Technical education

Educational solutions
Catalogue 2010 - 2011

Schneider Electric
Schneider Electric and Education

Schneider Electric partner in education to prepare the future of young people

Schneider Electric focuses on the efficient management of energy. Its vision is strategically clear, its positioning and its integrated offers for energy management provide the company with a unique position to seize the opportunities offered by intelligent energy.

We rely on privileged relations formed over more than fifty years with educational partners to develop the educational offer towards the jobs and solutions of tomorrow.

Safe
Transform and distribute energy safely

Reliable
Avoid electricity failures and fluctuations in quality

Efficient
Measure and control energy, automate, provide exact diagnostics

Productive
Manage the processes, improve management and communication of utilities of all the infrastructures

Green
Make the connection with easy, reliable and economic renewable energy sources

Schneider Electric deploys all its energy to realise its vision: do more with fewer of our planet’s resources. We use our expertise to integrate intelligent energy management solutions for the benefit of our customers and the environment.

We are presented with the opportunity to help each citizen achieve their potential whilst reducing their impact on the environment. Technology makes the world change, grow and progress faster than ever. The intelligent and efficient management of energy is essential for this progression.
This new edition of the educational solutions catalogue contains a wide range of systems designed from the expression of your needs and of our experience in the creation of products and job applications.

You will find major innovations in terms of products or solutions, for implementing the learning of energy efficiency concepts. Many other new things can also be found in this catalogue.

We will do everything to make our vast expertise in educational and teaching solutions available to you, always taking on board developments within our profession.

Thierry Ruard
Division Manager
Didactic Engineering
The OFMOD concept

Modular offer: a new concept for teaching automation systems and electrical distribution

This new offer contains educational modules allowing you to create any kind of configuration. Changing from a simple configuration to one that is more developed is done very flexibly by adding additional modules.

The diversity of modules allows you to mix different types of components within the same automation system architecture:

- electromechanical motor starters
- electronic motor starters
- programmable logic controllers linked to human-machine interface terminals
- control-system architectures etc.
- tertiary electrical installation
- installation with KNX bus
- machine safety
- etc.

Modules geared towards construction allow you to progress to installations implementing energy efficiency.

The simple operational parts allow you to illustrate the applications being developed.
Catalogue structure

To help you in your choice, this catalogue is divided into different sections:

- **Electrical energy distribution**
  You are looking for a system that allows you to deal with medium or low voltage distribution, earthing diagrams, selectivity and electrical authorisation.

- **Electrical installation**
  You are looking for a solution to set up an electrical installation safely.

- **Energy control**
  You are looking for systems that allow you to control the power of an installation.

- **Energy efficiency**
  You are looking for energy efficiency and renewable energy systems.

- **Data acquisition and processing**
  You are looking for solutions that allow you to learn the basic functions of automated systems.

- **Automated systems**
  You are looking for solutions to implement automated systems.
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Products comply with European Directives

Compliance report provided on request

All our products include:
  ● hard copy of the technical manual and practical exercise book,
  ● CD with the same documents in a PDF format and the PLC applications.
LV switchboard for professional school teaching

Teaching Objectives
- To study the hardware of a main switchboard
- To control distribution
- To manage energy

Electrical and mechanical data
- Power supply: 400 V 3-Ph + ground
- Size (H x W x D) - weight: 2310 x 1000 x 530 mm - 214 kg

Main industry
- Electrotechnical professional school

This cabinet contains:
- a main power supply
- a residual current device at the head and a switch-disconnector with visible breaking
- a busbar
- a measurement unit equipped with a configurable alarm device
- an emergency stop device on the cabinet and the possibility of remote installation of at least one other emergency stop point
- feeder control using ON/OFF pushbutton + indication
- connection of power supplies and feeders at the back of the cabinet
- cabinet access from the front and back (for exercises and accreditation)
- a light beacon at the top to indicate power on
- safety devices conform to current standards.

Package description
This cabinet is used to:
- perform cabling and accreditation tasks with intervention on busbars
- take measurements (intensity, simple and composite voltages, active, reactive and apparent power, power factor and phase order)
- take measurements using an oscilloscope and hook-on ammeter
- distribute electrical energy on 6 separate feeders.

It can be supplied in a mounted, non-cabled version delivered with an Accessories kit to carry out cabling operations.

Proposed as an option:
- accessories batch (wires, tags, cable ends and sheaths)
- tooling batch (screwdriver, clamps, allen keys).

In the workshop, the cabinet will be used to supply:
- systems separately
- the spatial production area (3D cells)
- the panel-builder’s workstations
- a lighting area
- the cabinet cabling stations
- the “study” zone with the microcomputers.

To order
- MD1AA720: cabled LV switchboard
- MD1AA720NC: non-cabled LV switchboard
- MD1AA728: accessories kit
- MD1AA728P4: accessories kit (Q = 4)
- MD1AA729: tool kit

Un-wired rear face
LV switchboard for vocational diploma teaching

Teaching objectives
● To study the hardware of a main LV switchboard
● To control distribution
● To manage energy

Presentation of the switchboard
The MD1AA730PE LV switchboard for vocational diploma teaching is used to:
● distribute and control electrical energy on a real 63 kA installation
● carry out authorisation tasks with service operation on busbars
● take measurements (I, U, P, S, Q etc.)
● find out about the various industrial technologies used in a main LV switchboard (changeover switch, power meter, UPS, controller, load shedding, etc.)
● organise and administer a work site
● change an installation (to add one or more feeders)
● compensate for reactive power.

Composition of the LV switchboard cabinet with BA controller:
● a normal power supply (through the mains) and an emergency power supply (by a second mains or an electricity generation unit)
● two switch disconnectors with visible break function, rating - 100 A
● two motorised circuit-breakers – source changeover switches, equipped with an adjustable residual current relay
● an automated remote control integrated in the changeover switch, enabling the transfer of sources according to a configurable sequence to guarantee optimum continuity of service (BA module)
● two Powerclip busbars
● two RCP phase control relays and an RCU voltage control relay
● four pre-wired feeders: a 4-pole 63 A load shedding feeder, a 3-pole 32 A feeder, a single phase 10 A feeder and a single phase 4 A feeder to power the supervisor
● a Premium PLC (version PL7 or Unity) with web server module and developed html pages to enable remote supervision and control
● a 1 kVA UPS.

Options
A reactive power compensation cabinet supplied with steps control contactors.

Electrical and mechanical data
● Power supply:
  400 V three phase + neutral + earth
● Size (H x W x D) - weight:
  2450 x 1100 x 530 mm - 240 kg

Main industry
● Electrical engineering vocational diploma

In UEHGTGBT version
Possibility of adapting the LV switchboard for vocational diploma teaching to the customer’s specific requirements:
● choice of PLC type (Twido, Micro, Premium or M340) uninterruptible
● capacitor option in the cabinet
● touchscreen option (7.5” or 10”)
● supervisor option
● number of feeders, models, ratings, motorised or otherwise
● cabled or uncabled LV switchboard.

