiently significant current to be generated. The cabinet is self-contained and requires no connection to the mains 230V when in use. A mains cable is nevertheless included for recharging the batteries using an integral charger.
Available in 3 versions, fixed or mobile.

ref. HABILIT24-CA Open version - on wheels

ref. HABILIT24 Version with cabinet - fixed

ref. HABILIT24-S Version with cabinet - on wheels

EDUCATIONAL OBJECTIVES

- ***Put into application the knowledge, rules and methods for certification for authorization to electrical hazards***
- ***Carry out practical assignments, wiring tasks relevant to electrical authorization***
- ***Perform maintenance and cleaning operations in an industrial cabinet***
- ***Perform removal from service operations of electrical equipment***
- ***Take measurements using a clamp ammeter***

TEACHING RESOURCES STUDENT & TEACHER

Practical works

- Reminder on electrical authorization
- Changing sets of copper busbars
- Removing the cabinet from service
- Complete the removal from service and authorization documents
- Check correct use of PPE (Parsonal Protective Equipment)
- Reading the current in the electrical cabinet using a clamp ammeter

Comprises

- 1 main source and one secondary source 24VDC distributed on 2 sets of flat copper busbars, 100A
- 2 disconnectors with visible cutting, for padlocking
- 2 special circuit-breakers DC 10A
- 1 set of protection devices by fuse + RC circuit-breaker 10A-10mA, IS type
- 4 gel batteries 12V/14Ah
- 3 dual switches
- 6 bulkhead lights 24VDC-60W
- 1 battery charger 230VAC/24VDC
- 1 panel of safety instructions for electrical authorization
- 1 2-colour light column indicating 24VDC 'on' and battery recharging
- 1 lot of 2 posts + 5m of red and white chain
- 1 insulating mat
- 1 insulating blanket
- 2 removal-from-service padlocks

Features

- 3-metre mains lead for battery charger
- Dimensions : HABILIT24-CA: 800 x 800 x h 1800mm - Weight: 90kg
  HABILIT24: 450 x 700 x h 2000mm - Weight: 96kg
  HABILIT24-S: 600 x 800 x h 2120mm - Weight: 111kg

CABINET FOR ELECTRICAL AUTHORIZATION - COMPACT MODEL

Meets the same educational objectives and allows to carry out all the practical work described on the previous page.

Comprises
- 1 lockable disconnector.
- 1 battery charger 230VAC / 24VDC-5A.
  Overload protection by electronic and against short-circuit by fuse short circuit gPv.
- 2 gel batteries. Sealed. 12V-14Ah.
- 1 24VDC continuous circuit distributed on 1 set of 100A perforated brass bars.
- 1 circuit breaker C60H-DC -10A for protection of the 24VDC circuit.
- 2 double insulation bulkhead lights with switches and lamps 24V-60W.
- 1 insulating mat
- 1 insulating blanket
- 1 set of 2 posts + 5m of red and white chain
- 1 removal-from-service padlocks

Aluminum frame with wheels
- 3 meter power cord for the battery charger
- Dimensions L x W x H: 480 x 240 x 1000mm - Weight: 49kg

ref. HABILIT12

Battery charger supplied

STUDY OF EARTHING CONNECTIONS (NEUTRAL SYSTEM)

ref. SLT-1-T8

Version with HMI and support arm (supplied)

ref. SLT-1

Version with PC not supplied

SLT is a teaching system covering the main elements employed in protection against the electrical hazards of indirect or direct contact (residual current devices with several sensitivities, thermal magnetic circuit-breakers, three-phase transformer). It demonstrates the principle of electrical protective devices in TN, TT and IT earthing connection schemes. The teaching sequences are organized so as to discover the restrictions, outcomes and adjustments required for good protection against electrical hazards.
Use of the system and running the tests are clearly guided by means of an HMI with touchscreen. The student has no cabling to create as the connections are transparently controlled by relaying. The student can thus concentrate on understanding the phenomena. Using the touchscreen, the student can select the type of neutral system to be studied, the different resistance values of faults, earthing and the human body, see the equipotential bonding, visualize the leakage current, simulate a fault and produce the insulation fault without danger.
Each test is linked to a clear synoptic diagram, displayed on screen. Voluntary action on the HMI displays the potentials at the different points of the installation, as well as the path of the fault current and its intensity. The indicated values result from different case simulations:

- with or without insulation fault,
- with or without contact
- before or after protective device tripping.

The student validates the results of the simulation (and its calculations) by performing a test to see a protective device trip or not, and to measure the contact voltage and fault current with measuring instruments (not supplied).

Comprises

- Electrical cabinet on casters with worktop.
- 1 PVC panel equipped with emergency stop button, Start/Stop button and 2 Operation + Fault indicator lights.
- 1 PVC panel equipped with:
  - diagram with 3 indicator lights for visualizing the selected neutral system.
  - 4 safety terminals 4mm for reading the contact voltage between the earth and body as well as between the earth and a second body. 2 additional terminals 4mm for reading the fault current.
  - an insulation monitoring device (IMD).
  - a set of circuit-breakers and residual current devices used in each earthing connection scheme.
- 1 programmable logic controller (PLC) M221 (inside the cabinet) for managing all the functionalities.
- HMI 7.5", colour + support arm **(ref. SLT-1-T8 only)**.

Characteristics

- Three-phase power supply 400V +N +E with cable 5m and mains plug.
- Laminated worktop 670 x 750 mm
- Supplied operational with complete Student / Instructor teaching manual
- Dimensions ref. SLT-1-T8 270 x 750 x 1180mm - 112kg
  ref. SLT-1 270 x 750 x 940mm - 110kg

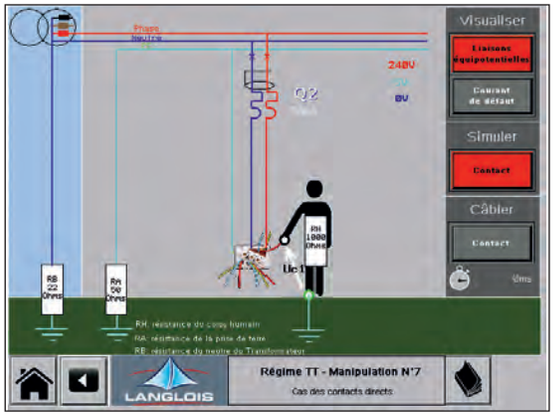
EDUCATIONAL OBJECTIVES

- **To learn about the notion of electrical hazard (qualitatively and quantitatively).**
- **To demonstrate the features of each earthing connection scheme (TT, TN, IT)**
- **To be able to explain the role of each element of the protective arrangements (earthing connection, thermal magnetic circuit-breaker, residual current device, IMD).**
- **To show the fault current paths without danger.**
- **To take into account standard NFC 15-100**

DOSSIER PEDAGOGIQUE ELEVE + PROFESSEUR

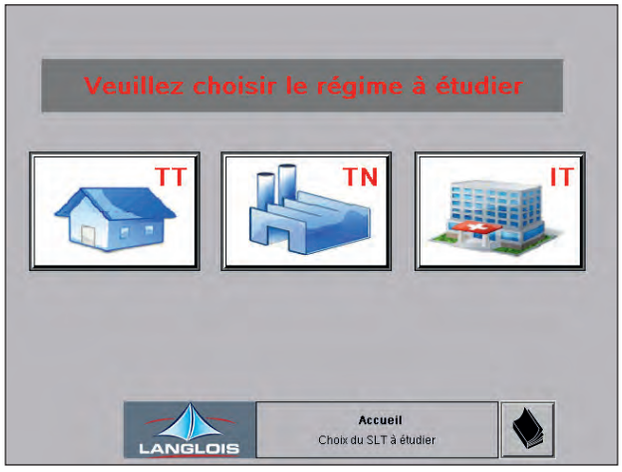
Pratical works - 2 types

• Demonstrating the structure of the protective arrangements against indirect and direct risks.
• Defining the selection criteria for the different components (protection sensitivity, etc.)
Study of 7 scenarios for the TT system, 3 for TN and 5 for IT.
Supplied with booklet for guiding the student through the course.
Contains a note on the 3 NEUTRAL SYSTEMS and some recaps of standard NFC 15-100.
For each test, this gives the objectives, the diagram, questions on the calculations to be done, on the measurements to be carried out and on the diagnostics to make.

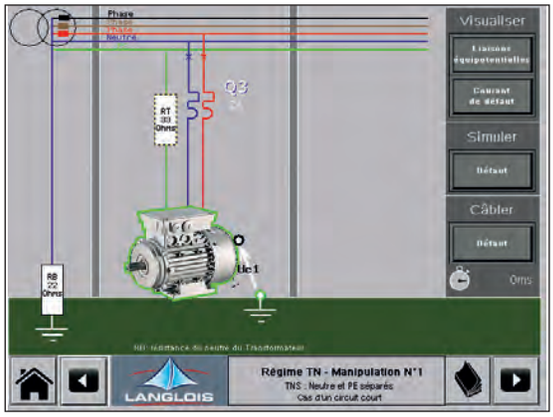


Example of screen
Test in TT system: View of equipotential bonding.

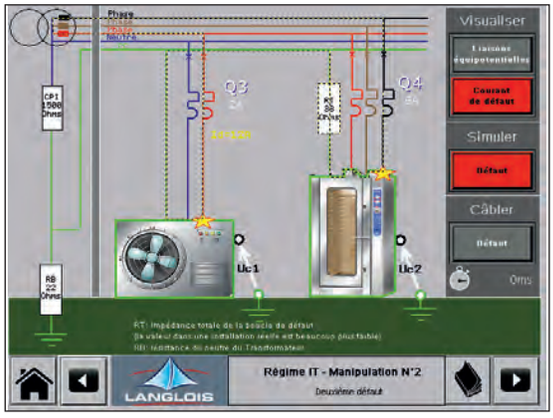
SOFTWARE AVAILABLE IN ENGLISH



Home page
For selecting the neutral system to study



Example of screen
Test in TN system: View of equipotential links.



Example of screen
Test in IT system: View of fault currents.
The student can measure the voltages on the front panel of the cabinet.

STUDY OF THE ROLE OF THE EARTH & A DIFFERENTIAL CIRCUIT-BREAKER

ref. SELDIF

The front synoptic shows

- the public network, with its medium voltage/low voltage transformer substation, and the neutral to earth connection, in this substation.
- the transmission line from the transformer substation to the dwelling
- the domestic installation, with the residual current circuit-breaker 30mA, the local earth, and a washing machine. The TT neutral system is the same as that of a domestic installation
- A person in the right-hand part has an LED for a heart. If a dangerous leakage current flows here, the LED comes on
- A two-pole industrial residual current circuit-breaker 30mA is located in the centre of the synoptic.
- Two jumpers enable the washing machine to be fully isolated, and current measurements to be taken.
- An ON pushbutton starts the washing machine, and a green LED comes on, symbolizing rotation of the machine.

Safety terminals 4mm, located on the front, let the student measure the fault currents, and insert different resistive modules. These modules simulate two earth resistance values, and two leakage current values. One module with variable resistance enables the differential's tripping current to be measured.

To prevent any risk of electrocution to the student, the model operates at extra low voltage using an isolating transformer to standard NFC61558.

EDUCATIONAL OBJECTIVES

- **Educating students about the risks of electrocution in the event of direct contact**
- **Educating students about the risks concerning the quality of the earth**
- **Showing the role of a 30mA residual current circuit breaker in a house**

TEACHING RESOURCES STUDENT & TEACHER

Theoretical recalls provided

- Operation of a thermal magnetic circuit-breaker rating, breaking capacity, tripping curve, symbols
- Operation of a residual current circuit-breaker rating, tripping time, symbols
- Physiological effects of the current hazard zones: current function times, dangerous voltages
- Maximum resistance of the earth

Practical work supplied

No earth and no insulation fault

- potential risk

Earth < 100Ω and net insulation fault

- with person in contact with the metal enclosure of the machine
- with no contact

Appearance of a fault current greater than 30mA, tripping of the differential.
Demonstration of the short circuit.

Earth < 100Ω and low insulation fault

Appearance of a fault current less than 30mA, no tripping of the differential.
Measurement of the fault current in the person in contact with the machine.

Earth > 100Ω and low insulation fault

Appearance of a fault current less than 30mA, no tripping of the differential.
Measurement of the fault current in the person in contact with the machine

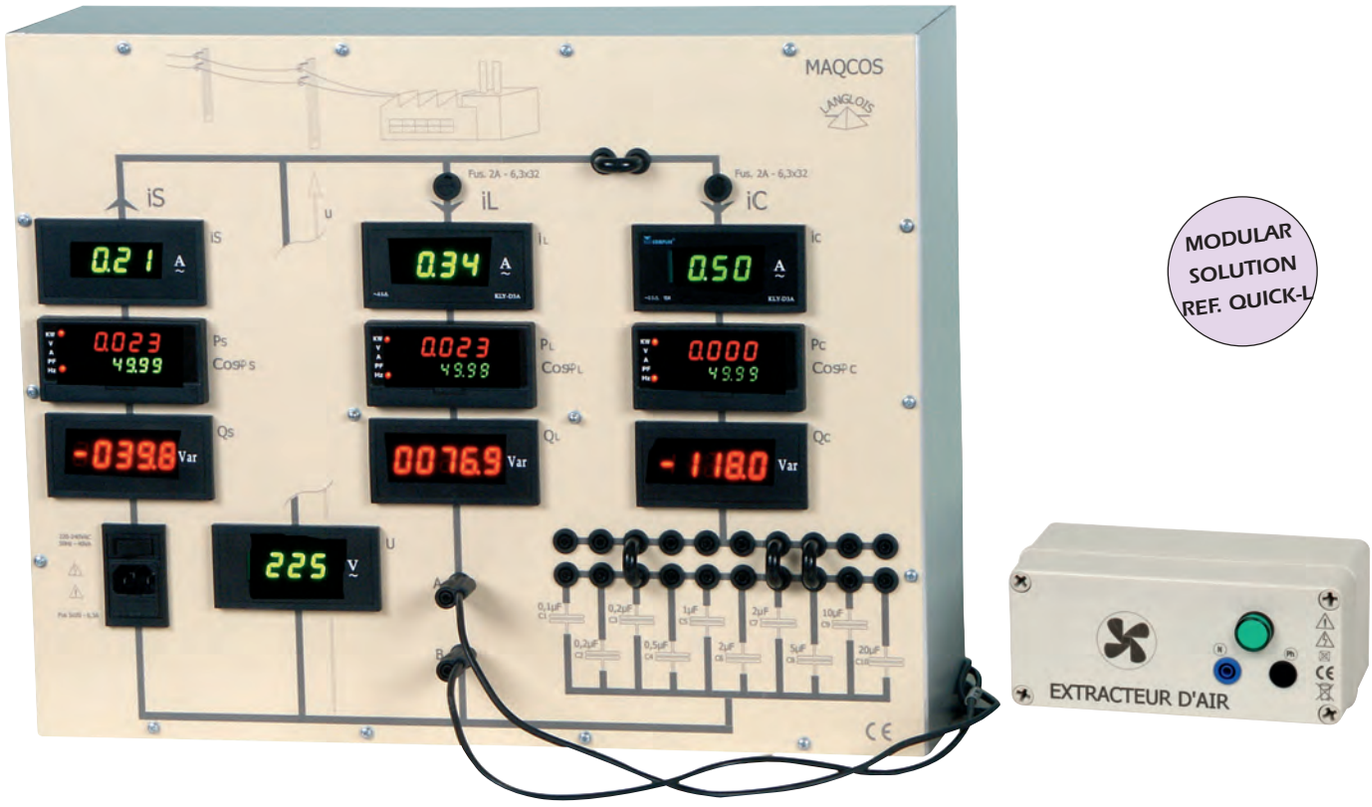
Earth > 100Ω and net insulation fault

- with person not in contact with the metal enclosure of the machine measurement of the fault current
- with person in contact with the enclosure: measurement of the fault current greater than 30mA, no tripping of the differential. LED symbolizing the heart, coming on.

