

EDUCATIONAL SOLUTIONS



info@langlois-france.com | www.langlois-france.com

Phone: 0033 5 56 75 13 33

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.

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.

- 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

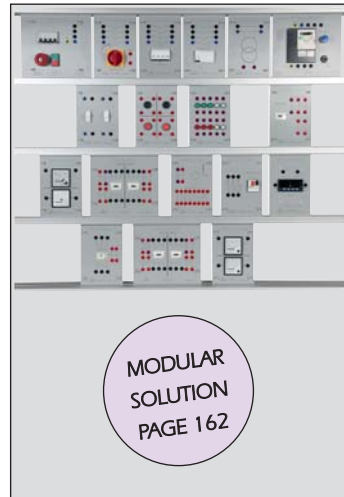


Unit from the teacher side, open door



Unit from the student side, open door.

MOTOR START-UP STUDIES



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.



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: 118kg

FEATURES

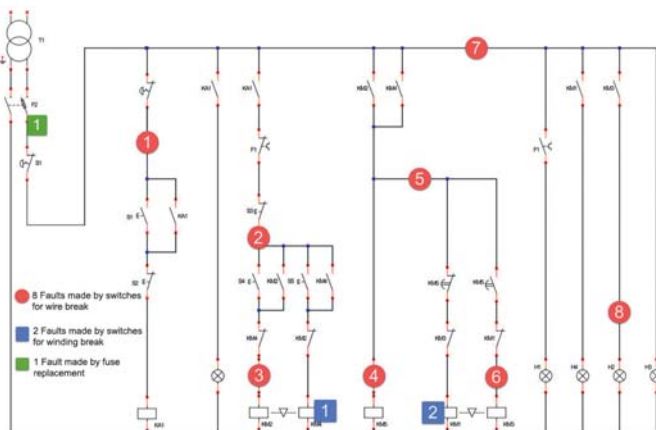
- Three-phase 400V supply voltage.
- Protected by residual current device, circuit breakers and fuses.
- Set of lamps and push-buttons for viewing and controlling the required type of start-up.
- Multifunction measuring unit with digital display, which is wired at the start of the circuit measuring the 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® (ATV31 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

UNIT FOR FAULT DIAGNOSTICS ON INDUSTRIAL ELECTRICAL WIRING



ref. ESSAI-DIAG

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.

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

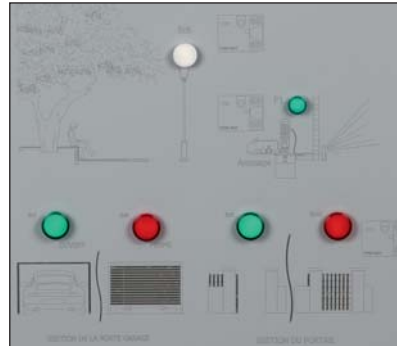
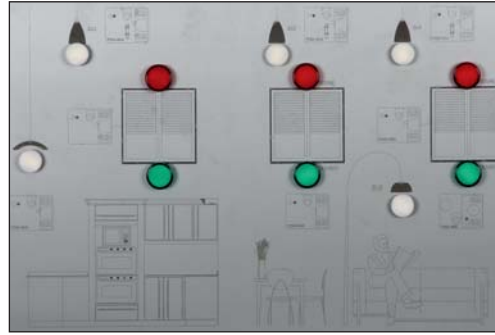
- 1 frame on casters (two with brakes) with dimensions H1800 x 800 x 700mm
- 1 Melamine shelf 750x400mm
- 1 wiring frame equipped with:
 - 1 protection with two-pole fuse
 - 1 relay 4 poles 24VAC
 - 1 relay 4 poles timed 24VAC
 - 4 contactors 4 poles
 - 1 thermal relay
 - 1 PVC surface including:
 - 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



CREATING A COMPLETE RADIO INSTALLATION



ref. DOMORADIO

ref. DOMORADIO-C
Communicating version
Tablet & Smartphone



DOMORADIO is a panel of generally used home automation components. This includes conventional components such as switches and push-buttons as well as radio communicating components.

For students to learn about radio configuration; the transmitter 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.

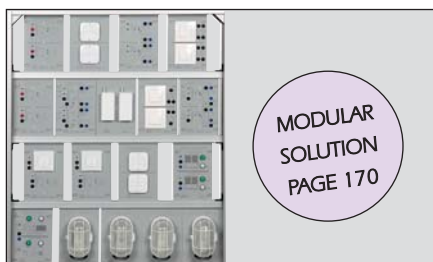
A complete diagram shows the different rooms of the house (kitchen, dining room, lounge), the garden, and the garage and electric gate. Indicator lights show:

- the operating state of the lamps of the different rooms
- opening/closing of roller blinds, gate and garage door.
- operation of the sprinkler pump.

A radio colour touchscreen controls all the radio components of the panel.

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.



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
- To study the programming of a radio touchscreen.

TEACHING RESOURCES STUDENT & TEACHER

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 touchscreen 480 x 272 pixels capable of managing the home radio components with built-in tutorial for component configuration
- 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.

COMMUNICATING ANTI-INTRUSION ALARM MANAGEMENT PANEL

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.
- Configuration of the wireless router.
- Realization of complete wiring.

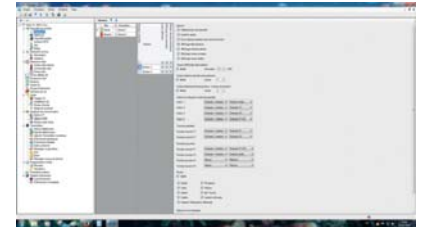
Composition of the model

- 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.

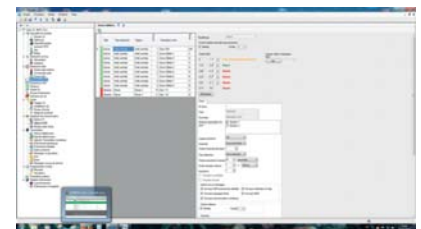


Overall dimensions
W x D x H : 750 x 730 x 1840mm.

COMPLETE DATASHEET
www.langlois-france.com



Keypad configuration from the programming software.



Setting the alarm unit from the configuration software.

ref. TAG-12
Communicating version
Tablet & Smartphone



HYBRID VIDEO SURVEILLANCE MANAGEMENT PANEL

This system allows the study of a hybrid analog CCTV and IP Easy. The student performs the interconnection with BNC and Ethernet cables between cameras, recorder and monitor. With the built-in recorder web server, the student will be able to configure addressing, parameters for different cameras, viewing of different camera images. Recording on detection or time slot.

EDUCATIONAL OBJECTIVES

- Understanding and configuring a set of CCTV components.
- Understanding of setting, programming from an embedded Web server.
- Setting an Ethernet computer network.
- Wiring a network of type hybrid analog and IP easy.

TEACHING RESOURCES STUDENT & TEACHER

Proposed Practical Works

- Setting the recorder and the computer to connect to the web server.
- Cameras configuration.
- Wiring an analog type hybrid network and IP easy.
- Realization of complete wiring.

Composition

- 1 video recorder AHD DVR, 8 video inputs Full HD, IPS 120, 1TB HDD. Integrated web server for configuration and viewing of videos. Images viewing from the 4 cameras simultaneously on the monitor.
- 2 AHD directional cameras, sensor 1/2.8" CMOS, 36 infrared LEDs for night vision, resolution Full HD (1080p).
- 2 swivel Easy IP cameras, sensor 1/4" CMOS, 30 infrared LEDs for night vision, HD (720p) resolution, 30 FPS. Supplied with IP / BNC connector.
- 1 LED Monitor 15.6". HD resolution.
- 1 multi-sockets unit 230V for connecting all devices.



Option dome color camera
Night/day, optical zoom x10, 650TVL resolution, waterproof, infrared LEDs, 3-axis controlled, variable speed RS485 control keyboard.

ref. CAM-DOM

ref. TAG-13
Communicating version
Tablet & Smartphone



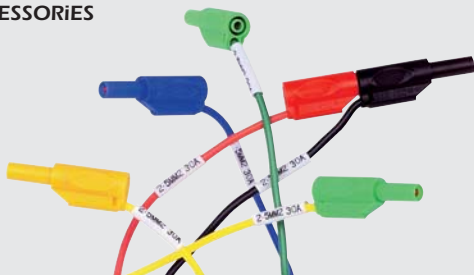
JUMPER LEAD PANEL



ref. TAG-2

RECOMMENDED ACCESSORIES

SAFETY LEADS
SEE PAGE 225



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.