To order
MD1AA730PE: LV Switchboard for vocational diploma teaching
MD1AA739: compensation cabinet
UEHGTGBT: customised LV switchboard for vocational diploma teaching
IT system cabinet and secondary distribution boards

Teaching objectives
- To be used with the teaching LV switchboards to explore the different workshop architectures
- To create an IT isolated operation system
- To have additional electrical distribution feeders
- To exchange information by Ethernet
- To create the links with a networked LV switchboard cabinet

Package description

IT system cabinet
This equipment is an electrical distribution cabinet equipped with four castors. It is used to demonstrate, through an IT isolated operation system, the principle of continuity of service for an installation as well as associated maintenance methods.

It includes:
- a 400 V/230-400 V 10 kVA three-phase transformer allowing an IT type earthing system (neutral isolated from earth) to be created
- three-phase feeders protected by 10 A circuit breakers, for connecting various other devices
- a TR22 permanent insulation monitor (PIM), to cover the principle of continuity of service of an installation as well as maintenance methods.

The tertiary or industrial distribution boards are Prisma Plus modular switchgear enclosures. Each enclosure is equipped with a master switch with external lock.

The industrial distribution board is equipped with two 2-pole circuit breakers and four 3-pole circuit breakers, to protect the power supply of industrial systems (machines, operational parts, etc.).

The tertiary distribution board is equipped with six 2-pole circuit breakers to protect the power supply of tertiary systems (lighting, sockets etc.).

These three cabinets (IT cabinet, industrial and tertiary distribution boards) are equipped with a Twido PLC centralising the state of the different feeders through the circuit breakers (open, closed or tripped). This information can then be sent to a concentrator PLC in a main LV switchboard via the Ethernet network.

To order
MD1AA700TIT: IT system cabinet
MD1AA700TDS: industrial distribution board
MD1AA700TDT: tertiary distribution board

Electrical and mechanical data

IT system enclosure
- Power supply: 400 V three-phase + neutral + earth/<10 kVA
- Size (H x W x D) - weight: 1400 x 645 x 440 mm - 200 kg

Tertiary or system distribution board
- Power Supply: 400 V three-phase + neutral + earth/<23 kVA
- Size (H x W x D) - weight: 645 x 480 x 250 mm - 18 kg

Main industry
- Electrical engineering
Securis case

Teaching objectives
- To make students aware of the issue of safety
- To explain how safety devices (residual current circuit breaker) work to counter electrical and mechanical hazards

Package description
The Securis case is designed to highlight the issue of safety. This educational tool illustrates safety system operation through practice:
- electrical safety
- machine safety
- protection of equipment and personnel.

Securis is a kit built into a demonstration case with a transparent cover so that all the different components are visible. This enables students to learn how the different products operate and what their role is in the safety circuit.

Securis simulates a machine with a safety door which enables the protection functions to be studied in the following contexts:
- power failure and restoration:
  - emergency stop circuit
  - automatic power supply.
- opening the cover during operation:
  - role of the limit switch
  - machinery directive.
- insulation fault and contact with a live part:
  - studying a thermal magnetic circuit-breaker
  - studying a residual current circuit-breaker.

Securis includes all the cables needed for its use.

Electrical and mechanical data
- Power supply: 230 V single phase + earth/40 VA
- Size (H x W x D) - weight: 520 x 380 x 150 mm - 7 kg

Main industries
- Electrical engineering
- Industrial technology

To order
MD1VSE1F: Securis case
Earthing diagram (ED) benches

Teaching objectives
- To study the theory of neutral point connection
- To highlight the basic rules for protection of low voltage distribution in each earthing diagram (neutral point connection)
- To enable automatic detection of a faulty starter unit (version XM200)

Package description
This bench demonstrates the reasons for decrees, regulations and the standards in force for the protection of persons in the various earthing connection diagrams (TN, TT and IT regimes).

It contains 2 working faces:
- one face to study the TN and TT regimes
- one face to study the IT regime.

Each face includes:
- a distribution architecture diagram on each side
- three single- or 3-phase receivers (represented diagrammatically and simulated by charges installed in the bottom of the bench)
- protection by thermal magnetic or differential circuit breakers
- differential switches and contactors
- power resistors in the base of the bench connected to safety sockets
- a set of flexes with safety plugs
- a permanent insulation monitor for IT status (TR22 or XM200).

The permanent insulation monitor is used to measure overall mains resistance and earth capacity.

In version XM200, XD301 sensors built into the structure are used to detect faults automatically.

Electrical and mechanical data
- Power supply: 400 V (3-phase +N+ ground) / <4 kVA
- Size (H x W x D) - weight: 1950 x 700 x 600 mm - 152 kg

Main industry
- Electrical engineering

Other industries
- Civil engineering
- Mechanical engineering

Version TR22 has an optional kit with clips-on ammeter, an XGR leakage current generator and an XRM receiver to complete fault study and detection.

Search kit
Bench XM200 IT face
Bench TT TN face

To order
MDG99603: version XM200
MDG99605: version TR22
MDG99609: fault search kit for TR22
Teaching objectives
- To understand how thermal magnetic circuit-breakers work (tripping curves and breaking capacity)
- To implement discrimination between upstream and downstream protection
- To understand the causes and effects of short-circuit currents

Package description
The training bench for studying discrimination between protective devices in low voltage distribution systems demonstrates the notions of current and time discrimination.
It promotes understanding of:
- how to use an adjustable residual current relay with separate current transformer
- the causes and effects of short-circuit currents, how to calculate them and select the appropriate protection
- the operating principles and characteristics of a thermal magnetic circuit-breaker
- using and tracing a tripping curve for a given rating
- the simulation of situations of total discrimination, partial discrimination and non-discrimination
- the study of the notions of discrimination on 2 or 3 stages and their consequences and effects on an installation
- the choice of earth fault loop impedance by induction coils of controllable values
- the simplified presentation of breaking by a very low voltage electric arc and limitation of short-circuit current.

Electrical and mechanical data
- Power supply: 230 V single phase + E / <3.2 kVA
- Size (H x W x D) - weight: 1950 x 700 x 700 mm - 150 kg

Main industry
- Electrical engineering

Other industries
- Civil engineering
- Mechanical engineering

The bench is mounted on castors and comprises:
- two independent work surfaces to study current discrimination on one and time discrimination on the other
- circuit breakers with various tripping curves (B, C or D)
- a set of safety cables
- a lower part comprising two 220 V / 48 V isolation transformers allowing the faces to be supplied separately and to limit the energy involved when provoking the faults needed for the study
- a set of self-induction coils, the impedances of which are calculated for current discrimination
- a rheostat to make a fault current flow for time discrimination
- a safety device to open the protection panels.