Others characteristics

- Power supply : 230VAC 50Hz
- Dimensions : 390 x 270 x 100mm
- Weight : 2.8kg
- Supplied with 5 resistive modules, coupling jumpers & leads

POWER FACTOR CORRECTION SYSTEM



ref. MAQCOS

EDUCATIONAL OBJECTIVES

- ***Studying the power factor & Demonstrating the interest of power factor corrector for the cost of the power (kWh)***

USER'S MANUAL + 3 PRACTICAL WORKS

Proposed Practical Works

- studying of an industrial air extraction installation:
  Current of branches – power of the transport line with and without power factor correction – Active and reactive power in the branches – Fresnel diagrams
- Study of the pure inductance of a plant in working in order to determine the capacitor bank necessary
  Role of automatic compensation
- Study of resonance, max / min current

TECHNICAL SPECIFICATIONS

- 13 displays: 3 x A , 3 x W , 3 x power factor , 3 x VAR , 1 x V
- 10 condensers: 0.1µF - 20µF
- Fuse protection
- Dimensions: 510 x 400 x 150 mm - Weight 8.2kg

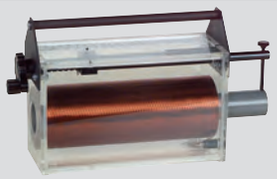
The MAQCOS model is designed for studying and rectifying power factors.
It consists of three branches:

- source branch, S, representing the energy supplied by the electricity mains (Network)
- plant branch, L , symbolizing a plant's energy consumption
- plant branch, C, including the padding condensers (integrated in the model and connected using jumper wires)

Each branch is equipped with the same measuring instruments:

- ammeter
- wattmeter, measuring active energy
- Power factor meter, measuring the power factor
- varmeter, measuring reactive energy

Students are thus able to compare four electrical variables in the three branches at the same time. They will observe (surprisingly?) that the source current value in the mains network branch may be much lower than the value in the plant branches. That source reactive energy is close to zero when power factor is around 1, whereas plant reactive energy is at maximum value. The model shows the impact of a power factor regulator on the cost per kWh transmitted and the resulting electricity bill.



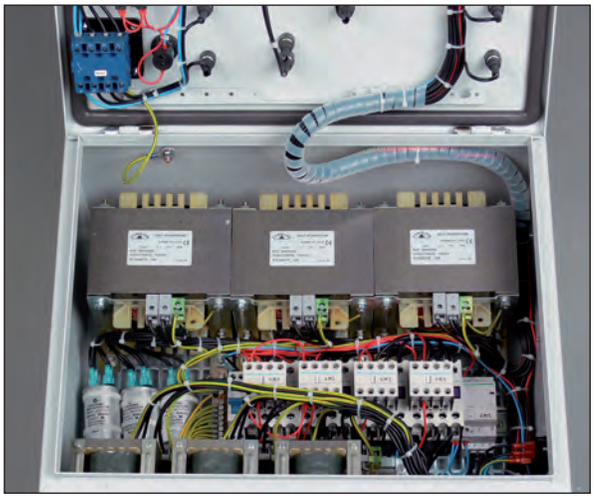
ref. PSYJR

VARIABLE INDUCTANCE OPTION

Students have to find out the pure resistances and inductances of an installation, without interrupting its operation and with a view to deciding on the compensation condenser battery to activate, via a power factor regulator.

STUDY OF THE 3RD AND 5TH ORDER HARMONICS

ref. HARMOVAR



EDUCATIONAL OBJECTIVES

- ***Studying, putting into service, getting started and setting of the system***
- ***Studying of harmonic filtering of orders 3 & 5 and the power factor***
- ***Practical corrections of harmonics generated by a speed variator.***

USER'S MANUAL + PRACTICAL WORKS

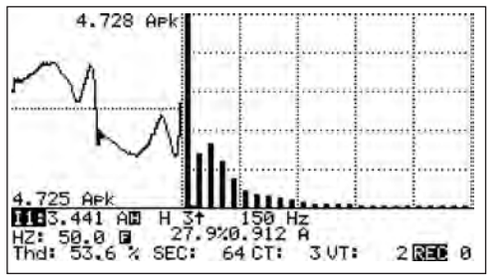
Unit on wheels consisting of passive filters used for studying the filtering of the third and fifth order harmonics (and, as a result, the increase in the power factor) during the use of a speed controller for an AC motor or apparatus with a diode-thyristor bridge with a capacitor filter. HARMOVAR uses the industrial methods employed for decreasing the harmonic pollution generated by U/f-type frequency converters or other pollutant receivers with third or fifth order harmonic currents (inverter, switch mode power supply and discharge lamps). The passive filters found there have been specially sized for optimal use and so that the LC-type filtering systems can be studied. They eliminate third or fifth order harmonic currents and show the effect of the third order harmonic current on the neutral.

- The network analyser ref. 6830 (option on page 239) records the harmonic graph
- A switch on the front of the unit is used for activating or deactivating the H3 and H5 filters.
- Jumpers and double channel terminals are used for electrical measurements (current, voltage and power), not only on the network side but also on the receiver side and in each filter.

FEATURES

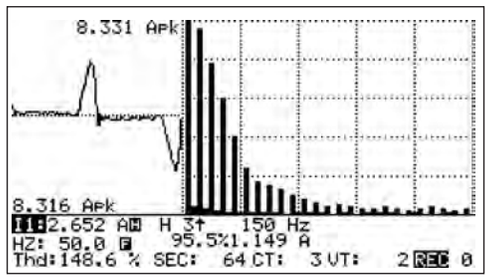
- Operation on 230V single-phase network or 230V/400V three-phase network
- Fitted with induction coils and capacitors which have been specially calculated for optimum filtering.
- Equipment sized under rated conditions for 1500W motor test bench controlled by frequency converter.
- Compatible with our frequency converters (pages 95-98)
- Supports the max. effective line current: 15A/H3 max: 10A/H5 max: 5A
- Wiring consisting of 4mm safety leads
- Supplied with instructions for use and tutorials
- Easy to move, thanks to its wheels
- Dimensions: 450 x 450mm Height: 530mm - Weight: 73kg

Speed controllers



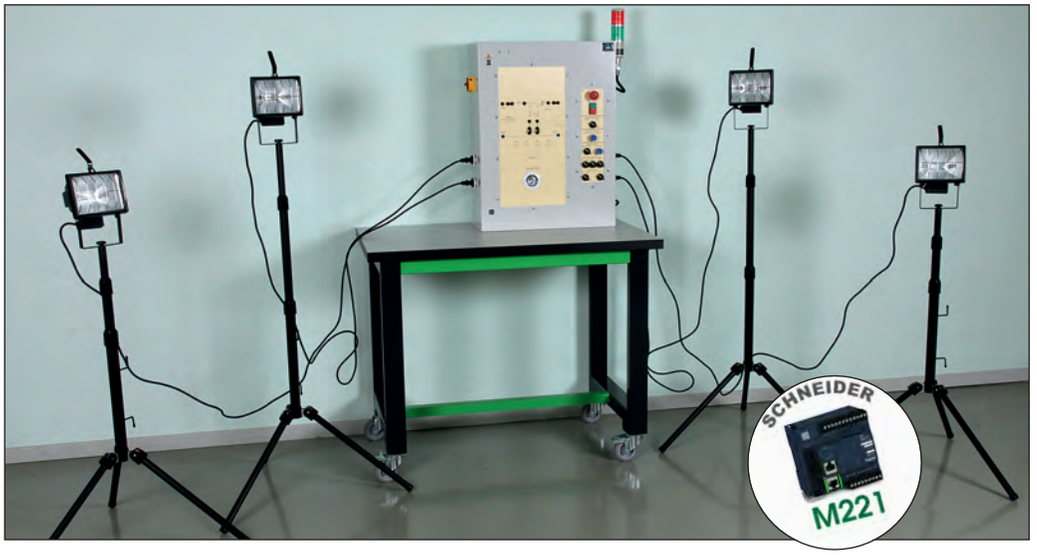
H3 filter activated

Examples of line current measurements taken with our 6830 network analyser, on HARMOVAR associated with our ACVAR5 frequency converter.



H3 filter deactivated

POWER QUALITY CONTROL



Inside view of the cabinet

ref. HARMO-35

EDUCATIONAL OBJECTIVES

- ***Understanding and using of the method of Fourier series decomposition***
- ***Studying of the power in presence of harmonics***
- ***Understanding the compensation of the power factor by harmonics correction***
- ***Studying the functioning of the dephasing dimmer***

USER'S MANUAL + PRACTICAL WORKS

Proposed Practical Works

- Making a power balance in presence of harmonic of currents and voltage
- Observing the disturbances caused by a dimmer
- Raising the power factor, by offsetting a portion of the reactive power and filtering of harmonic of order 3
- Observing network disruptions, caused by a dimmer
- Increasing the power factor by canceling the reactive power (with an anti-resonance circuit)
- Reading the evolution of the PLC program
- Producing a summary document as a record

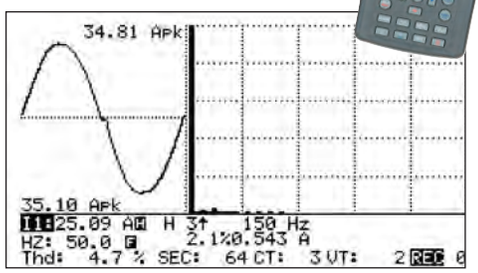
Four 500W halogen lamps on a tripod are powered by a SCR power regulator which creates harmonic pollution and reactive power degrading the power factor.
A passive filter with an LC circuit is used for:

- minimising the third order harmonic pollution
- measuring the power factor by decreasing the reactive power
- observing the resonance phenomenon.

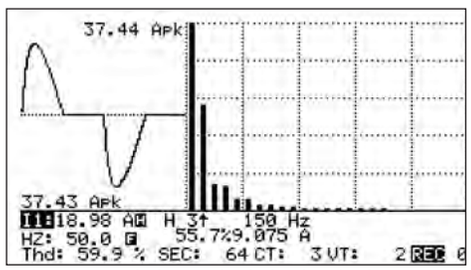
Principle : the industrial lighting of the panel – simulated by the four halogen lamps on a tripod – varies depending on the ambient sunlight, simulated by one low-voltage spotlight placed in the cabinet. When the current in the halogen lamps is significantly degraded, the filtering components are activated, either manually via the switches on the front or automatically by a PLC.
Auto mode: 3 sunlight levels are programmed. For weak sunlight the 3rd order current harmonic is high.
The PLC activates a passive filter which tends to decrease this harmonic.
Manual Mode: a potentiometer is used for continually adjusting the sunlight level. Varying it makes it possible to:

- VIEW, with the help of the network analyser (ref. 6830), the effect of the dimmer on the level of the current harmonics;
- MEASURE THE power factor by inserting a capacitor induction coil. The network analyser reveals that the solution can be found in the induction coil.
- FILTER HARMONIC 3 by using a resonant filter which will reduce noticeably its current

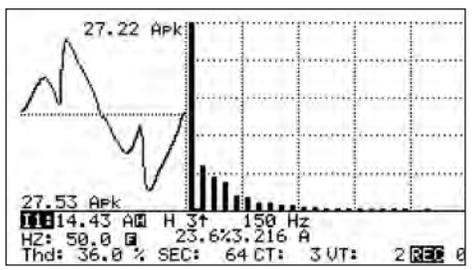
MEASUREMENT READINGS IN MANUAL MODE WITH A NETWORK ANALYSER
REF : 6830 ON OPTION



Lighting provided 100% (no harmonics)



Lighting provided 50% (high third order harmonic)



Lighting provided 50% with passive filter (reduction of third order harmonic)

OTHER FEATURES

- Light column indicating that the mains power is on
- PLC Software, tutorial and instructions for use are supplied.
- Power supply: 230V 50Hz
- Cabinet: 820 x 400mm Height: 930mm
- Base with wheels, with laminated bench-top: 1200 x 750 x 970mm
- Overall dimensions: 1200 x 750mm Height: 1900mm - Weight: 128kg

PNEUMATIC HANDLING LINE

OPERATING CYCLE

The parts placed on the conveyor belt are held by the vacuum suction grip of a first pneumatic jack, then placed on the horizontal jack, grasped by the electromagnet jack undergoing a complete handling cycle before being returned to the belt.