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

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

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

Practical 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.)

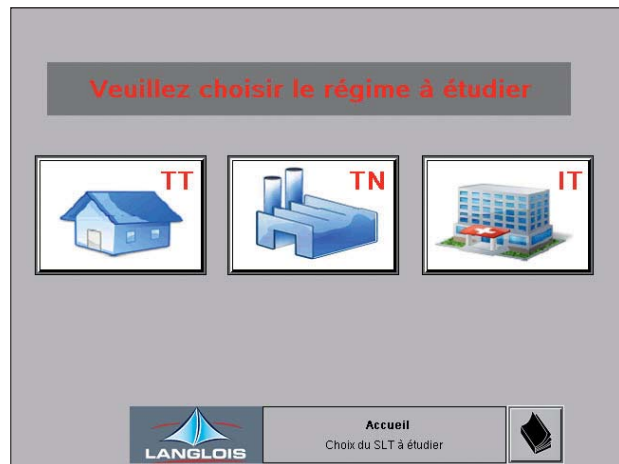
Study of 7 scenarios for the TT system, 3 for TN and 5 for IT.

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.

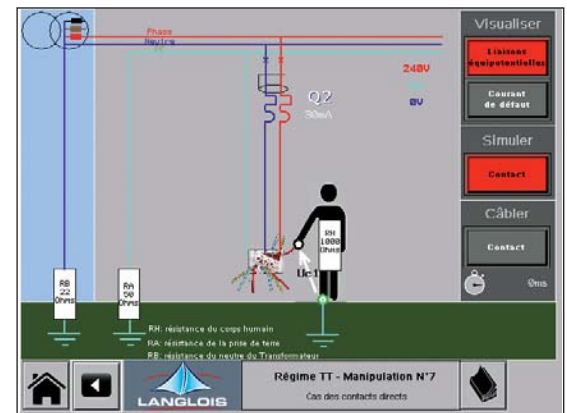
For each test, this gives the objectives, the diagram, questions on the calculations to be done, on the measurements to be carried out and on the diagnostics to make.

SOFTWARE AVAILABLE IN ENGLISH



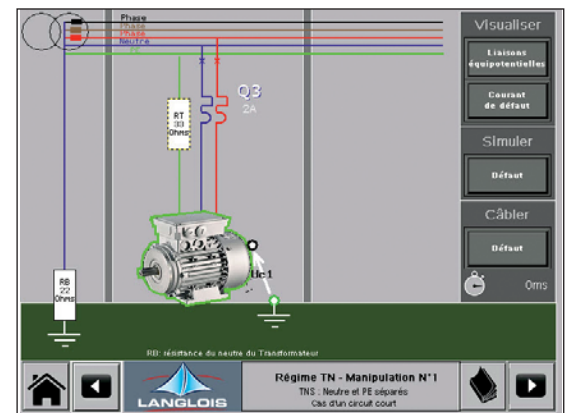
Home page

For selecting the neutral system to study



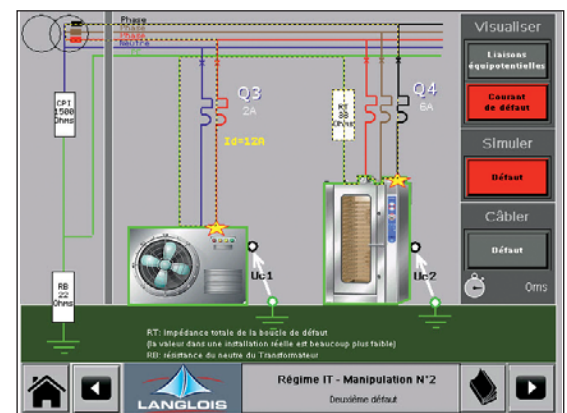
Example of screen

Test in TT system: View of equipotential bonding.



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.

CABINET FOR ELECTRICAL AUTHORIZATION

HABILIT24-CA 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 (Personal 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

HABILIT24-S model



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



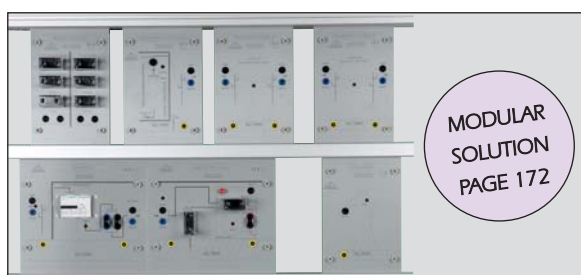
ref. SELDIF

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

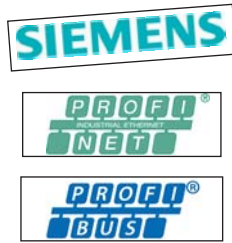
- Power supply : 230VAC 50Hz
- Dimensions : 390 x 270 x 100mm
- Weight : 2.8kg
- Supplied with 5 resistive modules, coupling jumpers & leads

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



ref. MAQ-NET

ref. MAQ-NET-N (WITHOUT table)



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 : 750 x 670 x 1950mm
- Weight : 64kg

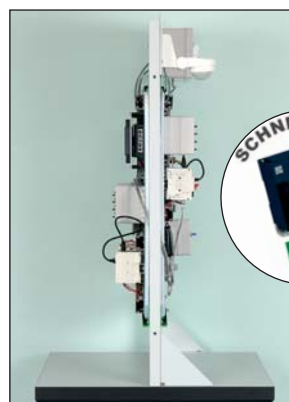
Composition of the model

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*

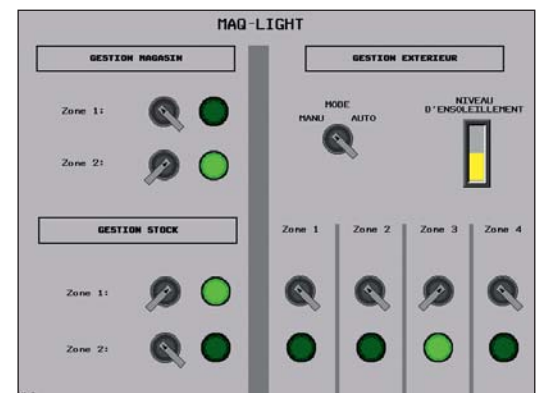
*HMI : Human Machine Interface

MANAGING OF HYPERMARKET LIGHTING BY SUPERVISION



Side

ref. MAQ-LIGHT



Features of the unit

- Power supply 230VAC by 3-metre mains cord
- Dimensions: 750 x 670 x h 1950mm
- Weight: 64 kg

FIELD BUS 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

TEACHING RESOURCES STUDENT & TEACHER / VIDEO

Features of the basement

- Base on wheels • Dim L x l x H : 750 x 670 x 1950mm • Weight : 63kg

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

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
- 1 set of Ethernet leads, Ethernet mounting connectors and 20 metres of Ethernet cable
- Software for programming (PLC, HMI, speed controller ATV32).
- 1 DVD includes the instructions, the practical assignments and videos.



Schneider Electric



ETHERNET

ref. MAQ-IP

ref. MAQ-IP-N (without table)

Large floor area buildings, like supermarkets, require a lot of lighting. The control of this lighting is a real economic and ecological issue which requires thinking about the concept of zoning and presence. MAQ-LIGHT offers the study of this need through controllers (PLC) and supervision controlled by 2 touch screens. The presentation with two-sided vertical panels on a wheeled frame provides an ergonomic view of the zones to be controlled.