To order
MDG99610: discrimination bench
Teaching objectives
- To undertake practical exercises relating to tasks requiring electrical skills and complying with UTE C 18-510 regulations
- To understand the problems of padlocking in industrial systems
- To carry out maintenance and repair operations in the electrical cabinet
- To study an industrial system

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Habilis system

Teaching objectives

- To undertake practical exercises relating to tasks requiring electrical skills and complying with UTE C 18-510 regulations
- To understand the problems of padlocking in industrial systems
- To carry out maintenance and repair operations in the electrical cabinet
- To study an industrial system

Package description

This industrial equipment is designed for applying the regulations, procedures and work methods to qualify for a certificate in electrical hazards skills in compliance with European Community regulations.

Based on an industrial kneader model, the equipment is used to study a typical technical system in the food industry implementing a process which may require uninterrupted operation.

Main cabinet with control box

Mounted on an aluminium rail structure with wheels and stabiliser feet, it includes:
- externally controlled padlocking isolator, padlocking circuit breaker
- power distribution by busbars protected by a removable screen
- 24 V AC control and signal circuits
- three padlocking starter units:
  - blade motor starter (Altivar speed controller backed up by a single-phase UPS)
  - cover motor starter (reversing contactor)
  - heating starter unit, a free slot for fitting and cabling a supplementary circuit.
- freestanding for mounting and wiring an extra circuit.

Kneader operating section

This small-scale industrial kneader is designed for maintenance operations (sensor adjustment, motor terminal verification) and develops a torque of 3.64Nm at full load.

The kneader includes:
- a device to open and close the tub lid
- a kneading blade
- heating by electrical elements
- sensors and detectors required for operation
- two 90 W motors, (blade rotation and lid opening).

PLC panel

This is equipped with:
- Magelis operator dialogue panel
- a TSX Micro (TSX37-22) or M340 PLC for kneader speed and ingredient heating cycle control.

NV and PPE kit

Optional kit with a multimeter (NV), padlocking device, beacon, tools and personal protection equipment (PPE) (gloves, face guard) to work in compliance with safety standards.

Electrical and mechanical data

- Power supply: 400 V DC 3-phase + N + ground / 1 kVA
- Size (H x W x D) - weight:
  - main cabinet: 2060 x 900 x 650 mm - 165 kg
  - operating section: 600 x 600 x 600 mm - 43 kg
  - PLC panel: 1150 x 340 x 430 mm - 15 kg

Main industry
- Electrical engineering

Other industry
- Mechanical engineering

Enclosure

To order

- MD1AA513: cabinet and control box
- MD1AA514: kneader operating section
- MD1AA516: TSX Micro control desk
- MD1AA518: NV and PPE kit
- MD1AA516MR: M340 control desk
### Valhabilis: electrical skills awareness kit

#### Teaching objectives
- To identify electrical hazards
- To be trained in B0V, B1V service operations
- To study the electrical energy circuit

#### Electrcaal and mechanical data
- **Power supply:** 230 V single phase + E/ <50 VA
- **Size (H x W x D) - weight:**
  - Distribution case: 450 x 390 x 310 mm - 10 kg
  - Motor case: 450 x 390 x 310 mm - 13 kg

#### Main industry
- Mechanical engineering

#### Other industries
- Civil engineering
- Electrical engineering
- Industrial technology

#### Package description
Valhabilis covers the concepts of electrical hazards for students studying non-electrotechnical subjects. This equipment includes two complementary kits, representing an electrical installation in an equipment room.

The “skills training” approach allows the following service operations to be carried out:
- a non-electric operation in the vicinity of live parts
- a connection in the vicinity of live parts
- adjustment, measuring and replacement operations
- a service operation following a fault on a control and power circuit
- commissioning of equipment.

The “electrical distribution” kit contains a small switchboard powering standard for measuring and connection work.

The “motor” kit, designed to be connected to the first kit, is used to work on a motor starter unit (e.g. installing a fan) to check and maintain the electrical circuit in compliance with relevant standards.

An optional pack is available with a safety voltage tester, isolation equipment and personal protection equipment (PPE), including gloves and a safety visor, to ensure that service operations are carried out in compliance with safety standards.

#### To order
- MD1AA630: Valhabilis
- MD1AA639: Safety voltage tester and PPE kit
- MD1AG630: Valhabilis with safety voltage tester and PPE kit
Electrical installation
# Electrical installation

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</tbody>
</table>

Products comply with European Directives

Compliance report provided on request

All our products include:
- hard copy of the technical manual and practical exercise book,
- CD with the same documents in a PDF format and the PLC applications.
### Residential and small service industry pack offer

#### Teaching objectives
- To study and install the components of a domestic and small service industry electrical installation.

#### Electrical and mechanical data
- **Power supply:** 230 V 50 Hz / < 15 A
- **Dimensions of storage boxes** (H x W x D) - weight: 470 x 430 x 250 mm - 20 kg

#### Main industry
- Civil engineering

#### Other industry
- Electrical engineering

### Presentation of the entire modular offer

The residential and small service industry modular offer allows you to study and install the components of an electrical installation for the residential and small service industry.

The offer contains the most commonly used products in the home, adapted for training purposes in box kit form.

Three different training kits are available for learning and using the main functions encountered when building electrical installations.

These kits are of increasing complexity and complement each other:
- The first kit allows you to create the functions encountered in 1 or 2-room housing
- The second kit, made up of products supplementary to the first, is used to demonstrate the functions encountered in 3-4 room housing
- The third kit, also made up of products supplementary to the first two, covers the main functions encountered in a small service industry building.

### Description of the offer

<table>
<thead>
<tr>
<th>Description</th>
<th>T1 / T2</th>
<th>T3 / T4</th>
<th>small service industry</th>
<th>reference</th>
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<tbody>
<tr>
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<td>Alcyon single pushbutton - ALB74030</td>
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<tr>
<td>15 W bulb holder module</td>
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<td>5</td>
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<tr>
<td>support frame</td>
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<td>1</td>
<td>1</td>
<td>MD1AM000</td>
</tr>
</tbody>
</table>

For ease of use, each component is built into a box where each connection is made using safety sockets.
Residential and small service industry pack offer

Presentation of the pack contents
This pack is designed for studying, installing and wiring the components of an electrical installation for the residential and small service industry.