PNEUMATIC COMPONENTS

- 3 double effect pneumatic jacks Ø32mm. Travel 250mm, each equipped with:
  - flow reducers allowing fine adjustment of their movement
  - magnetic position detectors (2 or 3 per actuator) with LED
  - quick-fit joints for Ø4mm tubes
- 2 5/2 electropneumatic distributors
- 1 5/3 electropneumatic distributor

  All distributors are fitted with
  - 24V DC coils
  - LED visual display of the state of the coils
  - quick-fit joints for Ø4mm tubes
  - fitted on mountings with silencers
- Vacuum generator

  One of the actuators is fitted with a suction grip with its vacuum system.
  An adjustable threshold vacuostat delivers an electrical presence or absence of vacuum signal.
  A vacuometer allows visual checking on the vacuum.
- Jacks protection

  To avoid any risk of destroying a pneumatic jack, an entirely pneumatic logic system (without student access) prevents the simultaneous movement of the horizontal jack with a vertical jack.

ELECTRIC BOX

- Contains a regulated 24V DC 2A source to feed the PLC if necessary if it does not have an internal supply. The necessary supplies to the model.
- A Start cycle button, a Stop cycle button,
- a reset button.
- a general emergency button stopping the electric and pneumatic supplies.
- The connector which the user connects to the PLC or to the manual control box.

USER'S PROTECTION

- A transparent color door is a barrier between the pneumatic jacks and the user's hand. The opening turns off the air pressure

PLC (only for PNEU99 version)

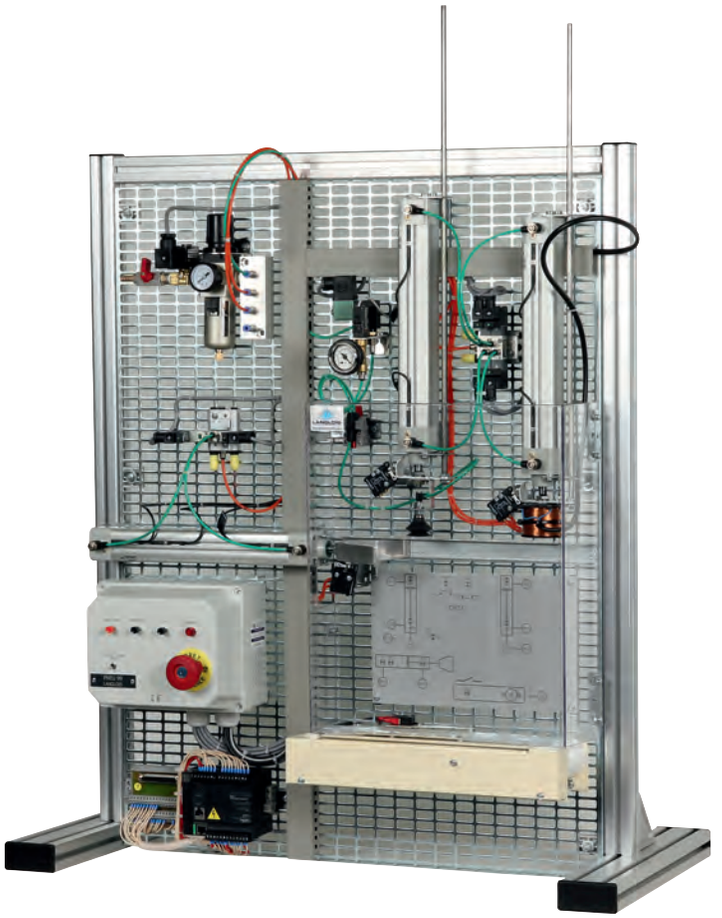
- 14 inputs / 10 outputs (RELAYS)
- 2 languages : Grafcet instructions, contact language.
- Programming : from a PC using a software (included).
- Delivered with a complete and functional program.

OTHER CHARACTERISTICS

The conveyor belt is either controlled by the automatic system and the end of belt detection switch or by being forced into operation. An electromagnet illustrates picking up by a magnetic field. PNEU** is connected to the air network by splined terminal placed on the valve block of stop + regulator + filter + distribution output by quick coupling.
Dimensions: 820 x 1000 x 460mm.

COMPRESSOR
SEE WEB SITE

ref. PRESS-35



ref. PNEU99 with PLC and software

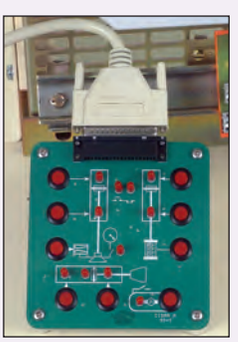
ref. PNEU98 without PLC

EDUCATIONAL OBJECTIVES

- **Introduction to pneumatic components**
- **Programming approach by PLC**
- **Monitoring of the system in manual or automatic mode**

USER'S MANUAL & THEORETICAL COURSES

The model is delivered ready for use (the electric part is completely wired and all the pneumatic connections made). The quick-fit joints allow dismounting/reassembly of pneumatic interconnections with Ø4mm tubes of various colors.
A manual gives details of the operation of all the electro-pneumatic components used and their adjustment. Several cycles are described, including one complete with its grafcet.

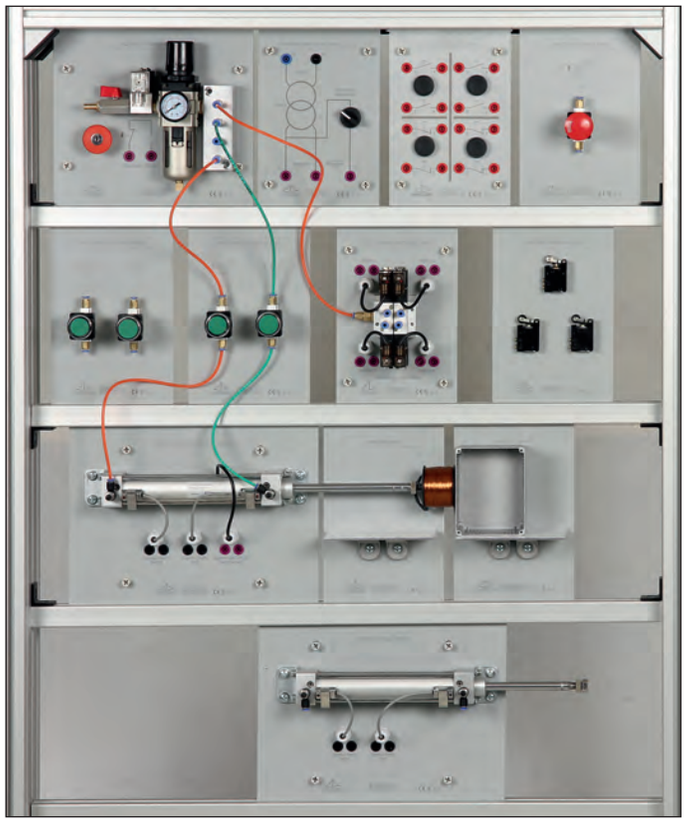


MANUAL CONTROL BOX SUPPLIED

This box contains
- 9 push buttons corresponding to each actuator
- 11 indicator lights which give information about the state of the sensors

It allows very slow observation of pneumatic phenomena and learning about the basic regulation of flow control, actuator speed, and detector positions.

STUDY OF PNEUMATIC COMPONENTS



ref. QUICK-PN1PLUS

ref. QUICK-PN1 **without frame and console**

Sockets on the back of the console for connecting the modules

Sets of modules (H 250mm) for studying pneumatic automation.
Comprised of cylinders, electropneumatic distributors, pneumatic controls that can be connected via pneumatic quick-fit connectors 4mm and safety terminals Ø4mm for electrical connection at 24V.

EDUCATIONAL OBJECTIVES

- ***To study the symbols used to represent pneumatic components***
- ***To study the operation of a double-acting cylinder***
- ***To study the operation of a double-acting cylinder with electromagnet***
- ***To study the wiring of pneumatic and electropneumatic automation***

TEACHING RESOURCES STUDENT & TEACHER

Proposed Practical Works

- Creation of pneumatic automation diagram
- Study of the operation of a pneumatic double-acting cylinder, with pressure adjustment to optimize displacement.
- Study of the operation of a pneumatic cylinder with electromagnet.
- Study of a pneumatic and electropneumatic distributor.

Comprises

- 1 pneumatic distributor module with 4 outputs, with manometer, filter, pressure regulator, coil 24VAC and emergency stop. Quick-fit connections for hose 4mm.
- 1 safety transformer module 220VAC/24VAC with on/off switch for electromagnet power supply.
- 1 pneumatic emergency stop module with quick-fit connections for hose 4mm.
- 2 modules of 2 pneumatic pushbuttons with quick-fit connections for hose 4mm.
- 1 module of 3 pneumatic limit switches with quick-fit connections for hose 4mm.
- 1 module of 2 electropneumatic distributors 5/2. Coils 24VAC with quick-fit connections for hose 4mm
- 2 part support modules with 1 metal box.
- 1 pneumatic double-acting cylinder module. With quick-fit connections with pressure variation for hose 4mm. 2 Position detectors.
- 1 pneumatic double-acting cylinder module. With quick-fit connections with pressure variation for hose 4mm. 2 Position detectors and one electromagnet 24VAC.
- 1 frame with wheels (H x W x D): 1610 x 940 x 500mm equipped with rack for cords (30 fingers)
- 1 single-phase power console:

- 1 thermal magnetic circuit breaker (16A)
- 1 Emergency stop push button with key
- 1 Push button + LED indicator
- 1 230V single-phase output on 4mm safety terminals
- 2 230Vac sockets (2P + E) + 12 230Vac sockets (2P + E), at the back

- 1 set of safety leads for carrying out the different practical works.

COMPRESSOR OPTION

Four oil-free cylinders compress clean air into a tank which maintains a stable steady pressure. Each cylinder has a filter. A regulator and pressure gauge enable service pressure adjustments from a few tenths of a bar to the maximum tank pressure. The latter can be selected between two values: 4 bars with motor shutdown by pressure switch or 6 bars in continuous operation. The compressor has thermal protection. Very low sound nuisance.

- Flow rate: 70 l/min
- Connection: 4mm
- Pressure adjustable from 0 to 6 bars
- Tank volume: 4 litres
- Power: 180W
- Sound level: 70dBA

(very low sound nuisance)

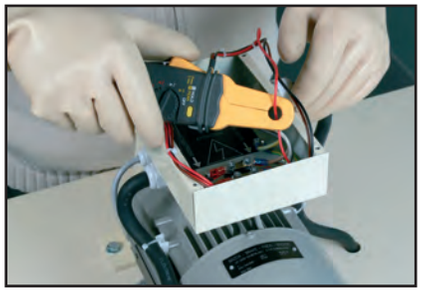
- Power supply: 230V AC 50Hz
- Dimensions: 385 x 205 x 325mm - Weight: 8.4kg

ref. PRESS-35

FAULT FINDING IN MOTOR

View of the teacher side, door closed and open.

View of the student side, with glass door.



Faults can be looked for inside the student unit and in the motor terminal.

EDUCATIONAL OBJECTIVES

- **Simulating common failures encountered with a cage induction motor with brake: damage winding, cut, shorted to ground**
- **Diagnosis by performing measurements and safety tests**

TEACHING RESSOURCES + PRACTICAL WORKS

Practical works

- Cut Winding
- Winding in short circuit
- Winding to ground
- Damaged winding
- Cut brake control system

The user's manual has been made by teachers, allowing the quick implementation of the product and the creation of practical work in the spirit of fault finding in the industry.

ref. MOTODIAG

This complete kit on casters, comprising two back-to-back units and an asynchronous squirrel cage motor and a parking brake, can be used to simulate the faults which occur most frequently.
The principle and the instructions have been devised by teachers who want to propose a method for diagnosing faults.

PRINCIPLE

Faults are recreated when the teacher rotates a single switch. Students can take measurements or perform tests in complete safety, regardless of the fault type. Faults can be looked for inside the student unit and in the motor terminal. The unit is isolated from the mains by means of an insulation transformer. In addition, a TT earthing system is recreated on the secondary for safety reasons.
Therefore, even isolation faults are detected by a 30mA differential mechanism. All safety measures are implemented in order to protect individuals and equipment. (See the faults in the description of the teacher unit)

TEACHER SIDE UNIT

The teacher uses this lockable area to manage faults activated by key switches. He/she knows, and t views all of the simulator's workings thanks to indicator light.
The position of the switches and indicator lights remain invisible to students.
The following faults are possible:

- 3 faults involving «damaged coil». A resistor is connected in series with a coil to change its impedance.
  One switch per phase, or three switches.
- 3 faults involving «power being cut in a coil». The power is cut in a coil. One switch per phase, or three switches.
- 3 faults involving a «short-circuit in a coil». The coils are short-circuited two at a time. One switch per possibility or three switches.
- 3 faults involving «coil earthing». A coil is earthed. One switch per phase, or three switches.
- 1 fault on the brake.
  The power in the parking brake is cut.

Unit from the teacher side, open door

STUDENT SIDE UNIT

This lockable area is used for starting up the simulator (if authorised by the teacher). The transparent door gives the unit a highly didactic appearance.
The student control panel is simpler than the teacher control panel, offering standard normal operation indications. This means that fault finding, testing and measurement are identical to reality in the field.

Unit from the student side, open door.

- Overall dims: 670 x 750 x 1180 mm. Weight: 136 kg
- Laminated bench-top: 670 x 750 mm
- 4 casters Ø 80 mm
- 3-phase Hypra socket on 5m mains cable

FAULT DIAGNOSIS UNIT FOR TEMPERATURE CONTROLLER

TEMP-DIAG is a setup for producing faults at different points of a temperature control process by PID. The faults are selected by the instructor using the switches located under a rear flap of the setup. For user safety, the circuit voltage does not exceed 24VAC. Students can take measurements or perform tests in complete safety, regardless of the fault type. Industrial terminals group the wiring of the different components to prevent wear of the screw terminals of the components.
Power supply 230VAC by 3m cable and mains plug 2P+E safely behind a panel.
Setup supplied wired and fully operational. Supporting material on CD includes the teaching file with the Student/Instructor practical works.