Comprises

- 1 unit with thermal magnetic, RC protection devices & emergency stop.
 - 3 SCHNEIDER® Ethernet PLCs
 - 1 Ethernet colour touch screen HMIS5T 3.5"
 - 1 Ethernet colour touch screen HMIS5T 5.7"
 - 1 presence detector
 - 1 Day / Night simulation unit with potentiometer
 - 1 engraved face defining the 3 lighting zones
- Face equipped with 16 indicator lights simulating the light points
- 3 control units with 7 pushbuttons and 7 indicator lights
 - 1 Ethernet RJ45 switch
 - 6 Ethernet leads, 1.5 metres

EDUCATIONAL OBJECTIVES

- Study and putting into service of a lighting management system for hypermarket by supervision
- Studying the configuration of an Ethernet type computer network
- Studying the programming of a PLC in contact language
- Studying the programming of an HMI (Human Machine Interface)
- Studying the coexistence of several PLCs and HMIs

TEACHING RESOURCES STUDENT & TEACHER

Practical works

- Creation of the architectural diagram of the electrical installation
- Creation of the computer Ethernet
- Creation of PLC programs in contact language
- Creation of the supervision from the two touch screens
- Change of IP addressing
- Testing the assembly

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)

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)

OPTION OF VISION SENSOR

ref. CONV-VISION

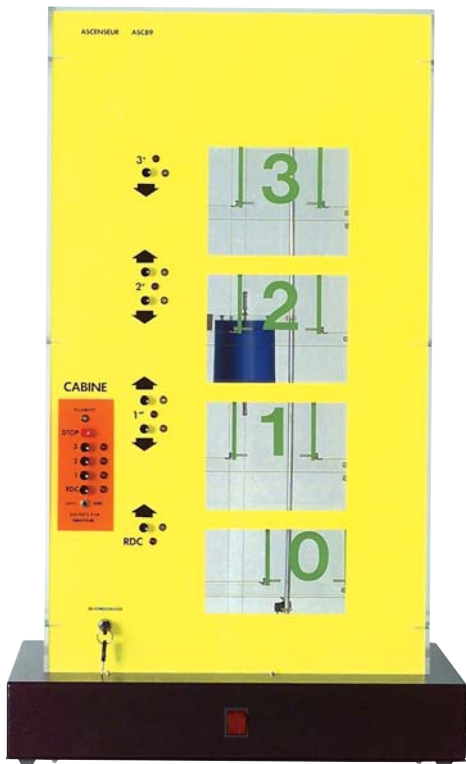
Vision sensor combined with configuration software for part surveillance and recognition by video. The part conveyed under the camera by the conveyor is checked and compared with the image recorded in the memory of the video sensor. If the part does not conform, the conveyor stops and an indicator signals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



ref. CONV-2

DIDACTIC LIFT

USER'S MANUAL + 7 PRACTICAL WORKS



ref. ASC89-24 LOGIC CONTROLS IN 24V

ref. ASC89-05 LOGIC CONTROLS IN 5V

The ASC89 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

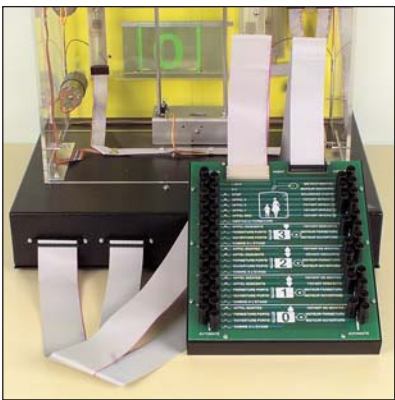
MAIN FEATURES :

- 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.
- Two limit switches, high & low, (without program control) stop the lift if there is an error in the program.
- 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.

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

4 LEVELS	1 electrically opening door - 1 photo-detector for 'door closed' - 1 photo-detector for 'door-open'
EACH LEVEL HAS	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 780 x 480 x 440mm Weight 15kg Supply 230V 50Hz The unit is available in two driving logic values, 24V or 5V.

INTERFACES FOR DIDACTIC LIFT (CHOOSE ONE OF THEM)



CHOICE N°1 WORKS WITH YOUR OWN PLC

ASMAT is an interface allowing a quick connection to the ASC89 lift from a PLC. To help in quickly identifying the functions of the connectors, small symbol and piece of text next to each connector, allowing immediate understanding of its function. The operating sense: Lift - PLC or PLC - Lift. It is clearly indicated by vertical arrows. Metal box: 22 x 272 x 32mm. Weight: 250g.

ref. ASMAT

PLC which can control the 24V lift via ASMAT interface.
Réf. 221-MAX see page 102.



CHOICE N°2 INTERFACE WITH BUILT-IN PLC

Interface designed to be connected to the ASC89-24 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

Compatible with ASC89-24 only

ELECTRICAL GATES
SEE WEB SITE



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 vacuummeter 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 : Grafset instructions, contact language.
- Programming : from a PC using a software (included).
- Delivered with a complete and functional program.



OTHER CHARACTERISTICS

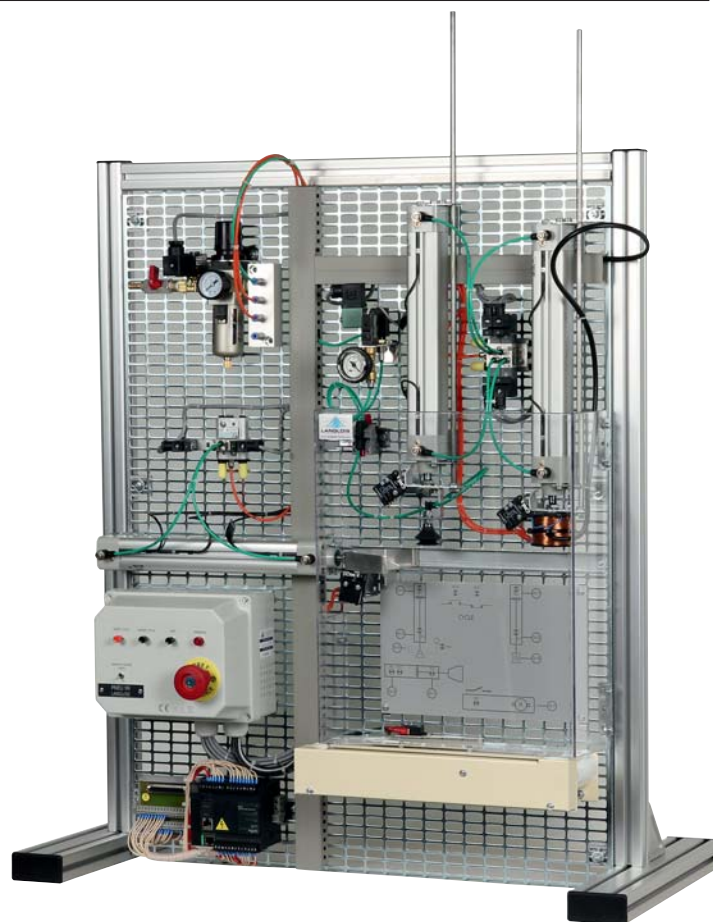
The conveyor belt is either controlled by the automatic system and the end of belt detection switch or by being forced into operation. An electromagnet illustrates picking up by a magnetic field. PNEU** is connected to the air network by splined terminal placed on the valve block of stop + regulator + 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

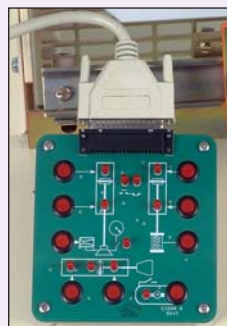
ref. PNEU98 without PLC

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 dismantling/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 grafset.



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.

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 inputs	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 inputs	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

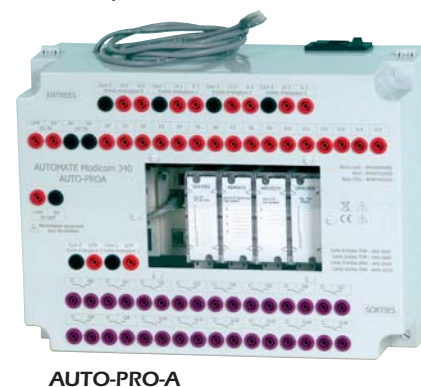


API24-BOX



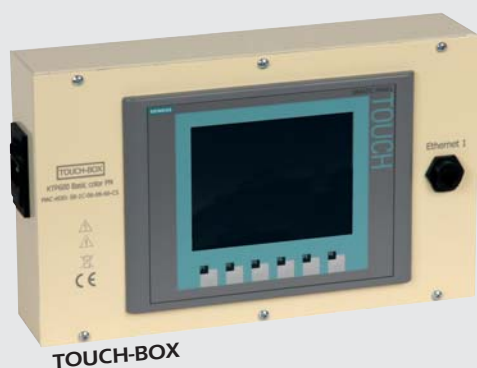
API26-BOX

	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 $\pm 10V / 0-10V / 0-5V / 1-5V / \pm 5V$ $0-20mA / 4-20mA / \pm 20mA$ 2 voltage / current outputs $\pm 10V / 0-20mA / 4-20mA$
	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.	