<table>
<thead>
<tr>
<th>quantity</th>
<th>description</th>
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<tr>
<td>1</td>
<td>Opale switchboard for circuit breaker</td>
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<tr>
<td>1</td>
<td>Opale switchboard with 3 rows of 13 modules</td>
<td>13403</td>
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<td>1</td>
<td>incoming circuit breaker</td>
<td>13120</td>
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<tr>
<td>1</td>
<td>tariff meter</td>
<td>C 1000</td>
</tr>
<tr>
<td>5</td>
<td>10 A circuit breaker</td>
<td>20725</td>
</tr>
<tr>
<td>6</td>
<td>16 A circuit breaker</td>
<td>20726</td>
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<tr>
<td>4</td>
<td>30 mA, 16 A residual current circuit breaker</td>
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<td>2</td>
<td>30mA, 20 A residual current circuit breaker</td>
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<td>1</td>
<td>16 A, 230 V AC impulse relay with built-in function</td>
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<tr>
<td>1</td>
<td>impulse relay</td>
<td>15510</td>
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<tr>
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<td>25 A 2-pole contactor</td>
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<td>2</td>
<td>time-delay switch</td>
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<td>switch-off warning</td>
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<td>light-sensitive switch</td>
<td>16652</td>
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<tr>
<td>1</td>
<td>load-shedding device</td>
<td>15908</td>
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<tr>
<td>7</td>
<td>Alombard 2-way switch</td>
<td>ALB74020</td>
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<td>6</td>
<td>Alombard pushbutton</td>
<td>ALB74030</td>
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<tr>
<td>3</td>
<td>Alombard illuminated pushbutton</td>
<td>ALB74035</td>
</tr>
<tr>
<td>1</td>
<td>Alombard double pushbutton</td>
<td>ALB74080</td>
</tr>
<tr>
<td>6</td>
<td>Alombard socket 2P + E 10/16 A</td>
<td>ALB74200</td>
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<tr>
<td>50</td>
<td>Alombard blue flush-mounting box</td>
<td>ALB71320</td>
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<td>10</td>
<td>Alombard central socket box kit</td>
<td>ALB71837</td>
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<tr>
<td>10</td>
<td>E27 plug socket</td>
<td>ALB88010</td>
</tr>
</tbody>
</table>

To order
MDG99120: residential and small service industry pack
MD1AM6121: 1 to 2-room housing training kit with support frame
MD1AM6122: 3 to 4-room training kit with support frame
MD1AM6123: small service industry kit with support frame
MD1AM6126: all kits MD1AM6121 to MD1AM6123
### Teaching objectives
- To analyse the functions and principles of a home automation installation on Konnex bus
- To wire the components
- To configure the system based on different scenarios

### Electrical and mechanical data
- **Power supply:** 230 V single phase + E / 200 VA
- **Size (H x W x D) - weight:** 780 x 650 x 1200 mm - 50 kg

### Main industries
- Electrotechnical engineering, energy, home automation

### Other industry
- Electronics

### Package description
The KNX bench and kits are used to demonstrate the latest intelligent home solutions:
- building management
- utility management and control.

The kits are made up of the most currently used KNX products. These components are adapted for training purposes in box kit form installed on an aluminium rail.

The products included in the kit are used to perform functions such as:
- control of roller blinds
- control and dimming of lighting
- control of actuators from pushbuttons.

### Products comprising the basic bench MD1AM3BA

<table>
<thead>
<tr>
<th>Description</th>
<th>bespoke reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>bus power supply module</td>
<td>MD1AM3 001</td>
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<tr>
<td>system coupler module</td>
<td>MD1AM3 002</td>
</tr>
<tr>
<td>switch actuator module with 4 outputs</td>
<td>MD1AM3 003</td>
</tr>
<tr>
<td>module with 4 binary inputs 230 V</td>
<td>MD1AM3 004</td>
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<tr>
<td>dimming actuator module</td>
<td>MD1AM3 005</td>
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<tr>
<td>programmable timer module</td>
<td>MD1AM3 006</td>
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<td>USB interface module</td>
<td>MD1AM3 007</td>
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<td>roller blind actuator module</td>
<td>MD1AM3 008</td>
</tr>
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<td>Artec dual control module for white roller blind</td>
<td>MD1AM3 009</td>
</tr>
<tr>
<td>Artec 8-key multifunctional module with IR + faceplate</td>
<td>MD1AM3 010</td>
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<tr>
<td>Artec 4-key multifunctional module + faceplate</td>
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<tr>
<td>transcent touch-sensitive control module</td>
<td>MD1AM3 012</td>
</tr>
<tr>
<td>complete movement detector module + faceplate</td>
<td>MD1AM3 013</td>
</tr>
<tr>
<td>interior presence detector module</td>
<td>MD1AM3 014</td>
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<tr>
<td>module with 2 binary inputs</td>
<td>MD1AM3 015</td>
</tr>
<tr>
<td>support frame</td>
<td>MD1AM 000</td>
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<tr>
<td>two 15 W bulb holders</td>
<td>MD1AMP 004</td>
</tr>
<tr>
<td>electric roller blind</td>
<td>MD1AMP 007</td>
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<tr>
<td>single-phase protection module</td>
<td>MD1AM2 001</td>
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<td>USB2 programming cable</td>
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<tr>
<td>ETS Pro software</td>
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</tr>
<tr>
<td>five ETS Trainee licences</td>
<td></td>
</tr>
</tbody>
</table>

**Other modules, not included in the basic bench, are also available.**

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All these elements are interconnected by the Konnex bus which complies with the international ISO/IEC 14543-3 standard. Functions are configured using ETS 3 software (included in the kit) installed on a PC. This equipment is designed for studying and installing KNX products.
# Fire safety system

## Teaching objectives
- To study how a fire safety system works
- To find out about and install the components of a fire safety system

## Electrical and mechanical data
- **Power supply:** 230 V AC + E
- **Size (H x W x D) - weight:** 1800 x 1000 x 600 mm – 120 kg approx.

## Main industries
- Electrical engineering
- Energy engineering

## Package description
The fire safety system control bench is a chassis mounted on castors, it includes:
- an enclosed 127-point addressable control centre with alarm management unit
- a central unit for fire safety settings
- a splitter box control panel with LCD screen
- an interactive, addressable, optical smoke detector
- an interactive, addressable thermo-velocimetric heat sensor
- two addressable, manual releases
- an action indicator
- a sound diffuser
- an electromagnetic release
- a smoke detector test gas cannister
- a kit comprising holder, pushbuttons and safety devices needed for it to operate properly.

The products are installed on a workspace equipped with safety sockets and are ready to use. Operations on this bench are performed in total safety due to the exclusive use of safety cables for establishing connections.

This bench is used to:
- signal data from the automatic sensors and manual releases
- locate the start of the fire
- trigger sound diffusers
- halt the broadcasting process in the case of unjustified triggering
- operate in restricted standby mode.