EDUCATIONAL OBJECTIVES

- ***To understand the wiring of a temperature control loop by PID***
- ***To simulate the most frequent faults on an temperature controller with analogue signal.***
- ***Analysing and interpreting the results.***

TEACHING RESOURCES WITH PRACTICAL WORKS

Practical works

- Identification of the different components and production of electrical diagrams.
- Production of the wiring of the temperature control loop.
- Programming the PID.
- Measuring the analogue signal 4-20mA.
- Finding the different faults on the circuit using measuring devices.

Composition of the system

- 1 frame on wheels (two with brake) with dimensions H1800 x 800 x 700mm
- 1 melamine shelf 750x400mm
- 1 wiring frame equipped with:
  - 1 PID controller which is the corrector device inserted in the control loop, intended to control the temperature process. From the temperature sensor it receives a signal 4-20mA, image of the value to be controlled, compares it with the set point (previously programmed in the PID) and controls the process to reduce any deviation.
    - Self-adjusting and manual PID
    - 4-digit display for instant measurement
    - 4-digit display for the set point
    - Bargraph image of the power output
    - Input 4-20mA on safety terminals
    - Output 4-20mA on safety terminals
    - High and low alarm outputs on safety terminals
  - 1 Heater unit equipped with 75W lamp directly powered with 230V.
    The Pt100 temperature probe, with a maximum diameter of 7mm, can be inserted sideways.
  - 1 Pt100 temperature probe
  - 1 conversion module PT/100-4-20mA.
    This unit links the temperature probe on the input 4-20mA of the PID, the gain and zero adjustment of the signal with 2 potentiometers.
  - 1 power controller for the load varies the conduction angle of the thyristors according to the control current in 4-20mA.
  - 1 indicator connected to the alarm output of the PID
  - 1 emergency stop for the instructor.

All the connections of the components (except the 230V power supply) are made to industrial terminals. The 230V terminals are not accessible.
Students produce the wiring diagram directly on the industrial terminals.

- 1 unit closed with flap containing:
  - 10 switches for creating faults
  - 1 main switch
  - 1 RC thermal-magnetic circuit-breaker 30mA-16A
  - 1 key operated switch with indicator for applying power to the wiring frame

ref. TEMP-DIAG

DESCRIPTION OF THE FAULTS

- Switch No. 1: fault creation on the input +4-20mA of the PID
- Switch No. 2: fault creation on the output +4-20mA of the PID
- Switch No. 3: fault creation on the input -4-20mA of the PID
- Switch No. 4: fault creation on the output -4-20mA of the PID
- Switch No. 5 to 7: fault creation on the wiring of the probe PT100.
- Switch No. 8: fault creation on the signal +4-20mA at the output of the interface PT100/4-20 mA.
- Switch No. 9: fault creation on the signal -4-20mA at the output of the interface PT100/4-20mA.
- Switch No. 10: fault creation on the alarm output of the PID

UNIT FOR FAULT DIAGNOSTICS ON INDUSTRIAL ELECTRICAL WIRING

ref. ESSAI-DIAG

ESSAI-DIAG is a model for producing faults at different points on a wiring frame. The wiring on frame represents the Star/Delta startup with double direction of rotation of an asynchronous machine. Only the control circuit is wired. Finding the faults is carried out only on the control circuit. The faults are selected by the instructor using the switches located under a rear flap of the model. The voltage of the circuit does not exceed 24VAC. Thus students can take measurements or perform tests in complete safety, regardless of the fault type.
Power supply 230VAC by 3 metre lead and mains plug 2P+E.
Model supplied wired and fully functional.
A CD contains the teaching manual with the Student/Instructor tutorials.

EDUCATIONAL OBJECTIVES

- ***To learn and understand the wiring of motor startup***
- ***To produce an industrial wiring diagram***
- ***To simulate the most frequent faults on an industrial installation***
- ***To take the measurements of the different electrical values***
- ***To analyse and interpret the results***
- ***To find the faults on a relay installation***

TEACHING RESSOURCES STUDENT & TEACHER

Practical works

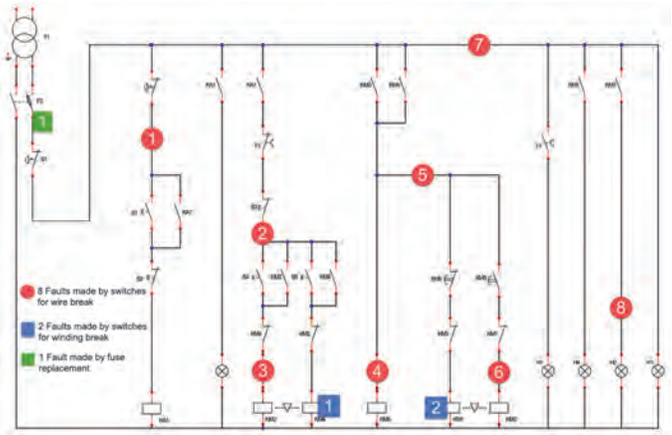
- Identification of the different components
- Producing the electrical diagrams
- Reading the currents and voltages in the circuit
- To find the different faults on the circuit using measuring devices

Composition of the model

- 1 frame on casters (two with brakes) with dimensions H1800 x 800 x 700mm
- 1 Melamine shelf 750x400mm
- 1 wiring frame equipped with:
  - 1 protection with two-pole fuse
  - 1 relay 4 poles 24VAC
  - 1 relay 4 poles timed 24VAC
  - 4 contactors 4 poles
  - 1 thermal relay
  - 1 PVC surface including:
    - 1 emergency stop button
    - 1 On/Off button with indicator light
    - 2 On pushbuttons
    - 1 Off pushbutton
    - 3 white indicator lights
    - 3 green indicator lights
    - 1 red indicator light
    - 1 emergency stop for the instructor.

  All the connectors of the indicator lights and pushbuttons are brought to industrial terminals flush with the surface. Thus students can very easily, using the probes, read the voltage or check if the circuit is cut.
- 1 unit closed with flap containing:
  - 10 switches for creating faults
  - 1 main switch
  - 1 RC thermal-magnetic circuit-breaker 30mA-16A
  - 1 key operated switch with indicator light for applying power to the wiring frame

DESCRIPTION OF THE FAULTS



- **Marked red**
  Faults 1 to 8: switch for wire break.
- **Marked blue**
  Faults 1/2: switch for winding break.
  The voltages are present on the terminals of the coil but the contactor does not stick.
- **Marked green**
  Fault 1: change of fuse with defective one.
  Supplied with the model.

PLC FAULTS DIAGNOSIS UNIT

Supplied with loop calibrator 4-20mA

ref. PLC-DIAG

PLC-DIAG is a setup for producing faults at different points on an automation wiring frame. Fault searches are produced around a Schneider® type M221 programmable logic controller (PLC). The faults are selected by the instructor using the switches located under a rear flap of the setup. For user safety, the circuit voltage does not exceed 24VAC. Students can take measurements or perform tests in complete safety, regardless of the fault type.
Power supply 230VAC by 3m cable and mains plug 2P+E safely behind a panel.
Setup supplied wired and fully operational. Supporting material on CD includes the teaching file with Student/Instructor practical works and examples of PLC programs.

EDUCATIONAL OBJECTIVES

- ***To understand the wiring of a programmable logic controller (PLC)***
- ***To load a program into a PLC with Ethernet connection.***
- ***To simulate the most frequent faults on an automation installation with analogue signal.***
- ***To analyse and interpret the results***

TEACHING RESOURCES WITH PRACTICAL WORKS

Practical works

- Identification of the different components and production of electrical diagrams.
- Loading a PLC program on USB and Ethernet with SoMachine basic software.
- Viewing of the PLC input/output states on the SoMachine basic software.
- Finding the different faults on the circuit using measuring devices.

DESCRIPTION OF THE FAULTS

- Switches 1 to 4:
  Fault creation on 4 INPUTS of the PLC
- Switches 5 to 8:
  Fault creation on 4 OUTPUTS of the PLC
- Switch 9:
  Fault creation on the signal 4-20mA at the PLC input.
- Switch 10:
  Fault creation on the signal 0-10V at the PLC output.

Composition of the system

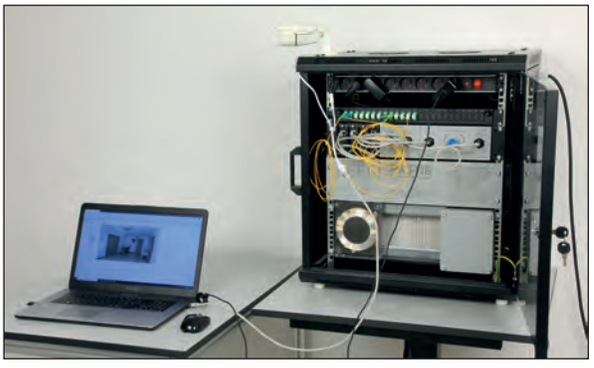
- 1 frame on wheels (two with brake) with dimensions H1800 x 800 x 700mm
- 1 melamine shelf 750x400mm
- 1 wiring frame equipped with:
  - 1 two-pole fuse protection device
  - 1 PLC Schneider® M221-14I /100 relays, Ethernet with analogue card 4-20mA.
  - 2 contactors
  - 1 analog Input / Output interface box (4-20mA / 0 to 10V) to PLC
- 1 PVC panel including:
  - 1 emergency stop button
  - 1 On/Off button with indicator
  - 2 On pushbuttons
  - 1 Off pushbutton
  - 3 white indicators - 3 green indicators - 1 red indicator
  - 1 emergency stop for the instructor.

  All the connections of the indicators and pushbuttons are made to industrial terminals flush with the panel. Students can then very easily, using probes, read the voltage or check the circuits.
- 1 unit closed with flap containing:
  - 10 switches for creating faults (see faults description)
  - 1 main switch
  - 1 RC thermal-magnetic circuit-breaker 30mA-16A
  - 1 bipolar circuit breaker protection for 24Vac circuit
  - 1 key operated switch with indicator for applying power to the wiring frame
- 1 loop calibrator 4-20mA (supplied) for generating at the PLC input a signal of 4-20mA.

OPTICAL FIBER STUDY

VDI type box with handles (H760mm x W680mm x D450mm) to be placed on table + camera. Weight: 40kg.
Power supply by 230Vac power cord of 3 meters (2P + E).
Delivered wired and functional.

Back side. Teacher interface for fault creation.



Supplied with a Student + Teacher teaching documentation and numerous practical works, this educational model makes it possible to understand the use of optical fiber and to compare it with Ethernet cabling networks in RJ45.

ref. MAQ-FIB

EDUCATIONAL OBJECTIVES

- **Presenting the components of an optical link**
- **Mastering the principles of optoelectronic data transfer**
- **Understanding the role of an optical coupler**
- **Compare transmissions on optical media and RJ45**
- **Address the limits of copper compared to fiber (distances, flow rates, ...)**
- **Highlighting the main failures of an optical link**
- **Highlighting the main failures of an RJ45 link**
- **Manipulations and practical work on the model**

TEACHING RESSOURCES produced by a Fiber trainer

Practical work provided

- Course questions (theoretical course written by a specialized trainer)
- Commissioning of a camera via the RJ45 network
- Commissioning of a camera via the fiber optic network using media converter
- Understand the value of a 4 to 1 coupler
- Highlighting the flow problem over a long RJ45 length
- Diagnosis and identification of common RJ45 faults (wire cut inversion of straight / crossed wiring, etc.)
- Diagnosis and identification of common fiber optic failures (cut fiber and strain on the fiber)
- Measurement on the RJ45 cable using a network tester
- Measurement on the optical fiber network thanks to a power meter and a light source on optical fiber
- Analysis of uplink and downlink speeds and internet latency via the RJ45 network and via fiber optics (this lab requires internet access)

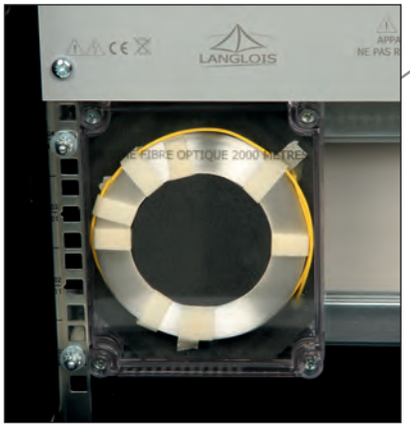
Composition of the model

- 1 brewing box composed of:
  - 1 multiple socket protected by fuse
  - 1 fiber optic patch drawer
  - 1 4-way optical coupler connected to the drawer
  - 1 fiber optic coil of 2 km connected to the drawer
  - 1 set of optical fibers connected to the drawer
  - 2 media converter RJ45 / Fiber optic pairs
  - 1 RJ45 cable length simulator
  - 1 teacher interface for fault management (access to the rear by key lock)
- 1 IP camera
- 1 optometer source with visible and invisible light source
- 1 power meter to carry out the attenuation measurements
- 1 RJ11, RJ45, and BNC network tester with remote control block
- 1 set of 4 RJ45 cords and 6 optical fiber
- 1 educational file including:
  - A presentation of the model
  - 6 lessons on CD with video support allowing a complete approach to optical fiber (history, presentation of the different optical elements, specificities, optical measurements, applications ...
    These courses are not just a stack of knowledge. Made by a certified fiber optic trainer, they allow you to understand what an optical fiber is, what each concept corresponds to, when to use one measurement element rather than another, how to troubleshoot or make a recipe, in order to make it autonomous to easily survey the relatively complex area of optical fiber.
  - Manufacturer's notices
  - Students / teacher practical work
  - The installation diagram