INTEGRATED TOUCHSCREEN UNITS

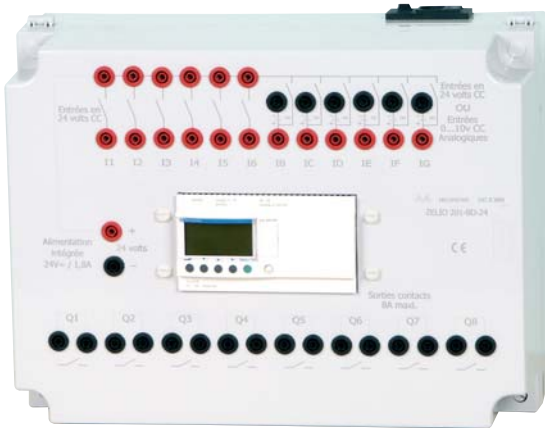
Ref.	TOUCH-BOX	STU-BOX4	STU-BOX6
Brand	SIEMENS	SCHNEIDER	
Model	Simatic KTP600	HIMISTU	
Software	LOG-STEP (in option)	VjeoDesigner (supplied)	
Touchscreen	5,7" TFT 256 colours	3,5" 65536 colours	5,7" 65536 colours
Resolution	320 x 240 pixels		
Ethernet	1 RJ45 connector	6 RJ45 connectors (Including 1 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.	



PROGRAMMABLE CONTROLS SYSTEM



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)



ZELIO-NET is supplied with software Zelio Soft 2

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



PROGRAMMING SYSTEMS

LIGHTING CONTROL SYSTEM WITH PLC



ref. COFEC
Complete datasheet
www.langlois-france.com

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.

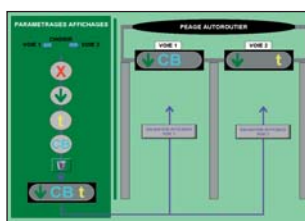
TRAFFIC LIGHTS WITH PLC



ref. TRICAUTO
Complete datasheet
www.langlois-france.com

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.

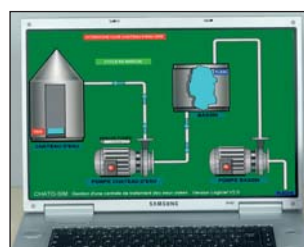
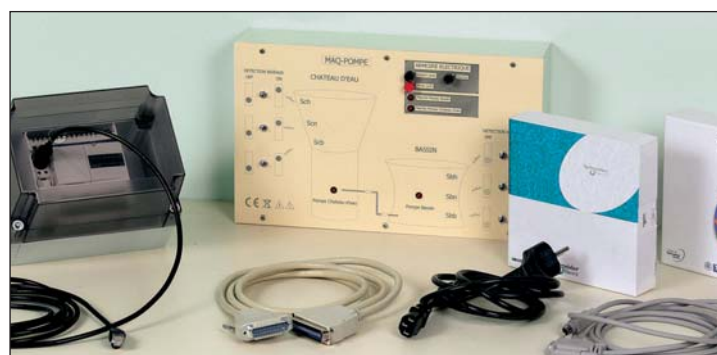
LIGHT SIGNS SYSTEM (FOR A MOTORWAY TOLL)



ref. AUTO-PEAG
Complete datasheet
www.langlois-france.com

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.

PUMPING STATION



ref. CHATO-SIM
Complete datasheet
www.langlois-france.com

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.

ALL-OR-NOTHING REGULATORS FOR REGULATION

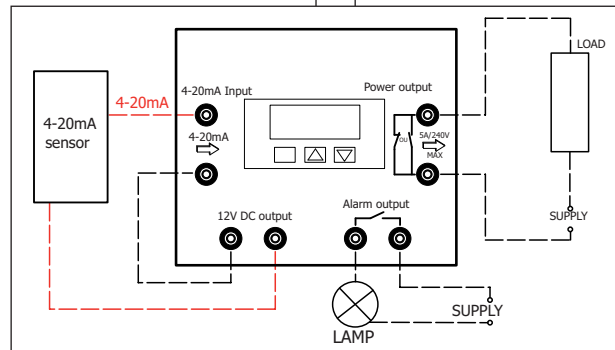
STANDARD MODEL



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 & 9999
 - For 20mA input, the user can choose the value displayed between 0 & 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
- Power supply output: integrated auxiliary 12VDC - 0.5A
- Alarms: high and low, relay output on safety sockets 4mm
- Settings: offset, hysteresis, gain, filter
- 230VAC 50Hz power supply by power cord
- 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.
- 1 relay 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



SRC POWER CONTROL AND LOADS FOR REGULATION

HEATING UNIT



ref. RH-BOX

230V power supply heating unit fitted with a 75W 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).

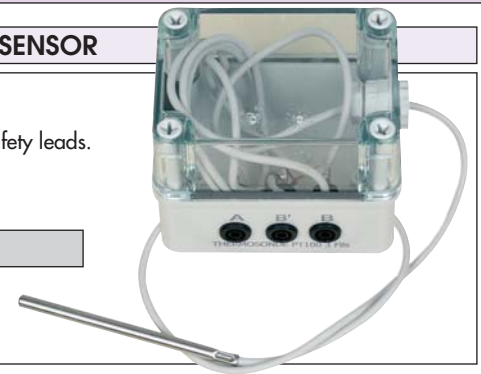
Features

- 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

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

ref. PT100-BOX



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
- Dimensions: 77 x 106 x 92 mm

ref. TMPT-BOX

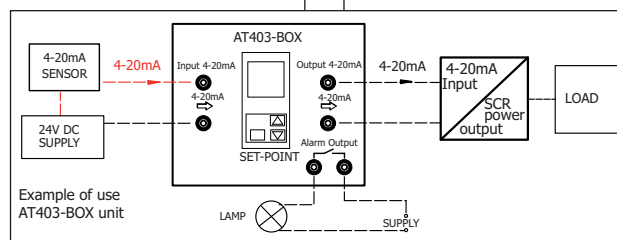
PID REGULATORS FOR REGULATION

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

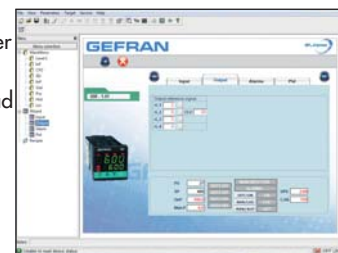


COMMUNICATING MODEL GEFRA®



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



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



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-221-A.

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

ref. GRAD-BOX



SET OF ALL OR NOTHING TEMPERATURE REGULATION

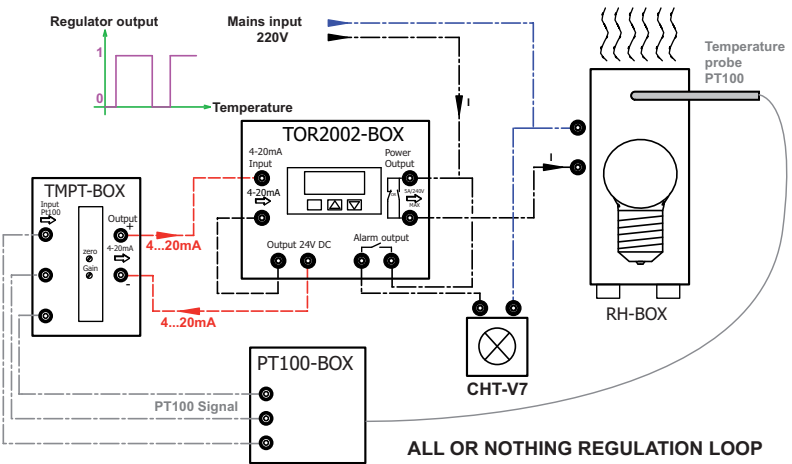
EDUCATIONAL OBJECTIVES

- Understanding and wiring of a regulation chain All-Or-Nothing.
- Studying, setting, control of a All-Or-Nothing regulator.
- Retrieving information by computer (communicating version).
- 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, an user's manual for each component and also wiring diagrams.