## To order
MDG99130A: Fire safety system

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Educational solutions catalogue 2010-2011

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Containment cabinet

Teaching objectives
- To run electrical tests without coming into contact with live parts
- To implement an electromagnetic equipment in a safe environment

Electrical and mechanical data
- Power supply: 400 V 3-phase + N + ground
- Size (H x W x D) - weight: 1470 x 700 x 350 mm - 70 kg

Main industry
- Electrical engineering

Package description
An indispensable feature in equipment prototypes and production electrical engineering workshops, this cabinet is used for trainees to power equipments with all the requisite protection devices as per the recommendations in documents on “tests and work in live voltage areas”.

This equipment offers the following functions:
- Electrical assembly test voltages only live if the cabinet door is closed (400 V and 24 V)
- Lock switch for maintenance operations by authorised staff allowing for live voltage when the door is open
- Removable protection and control unit
- Trainee plate powering by safety terminals
- Trainee quick panel connections
- Exterior connections by safety terminals (2 motor outputs).

The containment cabinet is supplied with:
- 4 Telequick plates, reference AM3PA86
- 4 PVC plates, sizes: 295 x 200 x 3 mm
- 24 withdrawable terminals, 5-pole, female, reference AB1BD533
- A technical notice, reference MD1AD685T.

To order
MD1AA685: containment cabinet with 4 sets of telequick plates and plug-in connectors
Industrial component wiring bench

### Teaching objectives
- To install the electromechanical plate in a safety environment
- To link the plate to an operational part
- To conduct tests in complete safety

### Package description
This bench is made up of a mobile monobloc structure designed to receive a control baseplate built by the trainee, which will then be connected to be linked to various operational parts (compressor unit, fan, pneumatic cylinders) using industrial connectors.

The lower part receives the pre-wired operational parts. An electrical testing cabinet is mounted on the top part to accommodate the plates and establish the connections with the actuators.

The rear part of the structure is designed to accommodate plate-mounted equipment in order to be able to complete the range of actuators with which you want to work.

The test cabinet, equipped with a transparent door, is also pre-equipped with buttons, indicators and switches for controlling the plates built by the trainees. Operation of the enclosed equipment will be done according to the relevant requirements relative to live apparatus.

The bench includes an optional hardware kit for building a control plate.

This kit comprises the following components:
- telequick plate
- contactors
- thermal overload relay
- circuit breakers
- disconnect switch
- cylinders
- valves
- electrical and pneumatic wiring accessories.

### Electrical and mechanical data
- **Power supply**: 400 V triple phase + N + E / <2.2 kVA
- **Size (H x W x D) - weight**: 1900 x 1050 x 750 mm - 140 kg
- **Test cabinet: size (H x W x D)**: 1000 x 800 x 300 mm

### Main industry
- Electrical engineering

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To order
MD1AA200: IC wiring bench
MD1AA209: plate kit for wiring
Energy control
Energy control

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Products comply with European Directives
Compliance report provided on request

All our products include:
• hard copy of the technical manual and practical exercise book,
• CD with the same documents in a PDF format and the PLC applications.
Motor starter packs

Teaching objectives
- To study and work out motor starter unit diagrams
- To understand the gear and differences in implementation
- To build power control equipment

Electrical and mechanical data
- Power supply:
  - rated power of motor (not included): 1.5 kW
  - remote-control circuit voltage: 24 V AC, 50 Hz
  - rated voltage of power circuits: 400 V 3-phase + N + ground 50 Hz
- Size (H x W x D) - weight:
  - 400 x 600 x 800 mm - 15 kg

Main industry
- Electrical engineering

Other industries
- Mechanical engineering
- Industrial technology

Package description
Electromechanical trainees use this package to design, mount, wire and repair power control equipment.
The electromechanical and electronic parts are used to study the functions relative to:
- isolation and disconnection
- control and switching
- short circuit protection
- overload protection.

The basic pack includes:
- a kit with plate and wiring parts
- a 24 V AC power supply kit
- a set of protections and contactors for:
  - direct on line starter, reversing starter
  - 1 or 2-way star delta starter.

The additional TeSys U pack includes:
- a kit to build an integrated, modular light-implementation direct on line starter and reversing starter.

The additional speed controller pack includes:
- an Altivar speed controller
- a soft starter
- power Suite software.

To order
MD1AA740: basic set
MD1AA740T: additional TeSys U set
MD1AA740V: additional speed controller set
Motor starter modular offer

Teaching objectives
- To discover the variable speed drive
- To study and create the various motor starter diagrams
- To get to know the equipment and the differences in implementation
- To build power control equipment

Electrical and mechanical data
- Power supply:
  - motor nominal power: 0.18 kW, 230/400 V
  - control circuits voltage: 24 V DC
  - power circuits voltage: 230 or 400 V AC three phase
- Size (H x W x D): structure: 1030 x 400 x 910 mm - 6.5 kg
  module: 70 x 150 x 245 mm - 0.7 kg approx.
- Main industry:
  - Electrical engineering

Package description
The motor starter modular offer is used for installing the components of a power control device.
The bench and kits are designed for studying and installing the products used for the electromechanical or electronic control of motor starters.
The bench includes the most frequently used products in box kit form for training purposes.
Two different training kits are available for learning and using the main functions encountered in building of electrical power control installations.

The motor starter discovery kit, reference MD1AMLDM contains:

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<tr>
<th>quantity</th>
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<th>reference</th>
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<td>magnetic circuit breaker module</td>
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<td>thermal magnetic circuit-breaker module</td>
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<td>switch disconnector module</td>
<td>MD1AM1005</td>
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<td>fused (off-load) isolator module</td>
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</tr>
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<td>1</td>
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The Altivar 312 discovery kit, reference MD1AMLATV312 contains:

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<td>drive control module</td>
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<tr>
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<td>230/400 V, 0.18 kW asynchronous motor</td>
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</tr>
<tr>
<td>1</td>
<td>support frame</td>
<td>MD1AM000</td>
</tr>
</tbody>
</table>

The customisable module offer solution allows you to build your own configuration.

To order
MD1AMLDM: motor starter modular offer
MD1AMLATV312: Altivar 312 discovery modular offer
Training drives

**Teaching objectives**
- To discover the basic principles of a variable speed drive
- To study and operate a variable speed drive
- To control three-phase asynchronous motors
- To operate the display terminal and the drive functions (display, adjustment, configuration, etc.)

**Package description**
The training drives are used to carry out, in complete safety, the operations necessary to set up an asynchronous motor, where there is a need to vary the operating speed.

The training drives exist in two versions:
- A basic Altivar 312 version
- A more advanced Altivar 71 version.

Both of these training drives can be connected to the Controller Inside bench, reference MD1AA585.