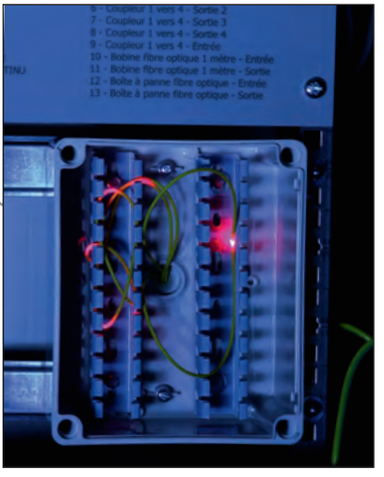
4-way optical coupler

MAQ-FIB presented on our TAB-EL76-R electric table

RJ45 cable length simulation potentiometer



fiber optic coil of 2 km c



Fault display box

supplied accessories

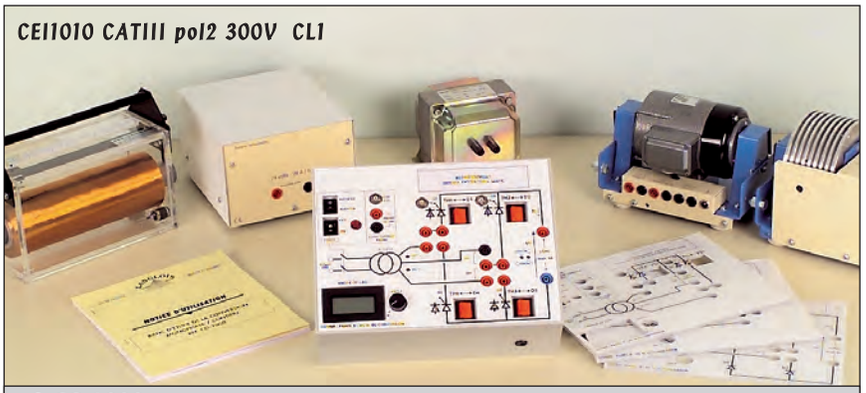
- 4 RJ45 cables
- 6 optical fibers
- 1 network tester
- 1 optometer source
- 1 power meter

CONVERSION TEST BENCH

RECTIFIER

SINGLE-PHASE / DIRECT CURRENT CONVERSION TEST BENCH

CO-1000 IS SUPPLIED WITH 4 MOVEABLE FRONT PANELS, INSTRUCTION BOOK INCLUDED TUTORIALS



ref. CO-1000

ACCESSORIES FOR CO-1000

Ref. ECO1/2 10Ω	Rheostat ECO1/2 10Ω (P.78)
Ref. SH90/24	Motor **90W** (P.50)
Ref. FR90	Powder brake FR90 (P.51)
Ref. PSYJR	Variable coil (P.85)
Ref. CO-104	Smoothing coil 40mH - 3A
	Advised option
Ref. CO-105	Smoothing coil 20mH - 3A
Ref. CO-108	Smoothing coil 60mH - 3A
Ref. CO-106	12V/24V Battery

EDUCATIONAL OBJECTIVES

- ***Studying of the controlled, non-controlled and mixed rectification of the single-phase***

TEACHING RESSOURCES + PRACTICAL WORKS

All types of practical tests on the rectification of controlled and uncontrolled single-phase current can be carried out with this single box, which comprises built-in supplies (including a power supply), a probe for measuring the AC+DC current output, an ignition angle display, and 4 switches to change from the diode assembly to the rectifier assembly. The test bench is supplied with 4 movable front panels. Each one is a specific mask, with holes for the indicator lights, input/output terminals, and switches required for a particular set of tests. Each panel is printed with the instructions for just those tests. None of the components are directly accessible to avoid short circuits. Rectifiers and diodes are specially mounted to facilitate maintenance and are visible behind a movable, transparent cover. The 30V x 6A output is capable of running a powerful motor (electrical power: 150W, mechanical power: 90W) connected to a brake, making it possible to observe the influence of braking on the conduction angle.The instruction book supplied with the test bench explains the tests listed below for each front panel.

RECTIFIER CONTROL

The ignition angle is controlled by a potentiometer and displayed. The control pulses, applied to the trigger through separation pulse transformers, are output via BNC to the oscilloscope.

CURRENT PROBE

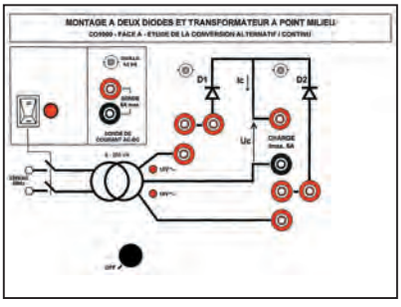
This probe consists of a Hall-effect sensor and is connected in series, like an ammeter. The current image is a voltage of 0.5 V/A available via BNC .

INDICATOR LIGHTS

LEDs indicate which rectifiers and diodes have been selected, which transformer windings are connected to the power supply, and the rectifier / inverter mode.

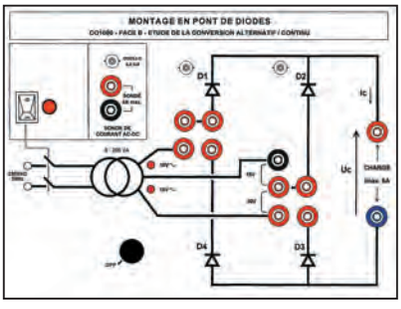
BUILT IN 200VA POWER SUPPLY

2 mid-point reactors: 2 x 15 Vrms
Power supply: 230VAC 50Hz 250VA
Dimensions: 670x370x170mm. Weight: 5.2kg



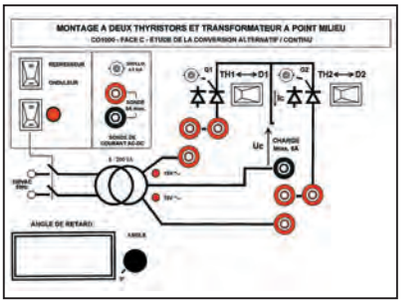
PANEL A: ASSEMBLY WITH TWO DIODES AND MID-POINT TRANSFORMER

Return to single half-wave rectification and switching to double half-wave rectification by simply adding jumper straps.
Experiment 1 Power flow on resistive load (R)
Experiment 2 Power flow on inductive load (R,L)



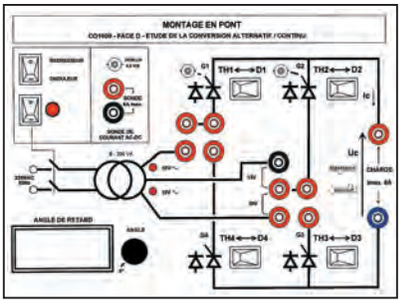
PANEL B: DIODE BRIDGE CIRCUIT ASSEMBLY

Experiment 1 Power flow on resistive load (R)
Experiment 2 Power flow on inductive load (R,L)
Experiment 3 Power flow on active load (E,R)
Experiment 4 Power flow on active inductive load (E,R,L)
Experiment 5 Application to a DC motor power supply
Any of these 4 diodes can be replaced by a rectifier at any time, simply by throwing the appropriate switch. This facilitates comparisons between all-diode, all-rectifier, symmetrical mixed, and asymmetrical mixed assemblies.



PANEL C: ASSEMBLY WITH TWO RECTIFIERS AND MID-POINT TRANSFORMER

Controlled single- and double-wave rectification.
The tests on panel A may be used again for comparison.



PANEL D: BRIDGE CIRCUIT ASSEMBLY (ALL RECTIFIERS OR MIXED)

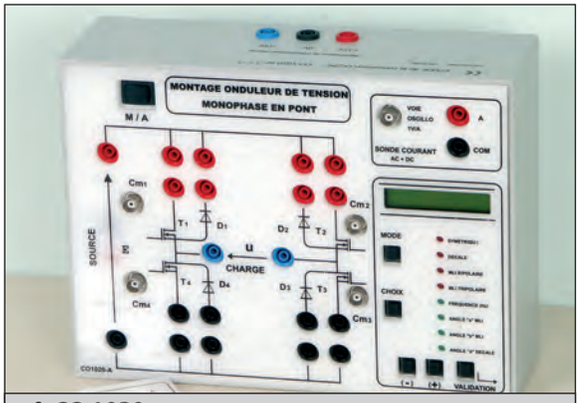
Comparative studies of diode / rectifier / mixed assemblies
Experiment 1 Power flow on active inductive load (E, R, L)
Operates as a static convertor
Operates as a grid-interactive inverter
Experiment 2 Application to a DC motor power supply (DCM)
Mixed bridge-circuit assembly
Experiment 3 Power flow on active inductive load (E, R, L)
Experiment 4 Application to a DC motor power supply (DCM)

CONVERSION TEST BENCH

INVERTER

SINGLE-PHASE CONTINUOUS/ALTERNATING CURRENT CONVERSION TEST BENCH

CO-1000 IS SUPPLIED WITH 2 MOVEABLE FRONT PANELS, INSTRUCTION BOOK INCLUDED TUTORIALS



ref. CO-1020

ACCESSORIES FOR CO-1020

Ref. ECO1/2 10Ω	Rheostat ECO1/2 10Ω (P.78)
Ref. ECO1/2 15Ω	Rheostat ECO1/2 15Ω (P.78)
Ref. ECO1/2 22Ω	Rheostat ECO1/2 22Ω (P.78)
Ref. ECO1/2 33Ω	Rheostat ECO1/2 33Ω (P.78)

for an optimal use, low resistance loads are better

Ref. PSYJR	Variable coil (P.85)
Ref. CO-106	12V/24V Battery
Ref. CO-107	Single-phase transformer 12V - 230V wth its lamp 230V - 40W
Ref. CO-109	load made up of a 40W machine 12V/230V
Ref. CO-122	Capacitor 22µF

EDUCATIONAL OBJECTIVES

- ***Studying of a 24V single-phase inverter, in half bridge and in bridge***

TEACHING RESSOURCES + PRACTICAL WORKS

This bench is suitable for all types of tests on independent, single-phase static voltage converters. It has 2 detachable front panels, with holes forming a mask that reveals the layout diagram for the specific type of test to be carried out.
The choice of layout (consisting of MOS power transistors) is thus determined by the front panel slotted into the casing:
PANEL A: "Single-phase, static, half-bridge voltage converter (two switches)"
PANEL B: "Single-phase, static, bridge voltage converter (four switches)"
The system includes a control panel offering the following options: (SYMMETRICAL, OFF-SET, BIPOLAR PWM, and THREE-POLE PWM), a display (frequency and offset angles), indicator lights (control mode selection and adjustment parameters), and an AC+DC current probe for measuring and displaying all the current in the layout. It runs both on batteries and the laboratory continuous power supply and has reinforced safety systems (for reversed polarity and shutdown of unused transistors). The output (IMAX = 3A) is sufficient to run a motor of significant power and, in particular, to study the U/F control.

TRANSISTOR CONTROL PANEL

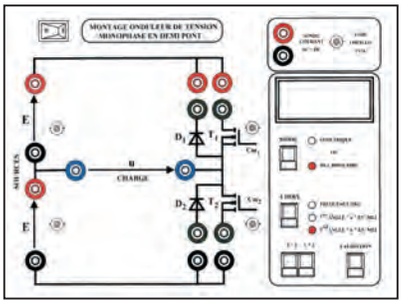
This flexible, easy-to-use control panel is entirely managed by micro-controller and is capable of all variable frequency controls.
CONTROL MODE
The control mode is selected by pressing the "MODE" key:
- Converter U/F constant
- SYMMETRICAL
- OFFSET
- BIPOLAR PWM - THREE-POLE PWM

A LED indicates which mode has been selected.
SELECTING ADJUSTMENT PARAMETERS:
Adjustment parameters are selected by pressing the "SELECT" key:
- FREQUENCY (Hz)
- OFFSET ANGLE
- 1st ANGLE "a" IN PWM
- 2nd ANGLE "b" IN PWM

A LED indicates which parameter has been selected. In PWM mode, the signal pattern is determined by the size of the angle (a, b) selected (which amounts to setting the pulse width). Depending on the values of these angles, it is possible to eliminate the 3rd- and 5th-rank harmonics to obtain a spectrum with fewer harmonics, closer to the sinusoid curve.

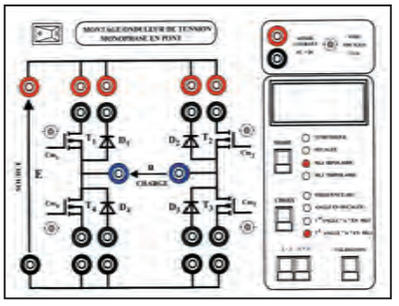
CURRENT PROBE

This probe measures AC, DC, and AC + DC current and is connected in series, like an ammeter, in the circuit to be measured. A BNC terminal displays an image of the current intensity at a voltage of 1 V/A.



PANEL: A "SINGLE-PHASE, STATIC, HALF-BRIDGE VOLTAGE CONVERTER (2 SWITCHES)"
The diode and power transistor operate by cross-barring
Presentation of symmetrical control
Presentation of the Pulse-Width Modulation control: Bipolar PWM wave

Experiment N°1:	Throughput over resistive load (R)
Experiment N°2:	Throughput over inductive load (R, L)
Experiment N°3:	Throughput over resonant load (R, L, C)



PANEL B "SINGLE-PHASE, STATIC, BRIDGE VOLTAGE CONVERTER (4 SWITCHES)"
Presentation of offset control
Presentation of the Pulse-Width Modulation control: Three-pole PWM wave

Experiment N°1:	Throughput over resistive load (R)
Experiment N°2:	Throughput over inductive load (R, L)
Experiment N°3:	Throughput over resonant load (R, L, C) Application to induction heating
Experiment N°4:	Application to speed variations in an alternating current motor
Experiment N°5:	Application to a backup power supply Using the CO-1000 test bench as a charger.

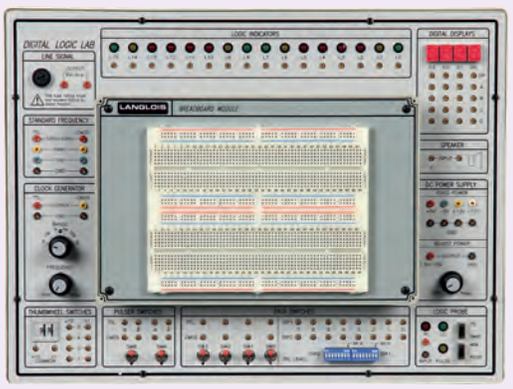
Digital lab equipped with a main unit and differents experiment modules.
Each module permits to realize several practical works.
Supplied with leads and user's manual.