Ref.	REGULOR (standard model)	
Composition	Reference	SEE page
TOR regulator	TOR2002-BOX	106
Heating unit	RH-BOX	106
PT100 temperature converter	TMPT-BOX	106
PT100 temperature sensor	PT100-BOX	106
Light	CHT-V7	177

Ref.	REGUL-S (communicating model)	
Composition	Reference	SEE page
Communicating TOR regulator	TOR-COM	106
Heating unit	RH-BOX	106
PT100 temperature converter	TMPT-BOX	106
PT100 temperature sensor	PT100-BOX	106
Light	CHT-V7	177

COMPLETE DATASHEET www.langlois-france.com

SET OF PID TEMPERATURE REGULATION

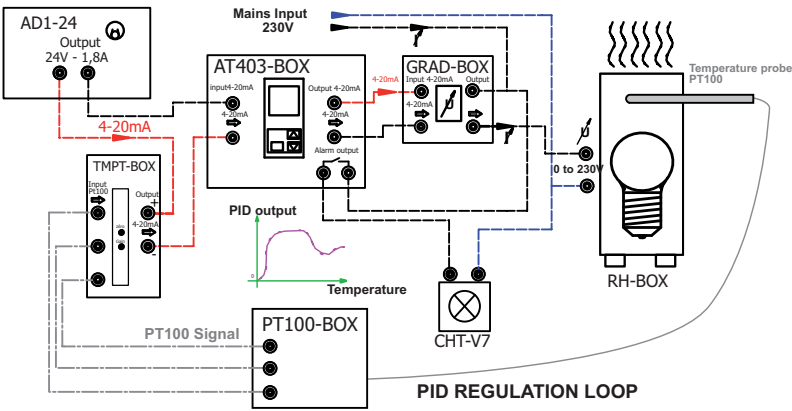
EDUCATIONAL OBJECTIVES

- Understanding and wiring of a regulation chain of temperature by PID
- Studying, setting, control of a PID regulator
- Retrieving information by computer (communicating version).
- 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)	
Composition	Reference	See page
PID regulator	AT403-BOX	107
Heating unit	RH-BOX	106
PT100 temperature converter	TMPT-BOX	106
PT100 temperature sensor	PT100-BOX	106
SCR power control	GRAD-BOX	107
DC power supply - 24V 2,2A	ADI-24	/
Light	CHT-V7	177

Ref.	REGUL-G (communicating model)	
Composition	Reference	See page
Communicating PID regulator	PID-G	107
Heating unit	RH-BOX	106
PT100 temperature converter	TMPT-BOX	106
PT100 temperature sensor	PT100-BOX	106
SCR power control	GRAD-BOX	107
DC power supply - 24V 2,2A	ADI-24	/
Light	CHT-V7	177

COMPLETE DATASHEET www.langlois-france.com



TEMPERATURE REGULATION BY PLC



ref. REGULAIR
Complete datasheet
www.langlois-france.com



COMPONENTS OF THE REGULAIR SYSTEM

- 1 moto ventilator
- 1 SCR power unit
- 1 Pt100 box
- 1 PLC M221
- 1 speed variator (frequency converter)
- 1 control unit + lights

EDUCATIONAL OBJECTIVES

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

MANUAL + Practical works

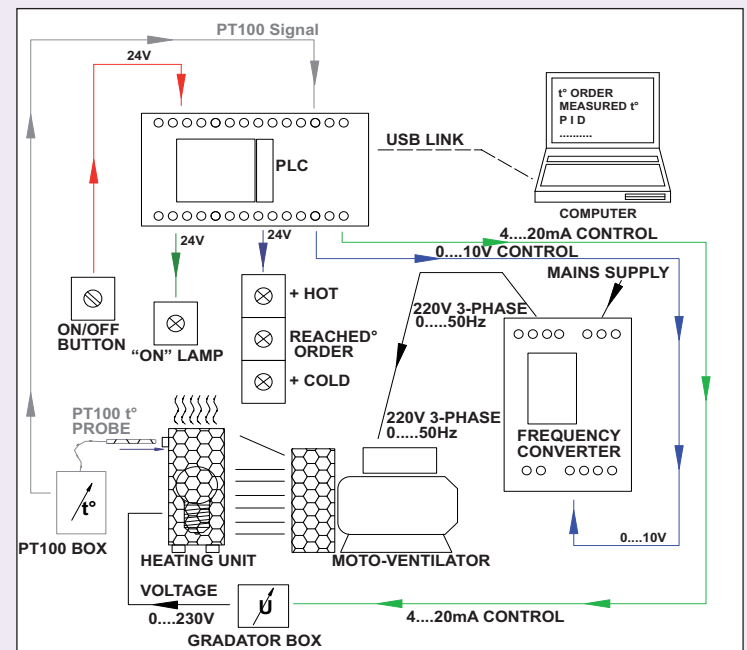
Practical works

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.



TEMPERATURE SENSORS AND HEATING CONTROL



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

ref. CAPTEMP

Complete datasheet

www.langlois-france.com

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 ohms 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:

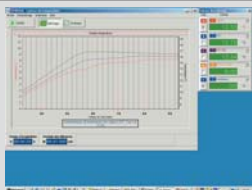
NTC thermistor – J thermocouple – PT100 platinum probe.

A digital thermometer provides a continuous readout of 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 : 1 kg

DATA ACQUISITION SOFTWARE (OPTION)



This option consists of an interface unit, a connecting cable, and software.

ref. LOG-CAPTEMP

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 and Cursor function
 - X and Y axes configurable
 - Acquisition data recovery in spreadsheet form
- SOFTWARE AVAILABLE IN ENGLISH AND IN FRENCH

SYSTEM FOR HEAT REGULATION BY P.I.D.



ref. DESP

Complete datasheet

www.langlois-france.com

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 to the standard 4-20mA with Pt100 probe and transmitter
- Calibration of the converter Pt100 / 4-20mA with the help of a decade box (not supplied)
- 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

OPTION INTERFACE & LOGIFOUR SOFTWARE

ADDITIONAL FUNCTIONS

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

ref. LOGIFOUR

FEATURES

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

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.

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.

Ref. MAQ-ND

Version without flow rate regulation

Ref. MAQ-NIV

EDUCATIONAL OBJECTIVES

- Putting an electrical installation into service.
- Learning about and using a PID regulator, a hydrostatic sensor, and a 4-20mA flowmeter.
- Using a regulation system for water level and flow rate by analogue signal 4-20mA.
- Using and configuring a speed variator locally and from programming software.
- Measuring, analysing and interpreting analogue signals.
- Learning industrial maintenance.

TEACHING RESOURCES + 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 speed variator
- Configuring the PID regulator
- Configuring the flowmeter
- Measuring the current 4-20mA at the input of the PID and at the output of the speed variator
- Maintenance on the flowmeter

COMPOSITION

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 1/4 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.
 - 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.



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.

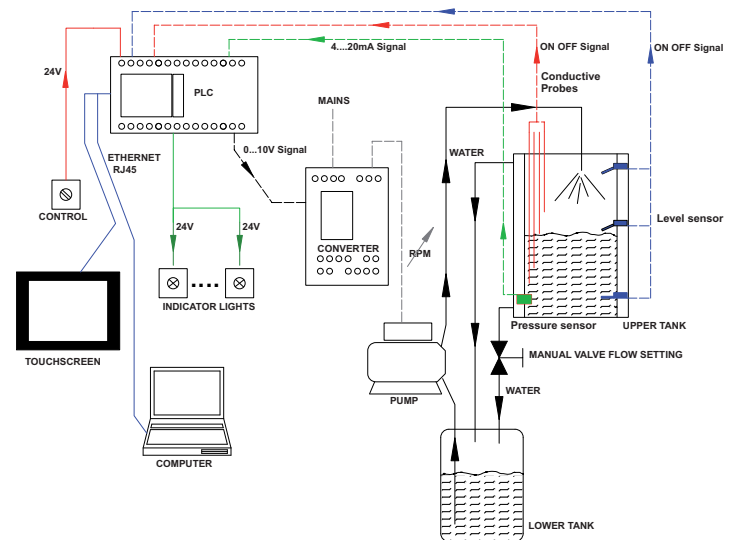
COMPONENTS PARTS OF THE MODEL

- 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.

PUMPING SYSTEMS WITH SUPERVISION AND REGULATION

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

ref. HYDRO-1-C

ref. HYDRO-2-C

ref. HYDRO-3-C

ref. HYDRO-4-C

Communicating models
Tablet & Smartphone



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 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-nothing 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.	✓		✓	


NEW
**STANDARDS MODELS : 3-PHASE 400V**

Available on single-phase 230V

Add -230 at the end of the references

**OPERATING
PART ALONE**

ref. HYDRO-OP

- 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

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

ref. HYDRO-DEB

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

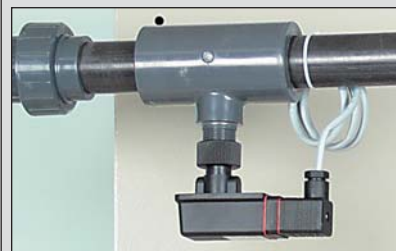
This option, supported by the PLC and the monitoring program, measures the water level. The monitoring screen displays the levels in the tanks proportionally to the pressure. Possibility to install 2 sensors, one on each tank (Basin / Water tower).