**Electrical and mechanical data**
- **Power supply:** 240 V AC single or three-phase or 400 V AC three-phase
- **Size (H x W x D) - weight:** 430 x 400 x 250 mm - 8 kg

**Main industry**
- Electrical engineering

**Other industries**
- Mechanical engineering
- Industrial engineering and maintenance

Drive enclosure

**Teaching objectives**
- To discover the basic principles of a variable speed drive
- To study and operate a variable speed drive
- To control three-phase asynchronous motors
- To operate the display terminal and the drive functions (display, adjustment, configuration, etc.)

**Package description**
The Altivar 312 enclosure is used to carry out the operations necessary to set up a drive connected to an asynchronous motor in complete safety. Its is designed with all the control, power and monitoring points connected to safety sockets for ease of use.

There are two diagrams on the front panel of the enclosure, one showing the internal operation of the drive and the other representing the motor used. The measurement points are available as safety sockets on these diagrams. All the control circuit connection points are linked to safety sockets on the enclosure door.

The diagram incorporates the drive control elements (switches, potentiometer and indicators). The kit also includes safety sockets to connect the three-phase motor of an operational part.

**Electrical and mechanical data**
- **Power supply:** 400 V AC three phase + N + E
- **Size (H x W x D) - weight:** 550 x 450 x 250 mm - 15 kg

**Main industry**
- Electrical engineering

**Other industries**
- Mechanical engineering
- Industrial engineering and maintenance

**To order**
- MD1AA31W03M2: Altivar 312 training version, 0.37 kW, 240 V AC single-phase
- MD1AA31W15N4: Altivar 312 training version, 1.5 kW, 400 V AC three-phase
- MD1AA71W03M3: Altivar 71 training version, 0.37 kW, 240 V AC three-phase
- MD1AA71W15N4: Altivar 71 training version, 1.5 kW, 400 V AC three-phase

Different ratings available on request.

**To order**
- MD1AA585: Altivar 312 enclosure, 1.5 kW, 400 V AC three-phase
Teaching objectives

- To discover the asynchronous electric motor
- To study the load current and power
- To install and connect the various protection and control components

Electrical and mechanical data

- **Power supply:**
  - 230/400 or 400/690 V AC
  - 180 W or 750 W depending on model
- **Size (H x W x D) - weight:**
  - model on castors: 465 x 465 x 750 mm - 35 kg
  - tabletop model: 500 x 290 x 400 mm - 20 kg
  - plinth-mounted model: 250 x 390 x 205 mm - 7 kg

Main industry

- Electrical engineering

Other industries

- Mechanical engineering
- Industrial engineering and maintenance

Package description

The training motors simulate an electro-mechanical device (blower fan, electric pump, hoisting winch, etc.).

Three models are available:

- a model on castors equipped with a 230/400 V three-phase motor with a power rating of 750 W, which offers the advantage of a conventional connection at a three-phase voltage of 230 V for a drive powered with 230 V single-phase, for example
- a tabletop model equipped with a 400/690 V three-phase motor with a power rating of 750 W, which allows a star-delta starting from a mains voltage of 400 V.

Both of these two models include an asynchronous electric motor connected to a powder brake for varying the motor torque. These motors can be used in combination with any training equipment requiring a load (e.g. motor starter kits, training drive, TeSys U case, etc.). The powder brake is connected to the electric motor by a mechanical coupling. When voltage is applied to this brake, the motor torque varies as a result.

- a base mounted model including a 180 W - 230/400 V AC asynchronous motor.

This model is particularly well suited to the motor starter modular offer.

To order

- MD1AA529: 0.75 W, 230/400 V training motor
- MD1AA529LT: 0.75 W, 400/690 V training motor
- MD1AMP001: 0.18 W, 230/400 V training motor

0.18 kW motor

0.75 kW LT motor

0.75 kW motor
Motor starter bench

Teaching objectives
- To study typical diagrams of electromechanical and electronic motor starters
- To combine power control components
- To measure the circuit voltages and currents
- To calculate torque, power and energy
- To study protection

Electrical and mechanical data
- Power supply: 400 V triple phase + N + E / 2 kVA
- Size (H x W x D) - weight: 1950 x 700 x 700 mm - 190 kg

Main industry
- Electrical engineering

Other industries
- Mechanical engineering
- Industrial technology

Package description
This bench allows motor starters to be studied chronologically:
- Implementation of the most common diagrams:
  - DOL starting
  - Star-delta starting
  - Reversing starting
  - Starting with electronic starter.
- Combining power control components:
  - Switch
  - Isolator
  - Contactor
  - Thermal overload relay
  - Compact Tesys U starter.
- Measurement of circuit voltages and currents
- Calculation of torque, power and energy

The motor starter bench includes:
- Two autonomous and independent work panels with industrial components connected to safety sockets
- One panel for analysing and connecting the power circuit
- One panel for analysing and connecting the power and control circuit
- A plinth with 2 units (230 V AC - 185 W motor / 190 V DC - 280 W generator)
- Two adjustable load rheostats
- A voltmeter to measure the voltage at each point of the circuit
- Ammeters for each motor phase and for the load
- Wiring accessories compliant with safety standards

Motor starters are built using the following types of component:
- Basic function components, such as the Vario switch, LS1D isolator, LC1 / LC2 contactors, class 10 LRD thermal overload relay
- Components with multiple or integrated functions, such as the GV2 circuit breaker, Integral 18, TeSys U motor starter or ATS01 starter.

To order
MD1AA540: motor starter bench

Manual panel

Automatic panel
Altivar speed controller training bench

Teaching objectives
- To control asynchronous motors
- To learn the speed controller operating principle
- To learn the main speed controller settings

Package description
An Altivar educational bench makes it possible to learn the control of asynchronous motors, discover the basic principles of a variable speed drive, the variable speed drive operation, standard controls and cabling of the motor section and control section.

The aluminium bench is designed to study and learn safely the basics of an electronic speed controller.

It includes:
- an Altivar 312 variable speed drive or equivalent
- a diagram with test and testing sockets (supply voltage, internal voltage, motor voltage, current, speed)
- a 0.37 kW asynchronous motor connected to a powder brake
- a powder brake coupling allowing various levels of load to be defined
- a set of flexes.

The working diagram shows how to connect to the safety sockets:
- the control and signalling sequence
- the speed controller inputs/outputs
- the motor terminals.

The general control and protection sequences are pre-wired.

Electrical and mechanical data
- Power supply: 230 V single phase + ground / 0.4 kVA
- Size (H x W x D) - weight: 480 x 790 x 450 mm - 42 kg

Main industry
- Electrical engineering

Other industries
- Mechanical engineering
- Industrial technology

To order
MD1AA580FP: Altivar training variable speed drive bench
### Powder brake speed controller bench

#### Teaching objectives
- To drive an asynchronous motor with a frequency converter
- Commision speed controller
- To study thermal protection
- To study torque/speed laws by simulating different loads
- Behaviour in the braking phase

#### Electrical and mechanical data
- **Power supply:**
  - 400 V 3-phase + N + ground / 2 kVA
- **Size (H x W x D) - weight:**
  - 1500 x 630 x 680 mm - 143 kg

#### Main industry
- Electrical engineering

#### Package description
The bench is designed to study an asynchronous motor drive solution by simulating constant, proportional and quadratic-torque loads, which correspond to various load types (pump, fan, hoisting etc.).