In the upper right corner, behind a locked hood by the teacher, a 8-positions switch allows to simulate some material defects.

DIGITAL LOGIC LAB

13 EXPERIMENT MODULES.
Designed with a 215 x 165 x 30mm solid body plastic housing, with electrical wiring printed on the front panel. An 8-bit DIP switch, located on the right top corner allows the user to simulate faults. Solution for faults are listed in the experiment manual for user's reference. Comprehensive experiment and instructor's manual are supplied with modules and contains theoretical drawings, wiring drawings.
The experiment part has input signals, location of test points, tables to be filled up, comments and exercises.

MAIN UNIT



ref. PSY3101

PSY3101 MAIN UNIT WITH:
4 fixed DC supplies with output overload protection: +5V -5V +12V -12V / 300mA on each output.
1 adjustable DC power supply with output overload protection: from 1.5 to 15V / 500mA
3 fixed frequencies: 1Hz, 50Hz, 1MHz 0.01%, fanout : 10 TTL load
1 variable signal generator
6 ranges from 1Hz to 1MHz - Fanout: 10 TTL or CMOS load.
2 x 8 outputs, edge 0 ⌐ 1 TTL level
4 outputs: edge 0 ⌐ 1 TTL or CMOS
1 fixed AC output - 6Vrms with overload protection
Thumbwheel switch, 2 digit, BCD code output, common point input.
16 x LED indicating high and low logic state
4 sets of independent 7-segment LED display, with BCD.
3 x LED functioning as a logic probe.
1 speaker with driver circuit.
Dimensions : 400 x 300 x 130 mm. Weight : 5.8kg

ACCESSORIES SUPPLIED
Jumpers, leads.
1680 tie-point breadboard which can be easily put into and taken off (permutable with the modules).

13 EXPERIMENT MODULES

Logic gates circuits, transistors, TTL and CMOS logic circuits. TTL/CMOS I/O voltage and current measurement experiments. Basic logic gate transmission delay measurement. AND, OR, NAND, NOR, XOR gate characteristics. Interface between TTL/CMOS and CMOS/TTL.

ref. DIGITAL1

NOR NAND XOR gate circuits, reverser, comparator circuit experiments, Schmitt trigger, open collector gate circuits.

ref. DIGITAL2

Three-state gate circuit. Adder.
Arithmetic logic unit.
Bit parity generator.

ref. DIGITAL3

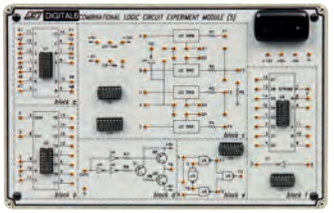
Adder. Subtractor. 2 and 3 inputs reverser.
BCD code adder circuit.
Bit parity generator with XOR gate.
10 to 4 bit decoder with TTL IC.

ref. DIGITAL4

4 to 2 bit encoder. 4 to 2 bit decoder.
Decoder circuit experiments
(decoding 7-segment display with BCD code).

ref. DIGITAL5

10 to 4 bit encoder.
Multiplexer circuit experiments.
Digitally controlled analog
Multiplexer/demultiplexer circuits.
Bi-directional transmission with CMOS IC.



ref. DIGITAL6

Oscillator circuit with basic logic gates, with Schmitt trigger. Voltage controlled oscillator circuit, with 555 trigger. Monostable multivibrator and synchronous astable multivibrator.

ref. DIGITAL7

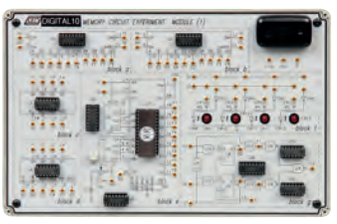
Variable duty ratio oscillator. RS, T, D, JK flip flop. Preset left/right shift register circuit.
Noise elimination circuit.

ref. DIGITAL8

JK flip flop: asynchronous/synchronous, binaries up/ down bi-directional counters. Ring counter circuit, Johnson's counter circuit.

ref. DIGITAL9

JK flip flop: asynchronous counter: decimal, divide by N, preset synchronous binary/decimal.
Constructing ROM memories with diodes, RAM memories with D flip flop.
Constructing EPROM



ref. DIGITAL10

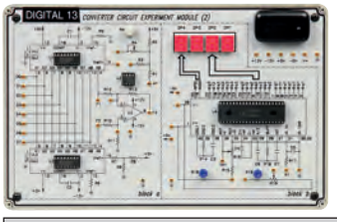
Constructing 64 bits RAM circuit.
Constructing Electronic EPROM circuit

ref. DIGITAL11

Construction dynamic scanning counter with single chip microprocessor. 8- bit analog/digital converter circuit.

ref. DIGITAL12

Digital/analog converter circuit, unipolar and bipolar.
3 digits analog/digital converter circuit.

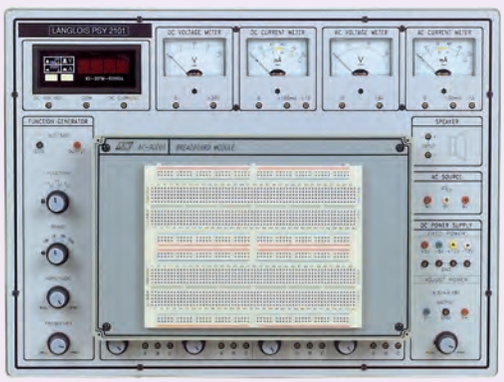


ref. DIGITAL13

ANALOG CIRCUIT LAB

17 EXPERIMENT MODULES.
Designed with a 215 x 165 x 30mm solid body plastic housing, with electrical wiring printed on the front panel. An 8-bit DIP switch, located on the right top corner allows the user to simulate faults. Each analogue module is delivered with 2 experiment manuals.

MAIN UNIT



ref. PSY2101

MAIN UNIT PSY2101 WITH :

- **4 fixed DC supplies** with output overload protection +5V -5V +12V -12V / 300mA on each output.
- **Dual DC power supply** with output overload protection ± 3V, ±18V / 1A continuously adjustable.
- **2 AC power supplies** with output overload protection 0-9VAC / 500mA
- **Signal generator**
  Sine, square and triangle 10Hz to 100kHz.
  - 4 ranges 100Hz - 1 - 10 - 100 kHz
  - Output impedance: 50Ω
  - Output voltage : 9Vpp (with 50Ω load), 18Vpp (open loop).
- **3 1/2 digit digital voltmeter/ammeter**
  Range: 2V - 200V - accuracy 0.3%
  Range 200µA - 2A - accuracy 0.5%
- **Analogue voltmeter/ammeter**
  0 to 20V DC - 0 to 100mA DC - 0 to 1A DC
  0 to 15 V AC - 0 to 100mA AC - 0 to 1A AC
- **Speaker 8Ω**, 0.25W with driver circuit.
- **0.25W potentiometers** : 1kΩ, 10kΩ, 100kΩ, 1MΩ.
- **Breadboard**: 1680 tie-point breadboard wich can be easily put into and taken off (permutable with the modules).

Dimensions : 400 x 300 x 130 mm. Weight : 5.8kg

ACCESSORIES SUPPLIED

Jumpers, leads.
1680 tie-point breadboard which can be easily put into and taken off (permutable with the modules).

17 EXPERIMENT MODULES

Silicium, Germanium, Zener, Photodiode and LED diode characteristics experiments.
Clipping and clamping circuits

ref. ANALOG1

Half wave and full wave rectifier circuit.
Bridge rectifier circuit. Dual power rectifier circuit.
Voltage doubler & multiplier circuit.
RC direct current charge & discharge circuit.
Differentiator, integrator.
RL charge & discharge circuit.
NPN and PNP circuit. IE IB IC measurement

ref. ANALOG2

Transistor amplification circuit: common emitter circuit, common base, common collector.
Automatic and voltage divider bias point.
Feedback collector/base. Switching.
Switching type transistor circuit. Relay control.

ref. ANALOG3

Darlington's circuit. Photoelectric control circuit.
Delay control circuit.FET measurement of IDSS, IGS, Vp.
MOSFET measurement of IDSS, Vp - FET and MOSFET amplifiers:common source, common drain.
Schemes.
Automatic and voltage divider bias point.

ref. ANALOG4

Two stage amplificator circuit, RC coupled.
Direct coupled amplification circuit.
Transformer coupled amplification circuit.
Push-pull amplification circuit with impedance adapter transformer.

ref. ANALOG5

Condenser coupling multi-stage amplification circuit.
OTL amplification circuit.
OCL amplification circuit.
IC amplification circuit.

ref. ANALOG6

Multistage amplifiers with direct coupling.
Transistor negative feedback circuit.
Serial voltage negative feedback circuit.
Parallel voltage negative feedback circuit.
Serial current negative feedback circuit.
Parallel current negative feedback circuit.

ref. ANALOG7

Direct feedback circuits. Low frequency sine wave. Oscillating circuit (RC phase-shifting and Wien bridge oscillator circuit). High frequency sine wave oscillating circuit (Hartley oscillator circuit). Astable oscillating circuit with fixed or ajustable frequency and output on transformer.

ref. ANALOG8

Sine wave oscillating circuit (Colpitts).
Crystal.
Square generator with fixed variable frequency, flip-flop, timers, divider by Z.
Bistable, Intermittent oscillating circuit.

ref. ANALOG9

Schmitt's trigger circuit.
Sawtooth wave oscillating
circuit linear ramp generator. Regulated voltage/current circuit with zener diode/transistor.
Regulated adjustable voltage. Current limiting.

ref. ANALOG10

Regulated voltage circuit with IC.
Constant current
circuit. Amplitude modulation circuit (AM).

ref. ANALOG11

Frequency modulation circuit (FM).
Transistor differential amplification.
Characteristics of OP amplifiers: input/output impedance, bandwidth, slew rate, offset voltage measurements for direct and inverse amplifier.

ref. ANALOG12

OP amplifier circuits: inverse and non inverse amplification, voltage follower, Difference amplification, Sum amplification, clipping circuit, constant voltage and current circuit, integrator circuit.

ref. ANALOG13

OP amplifier circuits: logarithm amplification, exponential amplification circuit, peak value detection circuit, precision clipping circuit, voltage regulator circuit, sampling/hold circuits.

ref. ANALOG14

OP amplifier : instrument amplification circuit, high pass, low pass and band pass amplification circuit.

ref. ANALOG15

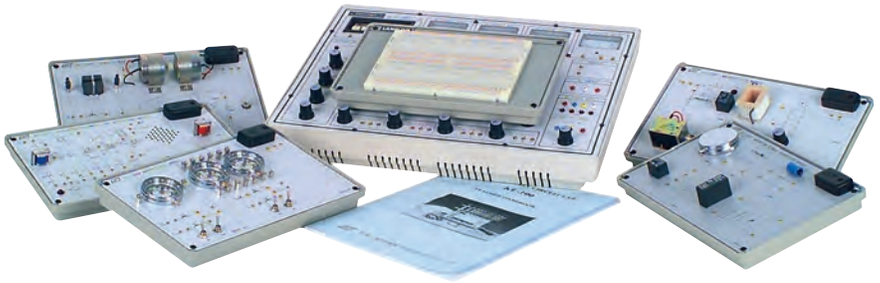
Tone controller circuit. RIAA amplifier circuit.
Single power bias amplification circuit.
Positive feedback OP amplifier: comparator, Schmitt trigger, window type comparator.

ref. ANALOG16

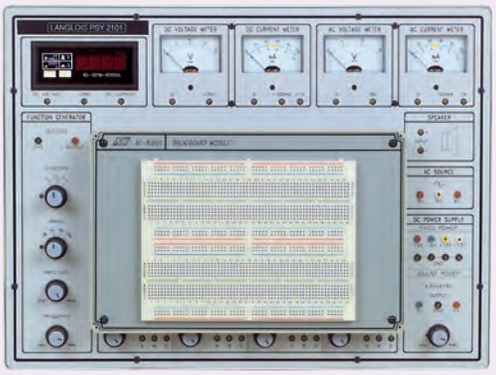
Operational amplifier oscillators:
Monostable and astable multivibrator: square wave generator.
Sine wave: oscillation circuit:
RC oscillator, Wien oscillator.

ref. ANALOG17

ELECTRONIC & ELECTRICAL CIRCUIT LAB



Electronic circuit lab equipped with a main unit and 11 experiment modules.
Each module permits to realize several practical work.
Supplied with leads and user's manual.



ref. PSY2101

EDUCATIONAL OBJECTIVES

- **Studying by different modules of electrical & electronical circuits commonly encountered**

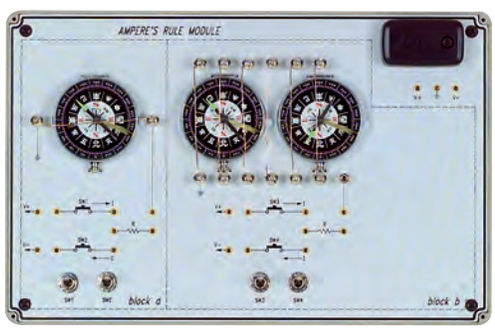
TEACHING RESSOURCES + PRACTICAL WORKS

MAIN UNIT PSY2101 INCLUDING

4 fixed DC supplies with output overload protection +5V -5V +12V -12V / 300mA on each output.
Dual DC power supply with output overload protection ± 3V to ±18V / 1A continuously adjustable.
2 AC power supplies with output overload protection 0-9VAC / 500mA
Signal generator
Sine, square and triangle 10Hz to 100kHz.
- 4 ranges 100Hz - 1 - 10 - 100 kHz
- Output impedance: 50Ω
- Output voltage : 9Vpp (with 50Ω load), 18Vpp (open loop).