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



ref. HYDRO-NIV

INCLUDING ON HYDRO-1 AND HYDRO-2

ALL OR NOTHING FLOW SENSOR

ref. CO-DEB

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

FLOW INDICATOR WITH FLOAT

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

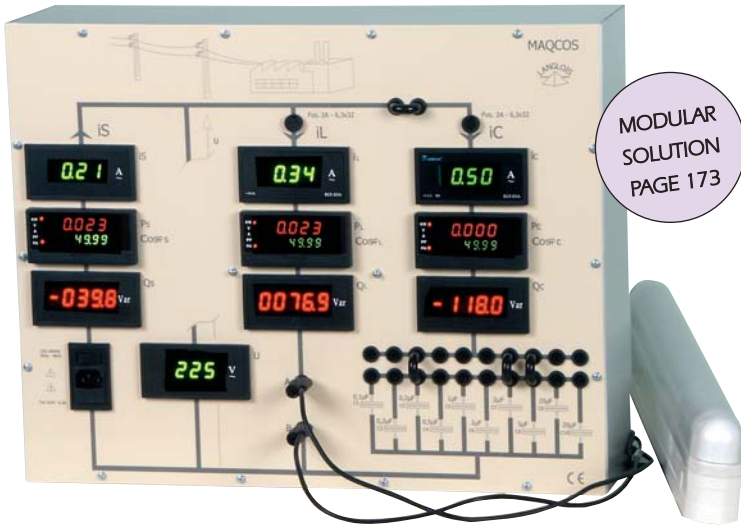
Features

- 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



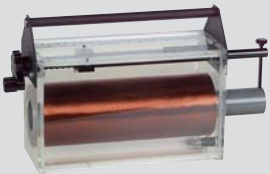
POWER FACTOR CORRECTION SYSTEM



ref. MAQCOS

TECHNICAL SPECIFICATIONS

- 13 displays: 3 x A, 3 x W, 3 x power factor, 3 x VAR, 1 x V
- 10 condensers: 0.1 μ F - 41 μ F
- Fuse protection
- Dimensions: 510 x 400 x 150 mm - Weight 8.2kg



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.

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 lighting installation from fluorescent tubes:
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

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. MAQCOS is supplied with a fluorescent tube and IPXX connection.

STUDY OF THE 3RD AND 5TH ORDER HARMONICS



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

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 63-66)
- 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

ref. HARMOVAR

Complete datasheet - www.langlois-france.com

POWER QUALITY CONTROL



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

THE FRONT PANEL COMPRISES

- Safety terminals for the measurements
 - voltages and currents supplied by the network
 - voltages and currents in the halogen lamps
 - voltages and currents in the filter components
- Switches for activating or deactivating the filter components
- An Automatic/Manual mode switch
- A lighting potentiometer

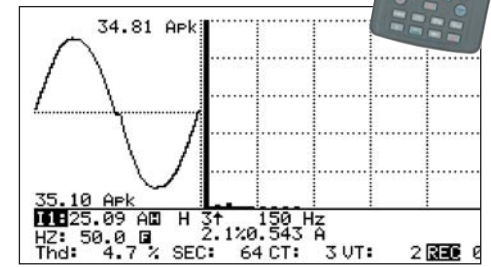
OTHER FEATURES

- 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

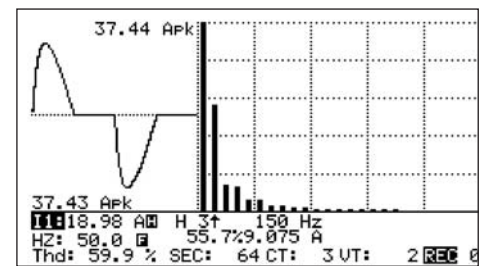


Inside view of the cabinet

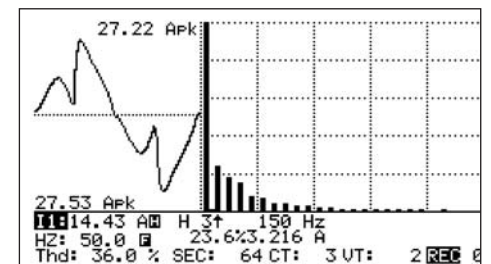
MEASUREMENT READINGS IN
MANUAL MODE WITH A
NETWORK ANALYSER
REF : 6830 ON OPTION



Lighting provided 100% (no harmonics)



Lighting provided 50% (high third order harmonic)



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

CONVERSION TEST BENCHES

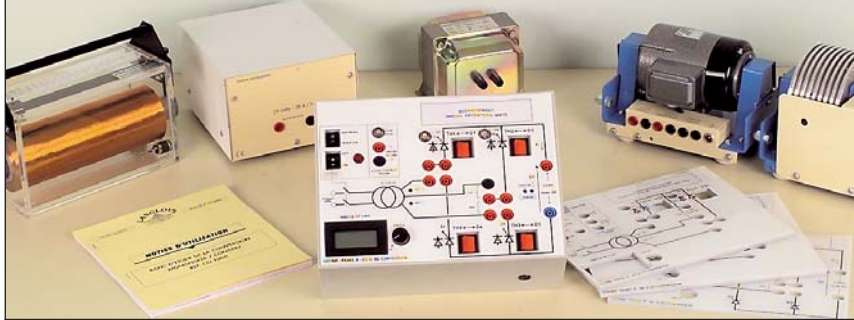
RECTIFIER

SINGLE-PHASE / DIRECT CURRENT CONVERSION TEST BENCH

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



CEI1010 CATIII pol2 300V CL1



ref. CO-1000

ACCESSORIES FOR CO-1000

Ref. ECO1/2 10 Ω	Rheostat ECO1/2 10 Ω (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 moveable 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

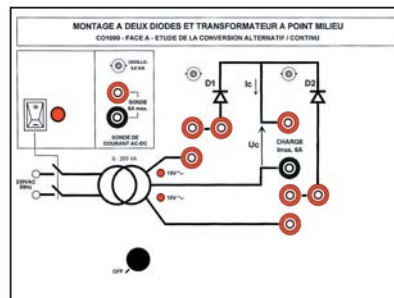
This probe consists of a Hall-effect sensor and is connected in series, like an ammeter. The current image is a voltage of 0.5 V/A available via BNC.

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

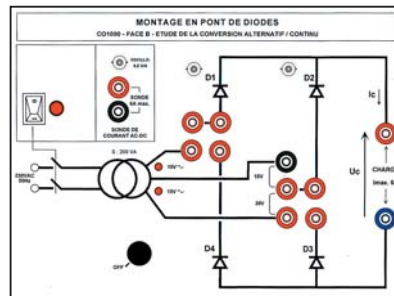


PANEL A: ASSEMBLY WITH TWO DIODES AND MID-POINT TRANSFORMER

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)

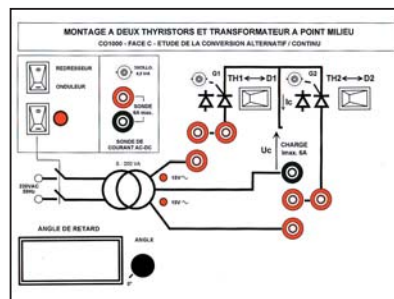
Experiment 2 Power flow on inductive load (R,L)

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

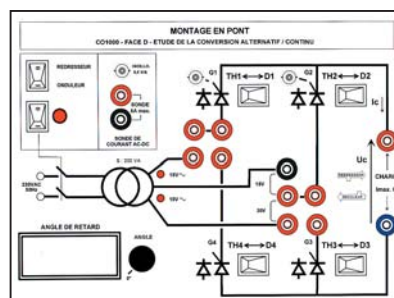
Any of these 4 diodes can be replaced by a rectifier at any time, simply by throwing the appropriate switch. This facilitates comparisons between all-diode, all-rectifier, symmetrical mixed, and asymmetrical mixed assemblies.