**It includes:**
- a 1.5 kW asynchronous motor with an inertia wheel
- an Altivar (ATV71U15N4 or equivalent) with braking resistance
- a fan cooled FRAT650 powder brake load system
- a TSX Micro PLC to simulate different types of loads
- a speed controller control sequence (selection switches and signalling lamps)
- testing safety sockets to take data readings:
  - mains voltage and current
  - motor voltage and current
  - motor temperature (PT100 probe)
  - speed feedback voltage
  - powder brake torque.

There is also a switch to simulate simple breakdowns to use the Altivar diagnostic data.

To order
**MD1AA570:** Altivar bench with powder brake
Teaching objectives
- To study the behaviour of a hoisting system controlled by a variable speed drive
- To set up and control the system
- To demonstrate drive performance
- To study the mechanics of the starting and braking phases

Package description
The product is adapted from a hoisting system manufactured by “Ledent Machines Equipements”. The winch hoisting system evaluates the behaviour of an asynchronous motor when hoisting a suspended load of between 0 and 150 kg. It is designed for studying a hoisting solution controlled by a variable speed drive with flux vector control. The maximum speed of movement is 30 m/mm.

The system can be equipped with one of the two following options:

Load sensor option
Measures the overload or bounce forces using sensors mounted on the articulated support frame of the motorised winch unit. The load measurement data can also be used by the drive to calculate the necessary motor torque (for lift and docking applications).

DOL starting option
Compares DOL starting with a variable speed drive solution. For safety reasons, the load sensors are replaced by dampers. A third, pulley system option allows the hoisting measurement time to be extended for clearer analysis of the system's position control performance. The system may be connected to an external PLC.

Characteristics of the operational part:
- crane chassis - overall height 2.4 m
- a 1.4 x 1.4 m ballast tray
- an articulated motor support frame
- a 1.5 kW 1500 rpm, 400 V three-phase brake speed reducer equipped with force-ventilated 1024 point encoder with PTC probes
- a reversible winch drum
- a 150 kg capacity cable with safety hook
- an upper and lower limit switch system
- an incremental 100-point encoder to control the speed and positioning of the load
- an automatic damper basket with a capacity of 7 dumbbells of 20 kg
- a Makrolon protective cubicle with electrical safety catch.

Characteristics of the control part:
The enclosure comprises:
- a lateral operation and measurement panel (internal, load)
- a white/green signalling beacon
- the electro-mechanical components of the safety loop
- an Altivar 71 - 1.5 kW variable speed drive and its braking resistor
- a key-operated lower limit switch shunt, inside the enclosure
- a key-operated enclosure opening contact
- a key-operated release contact
- a slot for the local control option (excluding weighing)
- a torque load measurement display
- a manual raise/lower control
- a speed reference.

This equipment is designed and manufactured in compliance with hoisting standards and directives.

To order
- MD1AA400P15: 1.5 kW hoisting system
- MD1AA409CC: hoisting system with load sensor option
- MD1AA409DD: hoisting system with DOL starting option
- MD1AA409MF: hoisting system with pulley system option

Options are to be specified at the time of order.
Energy efficiency
Energy efficiency

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Products comply with European Directives
Compliance report provided on request
All our products include:
- hard copy of the technical manual and practical exercise book,
- CD with the same documents in a PDF format and the PLC applications.
RSSI energy efficiency modular offer

Teaching objectives
- To learn the concepts of energy efficiency
- To optimise energy consumption by using the most suitable products

Electrical and mechanical data
- Power supply: 240 V AC
- Dimensions of storage boxes (H x W x D) - weight:
  470 x 430 x 250 mm - 20 kg

Main industries
- Electrical engineering
- Civil engineering

Package description
The RSSI energy efficiency modular offer allows you to study and install the components of an electrical installation for the residential and small service industry.

The aspects of energy saving and energy management are covered by using products such as programmers, light sensitive switches, time-delay switches and timers.

The offer includes the most commonly used products in the home, adapted for training purposes in box kit form.

The RSSI energy efficiency modular offer contains three training kits designed to enable trainees to discover, learn and use the main functions encountered when building electrical installations in residential and small service industry premises (see RSSI modular offer and pack in the Electrical Installation chapter).

This offer can be customised by acquiring modules separately.

Load shedding module
Programmable timer module
Light-sensitive switch module

To order
MD1AM6126: energy efficiency modular offer
Teaching objectives

● To understand the concepts of energy efficiency through the KNX bus
● To optimise energy consumption by using the most suitable products
● To control lighting and heating automatically

Package description

The KNX energy efficiency modular offer allows you to study and install the components of an electrical installation for buildings and the small service industry, while taking account of the energy saving and energy management aspects covered by using components on the KNX bus.

The bench and kits are designed for studying and building installation where KNX solutions demonstrate:

● achievement of energy savings
● optimised comfort for the occupant
● a satisfactory level of lighting for the user
● an optimised temperature level but which can be changed by the user
● an optimised and automatic use of solar gains.

The MD1AM3BA energy efficiency modular offer includes the following modules:

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<th>quantity</th>
<th>description</th>
<th>bespoke reference</th>
</tr>
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<tr>
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<td>bus power supply module</td>
<td>MD1AM3 001</td>
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<tr>
<td>1</td>
<td>system coupler module</td>
<td>MD1AM3 002</td>
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<td>switch actuator module with 4 outputs</td>
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<td>module with 4 binary inputs 230 V</td>
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<td>programmable timer module</td>
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<td>USB interface module</td>
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<td>roller blind actuator module</td>
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</table>

This offer can be customised by acquiring modules separately (see page 26).
Energy efficiency ventilation case

Teaching objectives
- To demonstrate an energy efficiency solution
- To configure a variable speed drive
- To use a power meter

Electrical and mechanical data
- Power supply: 240 V AC single phase
- Size (H x W x D) - weight: 700 x 500 x 350 mm - 20 kg

Main industries
- Electrical engineering
- Civil engineering

Other industries
- Mechanical engineering
- Industrial engineering and maintenance

Package description
This case allows the energy savings achieved with a variable speed drive in a pumping and ventilation installation to be demonstrated.

The energy efficiency ventilation case allows:
- Comparison of power consumptions
- Energy measurement
- Flow control by vanes
- Flow control by variable speed
- Drive configuration
- Visualisation of the flow by a ball in a transparent tube
- Analysis of the advantages of variable speed compared with a conventional solution.