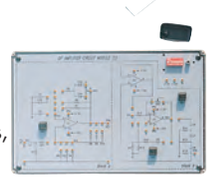
3 1/2 digit digital voltmeter and ammeter
Range: 2V - 200V - accuracy 0.3%
Range 200µA - 2A - accuracy 0.5%
Analogue voltmeter and ammeter
0 to 20V DC - 0 to 100mA DC - 0 to 1A DC
0 to 15 V AC - 0 to 100mA AC - 0 to 1A AC
Speaker 8Ω, 0.25W with driver circuit.
0.25W potentiometers : 1kΩ, 10kΩ, 100kΩ, 1MΩ.
Breadboard : 1680 tie-point breadboard on top panel can be easily put into and taken off (permutable).
Dim: 400 x 300 x 130 mm. Weight: 5.8kg

11 EXPERIMENT MODULES
Designed with a 215 x 165 x 30mm solid body plastic housing, with electrical wiring printed on the front panel. An 8-bit DIP switch, located on the right top corner allows the user to simulate faults. Each analogue module is delivered with 2 experiment manuals.



STUDENT BOOK
(supplied with each module)
A theoretic part, definitions, terminology, characteristics curves, schemas, theoretical schemas, and wiring diagrams with link slots.
The functioning is explained in details.
An experimental part to guide step by step the student to do practical works: choice of measurement appliances, settings, measurement to do, blank tables to be filled, curves to be drawn.
Result commentaries, additional practical works

INSTRUCTOR BOOK
(supplied with each module)
Practical works presentation: purposes, manipulation interpretation
Switches position to simulate troubleshooting.
Detailed and pedagogical solutions of practical works
Calculation shown in extenso. Moreover, the instructor will find technical complements, which can be distributed to students without any modifications.



DC voltage and current measurement.
Ohm's law. Power in DC circuit.
Series – Parallel network and Kirchhoff's law.
Thevenin's and Norton's theorems.
Maximum power transfer theorem.
RC circuit and transient phenomena. AC voltage and current measurement. RC, RL, RLC circuits.
Transformer characteristics.
Series and parallel resonant circuits. LC filter.
ref. ELEC1

Magnetic devices. Magnetic field.
ref. ELEC2

Drawing magnetic curves. Magnetic field strength.
Lentz's and Faraday's laws.
ref. ELEC3

Ampere's rule
ref. ELEC4

Fleming's rule
ref. ELEC5

Self induction. Mutual induction.
Magnetic flux detection by sensor and amplifier
ref. ELEC6

Diode characteristics.
Rectifier circuit half and full wave.
Filter circuit.
LC filters and RC filters in π. Zener diode characteristics. LED characteristics. Transistor characteristics NPN PNP Vce IB. Multimeter functions.
FET characteristics.
Triac UJT characteristics.
ref. ELEC7

One stage transistor amplifier.
AB class Push-pull - Voltage regulator - SCR power dimmer - Two stages amplifier - Relay characteristics - Touch controller switch.
ref. ELEC8

Two stages amplifiers by transformers.
Coupling - Push-pull output on speaker
Wheatstone bridge.
ref. ELEC9

Photoresistor characteristics - Using a switch.
Thermistor characteristics. Wheatstone using.
Thyristor drived by thermistor.
3 stages amplifiers controled by microphone.
ref. ELEC10

Blocking oscillator.
Blocking oscillator with speaker output.
Astable multivibrator. LC resonant circuit.
Electronic birdcall circuit
ref. ELEC11

ELECTRONIC POWER MODULES

ref. PSY5060

THE CONSOLE INCLUDES

- A 100V AC - 1A supply, overload protected for the supply of the modules through a special lead.
- An adjustable 0 to 20V DC - 1A supply through output terminals. Supplies galvanically insulated from the mains
- A 12 V DC motor coupled to a DC tachogenerator with output terminals.
- A 100V - 7W bulb
- 4 resistances, of load 400Ω - 300Ω - 2 x 200Ω
- A DC voltmeter with 2 scales, 50V and 150V

PSY5060 is a system of modules specialized in practical assemblies using thyristors, UJT, triacs and diacs. These modules are delivered with a supply/load console and a handbook of 12 practical experiments.
The functionning is explained in details. An experimental part to guide step by step the student to do practicals works, choice of measurement appliances, settings, measurement to do, curves to drawn.
Console dimensions: 550 x 200 x 460 mm
Dimensions of the modules: 250 x 166 x 64 mm
Total weight: 34kg

TEACHING RESSOURCES + PRACTICAL WORKS

Experiment N°1 : SCR operation in DC circuit
Experiment N°2 : SCR operation in AC circuit
Experiment N°3 : Rectification by phase control circuit
Experiment N°4 : Phase control by a Toulon circuit
Experiment N°5 : Self priming circuit by saturable transformer
Experiment N°6 :UJT oscillate trigger circuit
Experiment N°7 : Thyristor trigger circuit by a DIAC
Experiment N°8 : Thyristor phase angle control by the optocoupler
Experiment N°9 : Battery charger with charge control
Experiment N°10 : DC to AC inverter
Experiment N°11 : DC Motor speed control
Experiment N°12 : Regulated DC power supply with voltage or current control

SERVOSYSTEMS IN SPEED & POSITION

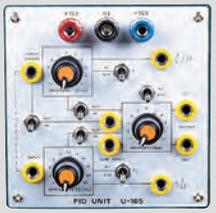
ref. PSY4400

Model with 12 units



ACCESSORIES SUPPLIED

65 leads. A box in which to arrange the modules. The bottom is magnetic to allow placing of the units (these are magnetic also) to allow arrangement for particular systems. Our users manual has been laid out for first time students working with servo-systems. The internal electronic schematics of the modules for their information or for understanding their workings and output signals.



OPTION PID

ref. PSY441

The PSY4400 is a system designed for the practical study of servo-systems. A manual describes 12 example experiments. Never has practices been so simple, with module schematics, schematics for all of the interconnections and the methods for assembling the systems. Including the solutions for the pupils, giving the charts and the conclusions.
Dim. : 670 x 500 x 210mm. Weight : 17kg.

PRACTICAL EXPERIMENTS

TWIN ATTENUATOR Each attenuator is comprised of a resistance decade, variable from 0 to 10 x 10 kΩ

SUMMING AMPLIFIER This operational amplifier is arranged as a summer and has 3 inputs. May be balanced by an internal resistor, an RC circuit or an exterior circuit via two sockets.

PRE-AMPLIFIER This pre-amplifier allows the amplification of the signal and regulation of the driver offset.

DRIVER AMPLIFIER This is a differential power amplifier and supplies the voltage for the motors on sockets and controls the direction of the motor. It is protected against voltage surges and short circuits: Output +15V to -15V 700mA Gain 34dB.

TACHO CONVERTER Converts an alternating signal at variable frequency issued from the tachometer into a DC signal, proportional to the rotation of the motor.

GENERAL POWER SUPPLY Delivers the necessary voltage for the motor +15V to -15V 500mA and for the modules +15V to -15V 200mA. An integrated ammeter shows the current taken by the motor.

POTENTIOMETER A potentiometer of high precision, with a graduated scale from 0 to 360°.

SERVO POTENTIOMETER Recopy potentiometer is fixed to the motor shaft and has a graduated scale from 0 to 360°.

SPEED METER This voltmeter is calibrated to 10V/100kΩ, and is graduated in rpm. Scale 0 to 4000rpm.

SERVO MOTOR It is a motor unit, continous current, 12VDC - 8W on 2 shafts.

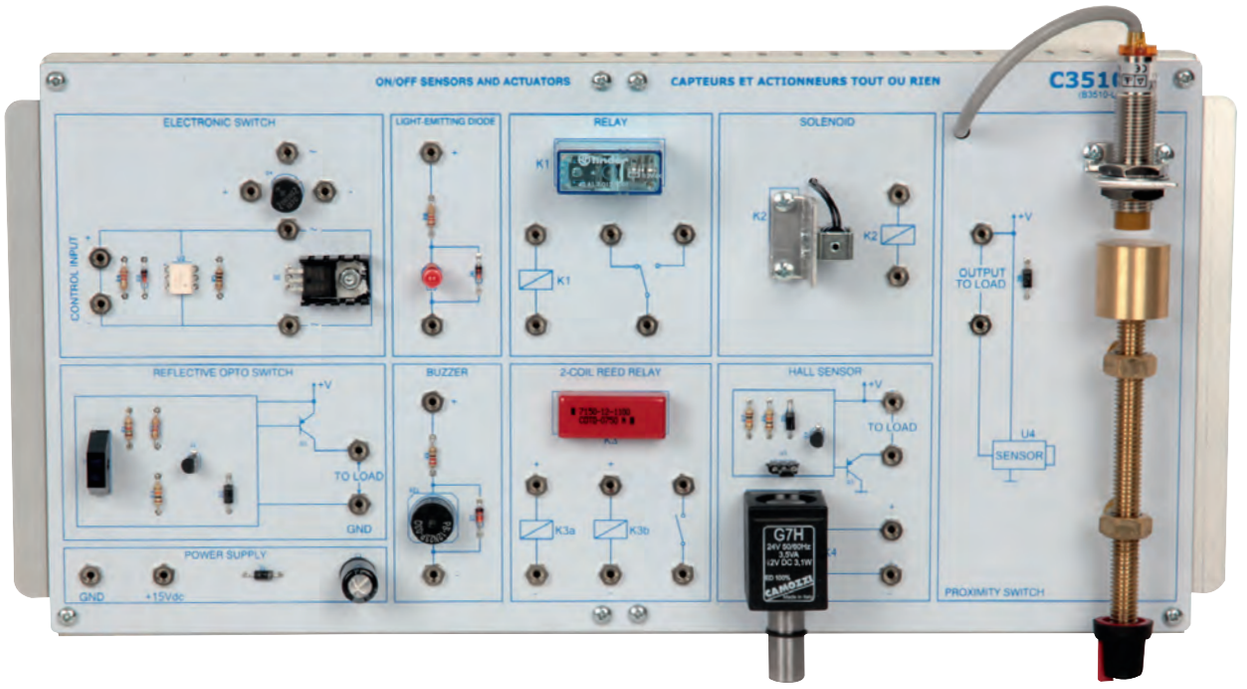
SIGNAL GENERATOR Used for the study of the transition speeds. Produces a square wave signal which controls the motor driver and produces a synchronous voltage ramp rised to sweep the X axis of the oscilloscope in XY mode

MAGNETIC BRAKE Slows down the metallic disc fixed on the motor shaft. The intensity of braking force can be adjusted via a graduated scale from 0 to 10.

TEACHING RESSOURCES + PRACTICAL WORKS

N°1 Transitory response of the motor
N°2 Study of the speed and brake torque
N°3 Use of operationals amplifiers
N°4 Study of a simple servo-system in one direction of revolution
N°5 Influence of loop gain on the quality of the servo-system
N°6 Study of the servo-system in two rational directions
N°7 Transitory response of the servo-system and oscillations
N°8 Study of a simple positional servo-system
N°9 Study of transitory response of inertia and ascillations
N°10 Speed response
N°11 Stable and un-stable positions
N°12 Study of a servo-system with two modes of reaction : speed and rotation

ALL OR NOTHING SENSORS AND ACTUATORS



ref. C3510-L

Dim. : 250 x 150 x 30mm. Weight : 900g.

PRACTICAL WORKS

- Description of the different components and their usage.
- Functioning of the amplifiers.
- Measurement of the detection distance of the inductive sensor.
- Analysis of the electronic switch, controlled by direct or alternating current.
- Study of a line consisting of an optoelectro-barrier, a switch and a solenoid.
- Possibility of making other lines: optoelectro-barrier - reed relay - Hall sensor - electronic switch - buzzer

This model includes sensors currently used in industry:

- an optoelectro-reflection barrier, with its output amplifier
- a Hall effect sensor with its output amplifier
- an inductive proximity sensor with its output amplifier
- facing a metallic mass which the operator progressively displaces using a worm screw.

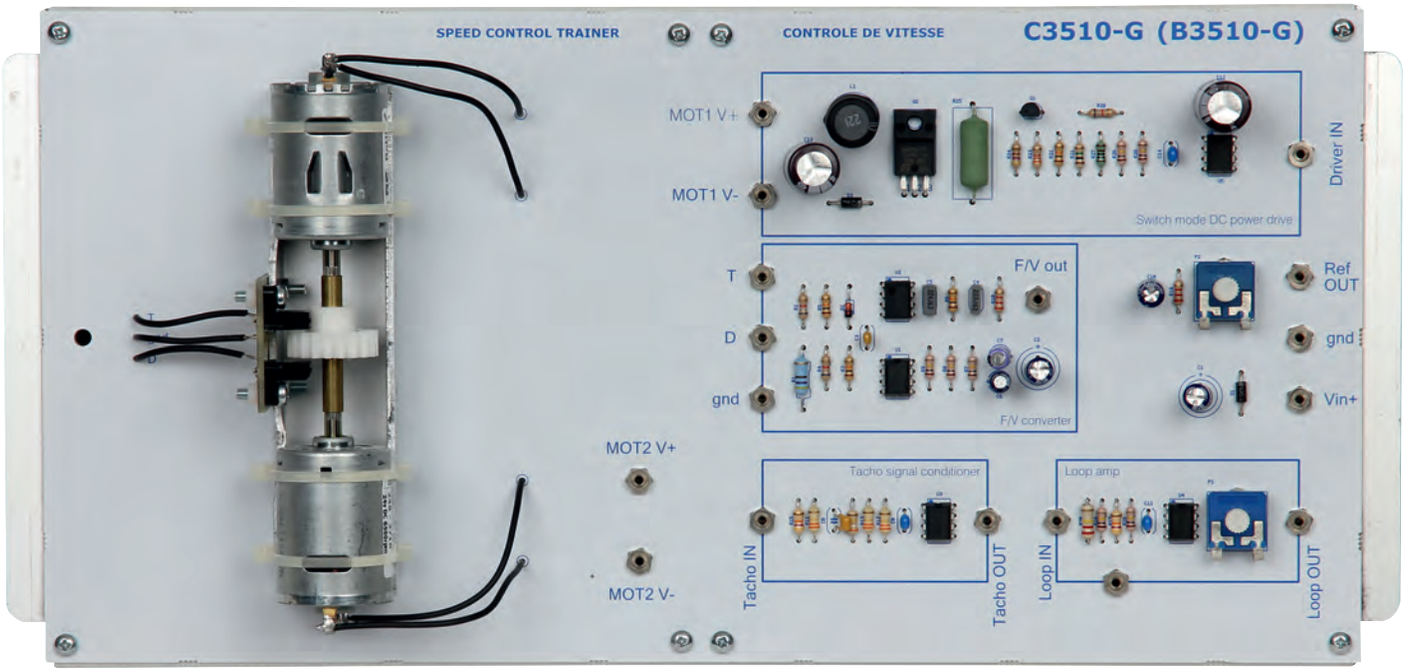
The model also includes:

- an electronic switch consisting of a triac and its electronic control
- a dry relay and a reed relay with two coils
- two solenoids: one facing the Hall sensor
- a visual LED display and a piezoceramic type buzzer with integral micro-oscillator.