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

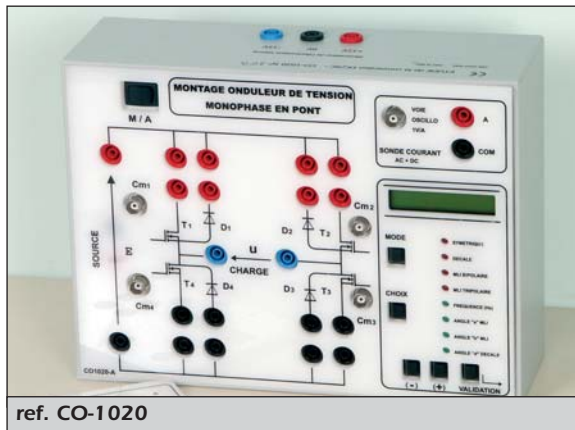
Experiment 3 Power flow on active inductive load (E, R, L)

Experiment 4 Application to a DC motor power supply

(DCM)

INVERTER

SINGLE-PHASE CONTINUOUS/ALTERNATING CURRENT CONVERSION TEST BENCH
CO-1000 IS SUPPLIED WITH 2 MOVEABLE FRONT PANELS, INSTRUCTION BOOK INCLUDED TUTORIALS



ACCESSORIES FOR CO-1020

Ref. ECO1/2 10 Ω

Ref. ECO1/2 15 Ω

Ref. ECO1/2 22 Ω

Ref. ECO1/2 33 Ω

for an optimal use, low resistance loads are better

Ref. PSYJR

Ref. CO-106

Ref. CO-107

Ref. CO-109

Ref. CO-122

Rheostat ECO1/2 10 Ω (P.78)

Rheostat ECO1/2 15 Ω (P.78)

Rheostat ECO1/2 22 Ω (P.78)

Rheostat ECO1/2 33 Ω (P.78)

Variable coil (P.85)

12V/24V Battery

Single-phase transformer 12V - 230V with its lamp 230V - 40W
load made up of a 40W machine 12V/230V

Capacitor 22 μ F

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 ($I_{MAX} = 3A$) 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:

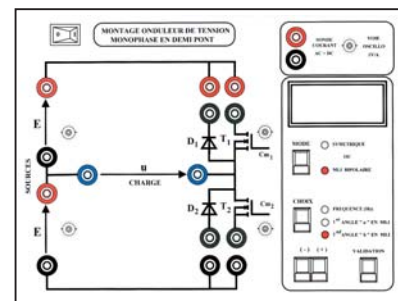
Adjustment parameters are selected by pressing the "SELECT" key:

- 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

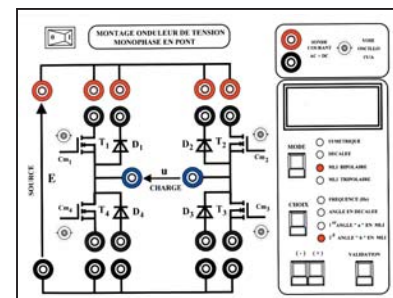
Presentation of symmetrical control

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 different experiment modules.
Each module permits to realize several practical works.
Supplied with leads and user's manual.



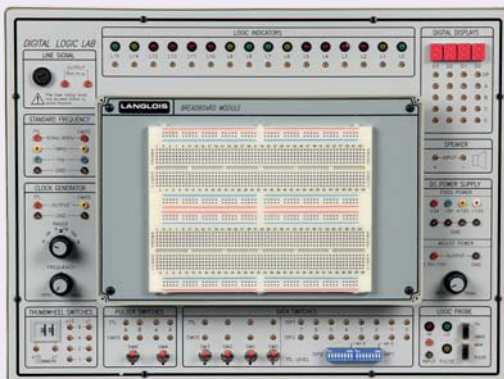
In the upper right corner, behind a locked hood by the teacher, a 8-positions switch allows to simulate some material defects.

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 $\square$ 1 TTL level
- 4 outputs:** edge 0 $\square$ 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

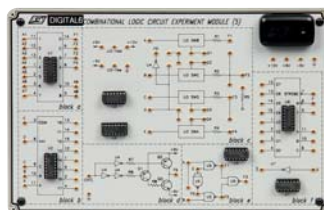
Adder. Subtractor. 2 and 3 inputs reverser. BCD code adder circuit. Bit parity generator with XOR gate. 10 to 4 bit decoder with TTL IC.

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

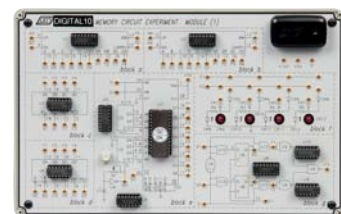
Variable duty ratio oscillator. RS, T, D, JK flip flop. Preset left/right shift register circuit. Noise elimination circuit.

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

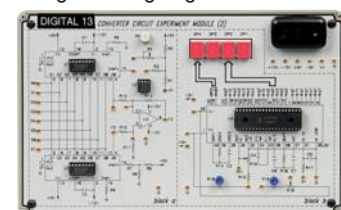
Constructing 64 bits RAM circuit. Constructing Electronic EPROM circuit

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 $\pm 3V$, $\pm 18V$ / 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: 50 Ω
- Output voltage : 9Vpp (with 50 Ω load), 18Vpp (open loop).
- **3 1/2 digit digital voltmeter/ammeter**
Range: 2V - 200V - accuracy 0.3%
Range 200 μ A - 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 8 Ω , 0.25W** with driver circuit.
- **0.25W potentiometers** : 1k Ω , 10k Ω , 100k Ω , 1M Ω .
- **Breadboard**: 1680 tie-point breadboard which 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 amplifier 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 adjustable 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

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
 $\pm 3V$ to $\pm 18V$ / 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: 50 Ω
- Output voltage : 9Vpp (with 50 Ω load),
18Vpp (open loop).
- 3 1/2 digit digital voltmeter and ammeter**
Range: 2V - 200V - accuracy 0.3%
Range 200 μ A - 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 8 Ω , 0.25W** with driver circuit.
- 0.25W potentiometers** : 1k Ω , 10k Ω , 100k Ω , 1M Ω .
- 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

EDUCATIONAL OBJECTIVES

- Studying by different modules of electrical & electronical circuits commonly encountered

TEACHING RESSOURCES + PRACTICAL WORKS

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

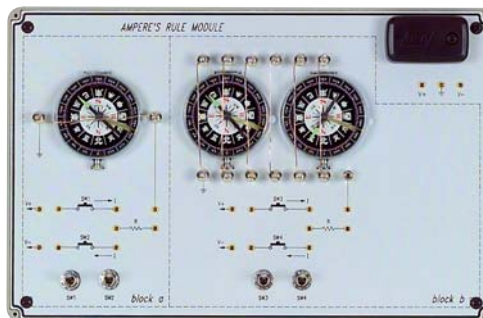
(supplied with each module)

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 driven by thermistor.

3 stages amplifiers controlled by microphone.

ref. ELEC10

Blocking oscillator.

Blocking oscillator with speaker output.

Astable multivibrator. LC resonant circuit.

Electronic birdcall circuit

ref. ELEC11

ELECTRONIC POWER MODULES

Complete datasheet - www.langlois-france.com



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 functioning 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 draw.

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.

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 SUMMING AMPLIFIER

Each attenuator is comprised of a resistance decade, variable from 0 to 10 x 10 kΩ

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.

May be balanced by an internal resistor, an RC circuit or an exterior circuit via two sockets.

This pre-amplifier allows the amplification of the signal and regulation of the driver offset.

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, continuous 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 used to sweep the X axis of the oscilloscope in XY mode

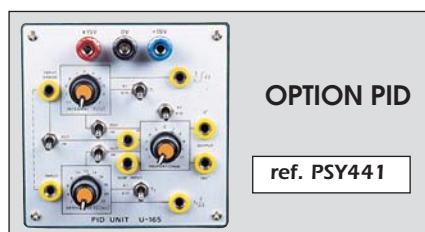
MAGNETIC BRAKE

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

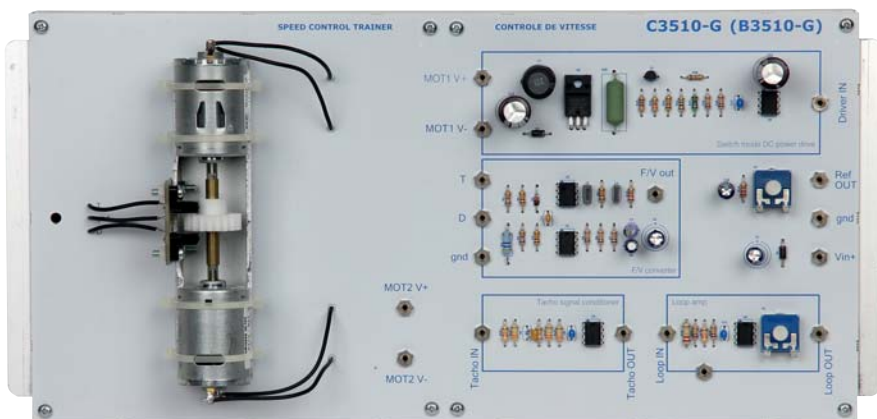
- N°1 Transitory response of the motor
- N°2 Study of the speed and brake torque
- N°3 Use of operational amplifiers
- N°4 Study of a simple servo-system in one direction of revolution
- N°5 Influence of loop gain on the quality of the servo-system
- N°6 Study of the servo-system in two rational directions
- 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 oscillations
- 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