ACCESSORIES SUPPLIED

1 set of leads Ø2mm :
2 x 100cm / 2 x 50cm / 3 x 30cm / 3 x 15cm

SPEED FEEDBACK



ref. C3510-G

Dim. : 340 x 160mm. Weight : 783g.

This model is designed for the simplified study of a speed feedback on a closed loop, with a feedback signal generated either by a tachometric dynamo, or by an optical impulsion encoder. It consists of a direct current motor which drives a second direct current motor, functioning as a generator. The signal issuing from this generator is used as an image of the speed. The shaft assembly also drives a toothed disc, which cuts a luminous barrier, the impulses of which are applied to a frequency voltage converter. A direct current adjustable source integrated in the model is used as the voltage reference level. A switching supply controlled by the error voltage supply the motor.

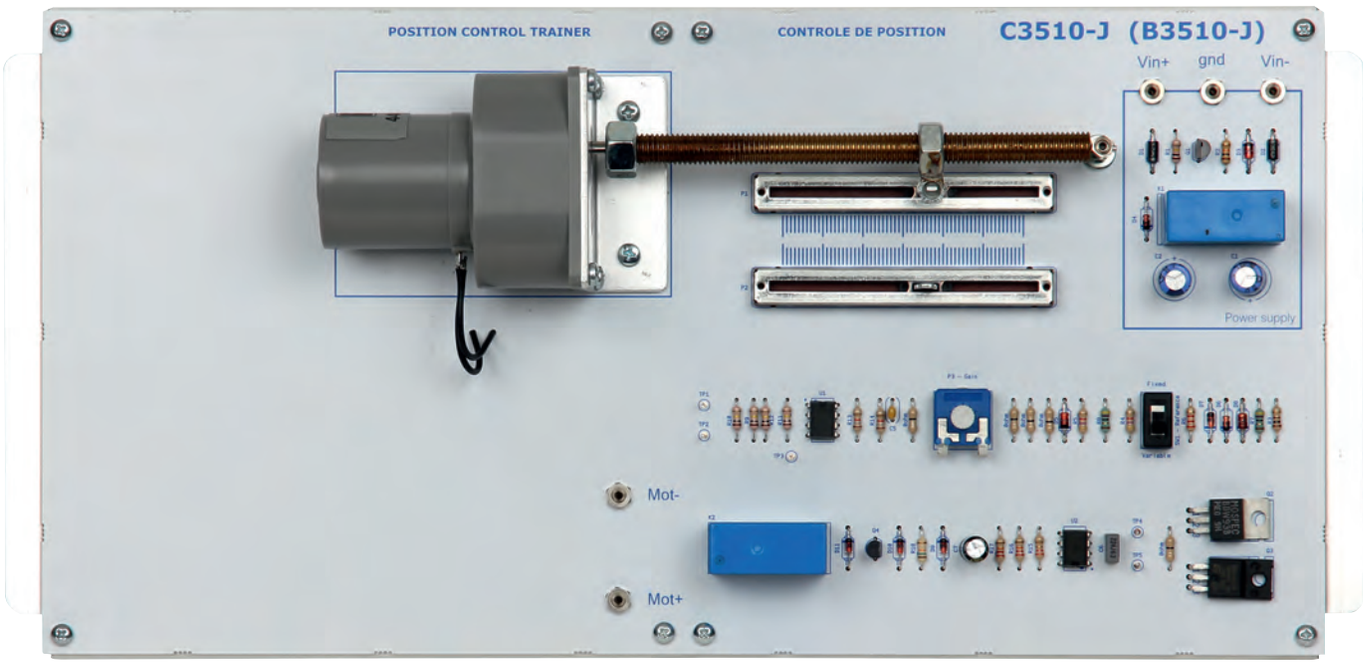
ACCESSORIES SUPPLIED

1 set of leads Ø2mm : 2 x 100cm / 2 x 30cm / 2 x 15cm

PRACTICAL WORKS

- Study of the luminous barrier/frequency voltage converter.
- Study of the tachometric filter.
- Study of the loop amplifier and of the controlled switching power supply.
- Comparison of tachometric voltages and opticalencoder + converter.
- Comparison of low rotation frequencies with and without feedback loop.
- Study of the feedback response for different values of loop gain.

POSITION FEEDBACK



ref. C3510-J

Dim. : 340 x 160mm. Weight : 750g.

PRACTICAL WORKS

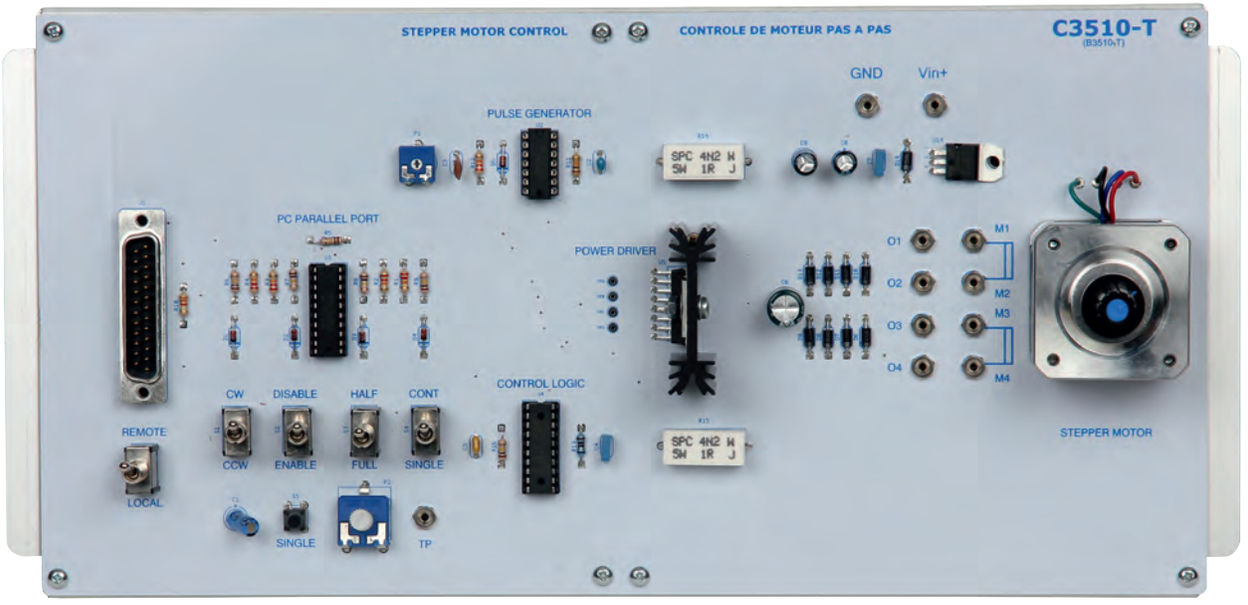
- Study of the principle of a closed feedback loop: error voltage, pre-amplification, driver stage, push-pull.
- Study of limitation of movements circuits.
- Anti-jamming system.
- Study of the feedback response to a voltage step for different values of loop gain.

This model is designed for the simplified study of a closed position feedback loop. It is composed of a direct current motor, the rotation of which drives a worm-screw.
The screw cursor is integrally attached to a copying potentiometer which supplies an electrical image of its position.
The potentiometer operated manually determines the basic position.

ACCESSORIES SUPPLIED

1 set of leads Ø2mm : 3 x 100cm / 2 x 30cm

STEPPING MOTOR



ref. C3510-T

Dim. : 340 x 160mm. Weight : 763g.

PRACTICAL WORKS

- Study of the principle of a stepping motor and its different ways of functioning by step and half-step.
- Vibrations seen at low frequency, loss of steps at high frequency.
- Determination of the take-in resonance frequency and of the rotation limit frequency
- Observation of signals delivered by the driver to the motor windings.
- Inversion of currents in the motor coils.
- Observation of 4 signals applied by the control logic to the driver out of phase with one another.

Includes a stepping motor with 2 separate coils, the motor driver and the specialised logic test circuit. The latter can be accessed by a manual control logic system integrated.
This logic comprises a controled impulse generator by push button for the step by step lead and a variable frequency generator for the continuous working.

ACCESSORIES SUPPLIED

1 set of leads Ø2mm :
2 x 100cm / 4 x 30cm / 3 x 15cm

INCREMENTAL & ABSOLUTE ENCODER

ref. B3510-R

This model illustrates how an incremental encoder and an absolute encoder work. They work in exactly the same way as commercial encoders. However, since resolution is not important in our application, the number of sensors is limited to 5. The model has two interchangeable encoder discs, with the sectors representing DCB encoding and Gray encoding.
When the operator turns the disc by hand, the phototransistors underneath send their signals to the decoding logic and the display (4 line x 20 character LCD screen) and to 4mm-diameter terminals, in order to control all of the control or decoding logics performed by the operator. The sensitivity of the phototransistors can be adjusted depending on the ambient light.

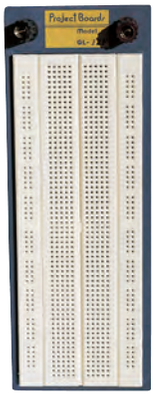
PRACTICAL WORKS

- 3-BIT ABSOLUTE DCB ENCODER correspondence between the position of the disc, the status of the sensors and the display. Transition codes and synchronisation sensor.
- INCREMENTAL DCB ENCODER use of the encoder in counter and count-down mode. Detection of the direction of rotation, improvement of accuracy using an angle sensor.
- 4 BIT GRAY ENCODER GRAY/DCB code comparison. A synchro. sensor is required.

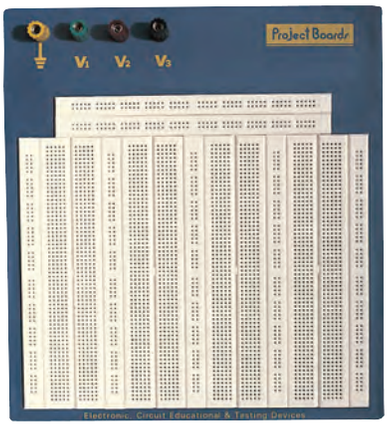
ELECTRONIC TEST BOARDS

Contact boards for the design and rapid testing of circuits. The double reed contacts of these boards are in nickel plated bronze. They are pitched 1 inch/2.54 mm apart in an insulating ABS base. Contacts grouped in strips of 5 or 10, can be fully dismantled from the rear. Use components or leads with maximum diameter 0.6mm.

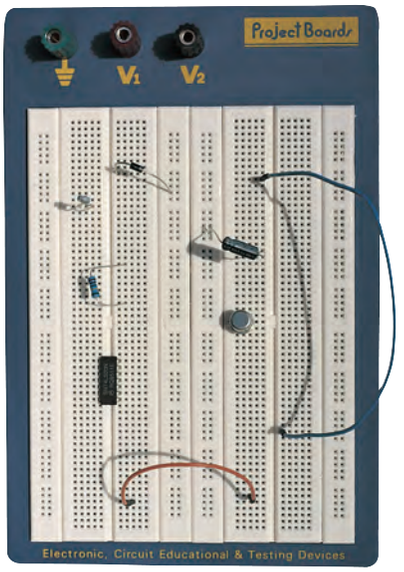
REF. PAL2420



REF. GL12



REF. GL48



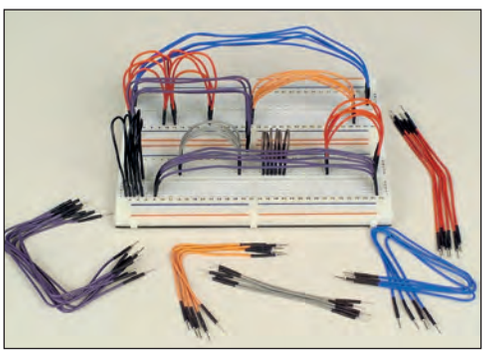
REF. GL24

Model with integrated power supply protected from short-circuits (PAL2420): 0 to +15V/500mA continuously variable ; 0 to -15V/500mA continuously variable ; +5V/1A fixed

Ref.	PAL2420	PAL2420S*	GL12	GL12S*	GL24	GL24S*	GL48	GL48S*
Number of contacts	2420	2420	840	840	1680	1680	3260	3260
Dimensions mm	245 x 195	245 x 195	200 x 75	200 x 75	225 x 150	2250 x 150	260 x 240	260 x 240

** With safety sockets*

MICRO-LEADS



Storage box for micro-leads

8 racks. Transparent plastic cover.
Total capacity of the box:
160 micro-leads.
Dimensions : 230 x 160 x 30mm.
Weight : 180g

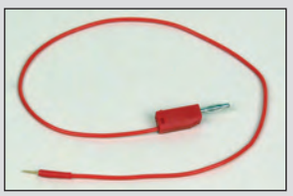
ref. MICRO-B

Ref.	M5	G7	O1	R10	N10	V1	B2
Length	50 mm	70 mm	100 mm	100 mm	100 mm	150 mm	200 mm
Obligatory color	BROWN	GREY	ORANGE	RED	BLACK	PURPLE	BLUE

The flexible wire used for these leads is terminated at each end by a 0.6mm diameter nickel-plated plug. The electrical contact is excellent.

Interface lead

Special lead to connect the testing boards and any system in diameter 2mm.
Max current 500mA.



ref. INTER-2R
25cm Red color

ref. INTER-2N
25cm Black color