OPTION PID

ref. PSY441

SPEED FEEDBACK



ref. C3510-G

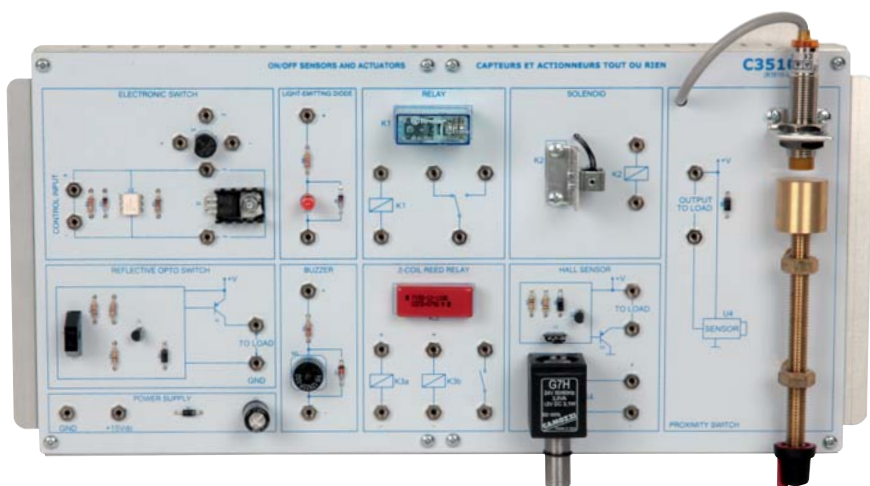
Dim. : 340 x 160mm. Weight : 783g.

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

ALL OR NOTHING SENSORS AND ACTUATORS



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.

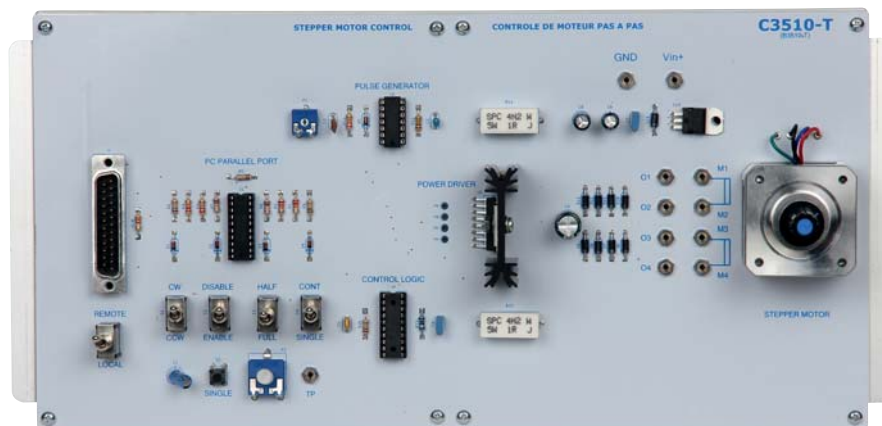
The model also includes:

- 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.

ref. C3510-L

Dim. : 250 x 150 x 30mm. Weight : 900g.

STEPPING MOTOR



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 controlled impulse generator by push button for the step by step lead and a variable frequency generator for the continuous working.

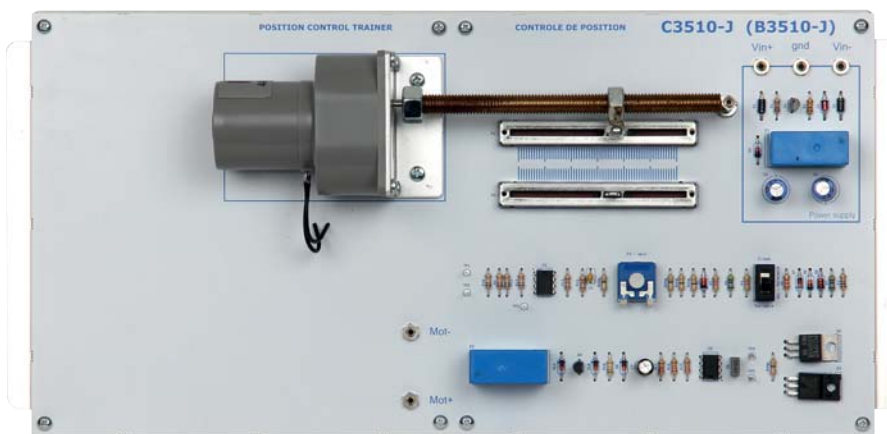
ref. C3510-T

Dim. : 340 x 160mm. Weight : 763g.

POSITION FEEDBACK

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 optical encoder + converter.
- Comparison of low rotation frequencies with and without feedback loop.
- Study of the feedback response for different values of loop gain.



ref. C3510-J

Dim. : 340 x 160mm. Weight : 750g.

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.

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.

ACCESSORIES SUPPLIED

1 set of leads Ø2mm : 3 x 100cm / 2 x 30cm

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

ACCESSORIES SUPPLIED

1 set of leads Ø2mm :

2 x 100cm / 2 x 50cm / 3 x 30cm / 3 x 15cm

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.

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

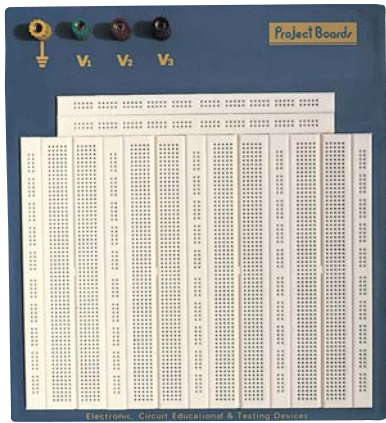
Contact boards for the design and rapid testing of circuits. The double reed contacts of these boards are in nickel plated bronze. They are pitched 1 inch/2.54 mm apart in an insulating ABS base. Contacts grouped in strips of 5 or 10, can be fully dismantled from the rear. Use components or leads with maximum diameter 0.6mm.



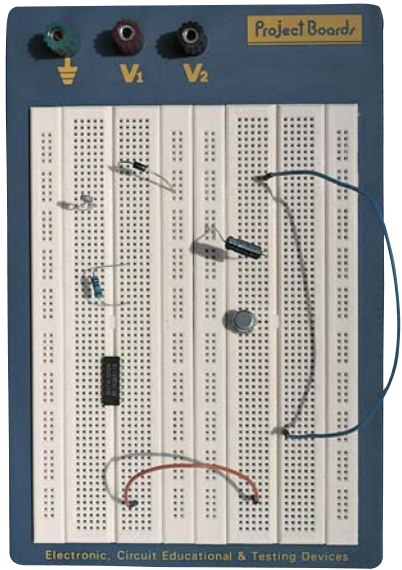
REF. PAL2420



REF. GL12



REF. GL48



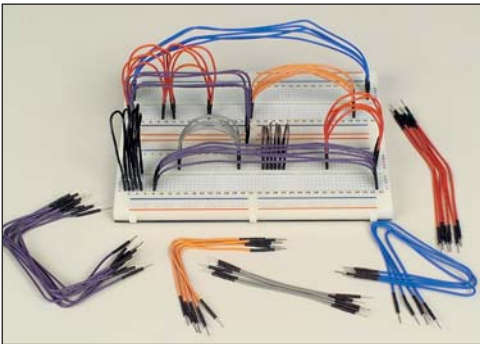
REF. GL24

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

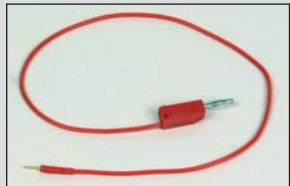


Ref.	M5	G7	O1	R10	N10	V1	B2
Length	50 mm	70 mm	100 mm	100 mm	100 mm	150 mm	200 mm
Obligatory color	BROWN	GREY	ORANGE	RED	BLACK	PURPLE	BLUE

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