The case includes:
- A 0.18 kW fan
- A circuit breaker - contactor DOL starter
- Starter via Altivar 312, 0.18 kW, single-phase
- A direct/variable speed switch
- A PM9 power meter
- A flow indicator
- Measurement points on safety sockets to provide the following information:
  - Mains voltage and current
  - Motor voltage and current.

To order
MD1ATVEE: energy efficiency case
Teaching objectives

- To discover and use the specific features of an Altivar for the ventilation application
- To configure and set the Altivar speed controller
- To compare the energy consumptions

Package description

The educational equipment of the ventilation bench allows you to install and study a motorised fan supplied by direct starting or a variable speed drive. The Altivar 21 or 61 controller is a frequency converter for three-phase asynchronous motors dedicated to the most common fluid management applications in industrial and tertiary buildings: ventilation, air-conditioning and pumping. Altivar reduces building operating costs by optimising energy consumption, while also enhancing user comfort.

Functions:
- energy saving law, quadratic law
- automatic compensation with speed search
- adaptation of current limitation as a function of speed
- elimination of noise and resonance by means of chopping frequency, adjustable as per rating up to 16 kHz in operation and at random modulation
- energy and operating time counter
- detection of fluid absence and zero flow rate, flow rate limitation.

Various topics that can be covered around a ventilation bench are:
- study and installation of Altivar 21 or Altivar 61 variable speed drive
- control of the ethernet communication variable speed drive
- comparing the energy consumption between a local control or by a variable speed drive
- approach to economic data through the ECO8 software
- study of the properties of a centrifuge fan
- measuring and calibrating measuring equipment
- checking the levels of EMC of the installation.

Electrical and mechanical data

- Power supply: 400 V 3Ph + N + ground / 0.75 kW
- Size (H x W x D) - weight: 2500 x 1200 x 850 mm - 185 kg

Main industry

- Electrotechnical engineering

Other industry

- Industrial technology

To order

MD1AA750A2: bench with Altivar 21
MD1AA750A6: bench with Altivar 61

This system is equipped with a motorised fan of a power of 0.75 kW that creates an air movement via a ventilation duct. The motorised fan is managed by:
- direct power supply with air flow management by a manual valve
- by an Altivar 21 or 61 speed controller, adapting speed to reach the required air flow rate at the duct outlet.

A measurement device is used to compare the flow rates and the power consumed, so as to evaluate the performance obtained with these two control types.
Solar modular offer

Teaching objectives
- To find out the basics of energy production by solar panels
- To discover and identify the components

Electrical and mechanical data
- Power size (H x W x D) - weight:
  - 70 x 150 x 245 mm - 0.7 kg approx.

Main industries
- Electrical engineering
- Civil engineering

Package description
The solar modular offer allows you to understand the production of energy by solar panels.

This kit includes the following modules:
- one meter module with a voltmeter and an ammeter
- a charge regulator module equipped with two indicators (green battery charged, red battery charging)
- a 12 V, 2.3 Ah battery module protected by two 4 A fuses
- a converter module (inverter) 12 V DC, 230 V AC, 60 W
- a 30 x 33 cm solar panel with a power of 5.2 W
- a 15 W bulb holder module
- a support frame.

The various topics that can be covered are:
- identification of the equipment
- analysis, size and installation of solar panels
- the characteristics of a solar panel, depending on temperature, tilt angle and insolation etc.
- use of an inverter
- use of a regulator
- use of different methods for charging and discharging the battery.

To order
MD1AMLSOL: solar modular offer
(5 modules + solar panel + bracket structure)
Soleolis: solar panels and wind turbine

Teaching objectives
- To analyse the principles of energy management from the electrical production of solar panels or of a wind turbine
- To study the storage and usage principles of electrical energy

Package description
This product is intended primarily for technology diploma students and is used to discover energy production by solar panels or wind turbines. A solar panel with voltaic technology of a surface area of 1 m² recovers energy equivalent to 100 Watts. This is stored in a battery to supply a simple lighting system. This system is completed by a wind turbine body driven by an asynchronous motor to simulate wind energy production. A variable speed drive simulates various wind strengths for a maximum production of 350 Watts. However, it is possible to use the wind turbine with these blades outside. A small Twido automation system allows you to combine production either in islands (standalone operation) or via the mains electricity network.

The proposed teaching relies on:
- identification of the equipment
- the size of the solar installation
- calculation of damping
- connection to the grid
- management of battery safety
- measurement of autonomy.

The Soleolis bench is a frame made of aluminium mounting rails mounted on castors onto which the following equipment is fixed:
- two 12 V, 109 W multi-position solar panels mounted in series or a single 24 V, 110 W solar panel
- a wind turbine (without blade) connected to a motor to simulate the wind
- an electrical enclosure made of painted sheet metal which contains:
  - a set of batteries
  - an inverter
  - a Twido PLC
  - an Ethernet module
  - a Magelis operator interface terminal for controlling the system
  - protection and control elements.

Electrical and mechanical data
- Power supply: 230 V single-phase +E / 200 VA
- Size (H x W x D) - weight: 1320 x 770 x 1700 mm - 130 kg

Main industry
- Electrical engineering

Other industry
- Industrial engineering and maintenance

To order
MDG99215: Soleolis system

Educational solutions catalogue 2010-2011
**Solar water heater**

**Teaching objectives**
- To study an instrumented solar thermal hot water production system

**Electrical and mechanical data**
- **Power supply:**
  - 230 V, 50 Hz
- **Size (H x W x D) - weight:**
  - water heater: 1700 x 1750 x 1000 mm - 200 kg
  - solar panel: 1600 x 1850 x 1900 mm - 140 kg
  - lighting rail: 1200 x 1850 x 2300 mm - 120 kg

**Main industries**
- Energy engineering
- Electrical engineering

**Package description**

The solar water heating system is used to study an instrumented solar thermal hot water production system.

It covers:
- studying the electrical wiring and hydraulic circuits
- studying the commissioning and maintenance operations
- studying the control system
- the heat balances
- drawing up the energy saving reports
- the physical principles.

The solar hot water production system includes:
- a **solar panel frame** equipped with a flat 2.40 m² sensor tilted at a 45° angle with the possibility of varying the tilt from + 5° to - 15° on a tubular steel structure with braked castors
- a **hydraulic frame** on a tubular steel structure with braked castors including:
  - a 200 litre domestic hot water tank with double heat exchanger with 2 kW boost resistor
  - an electronic control system
  - a circulation module with expansion tank
  - an Internet acquisition and communication system
  - operating software.

The hot water production system is supplied with:
- set of 20 m long flexible hoses
- glycol and filling pump
- heat-transfer fluid.

**Option**

A lighting rail with a set of three 1500 W floodlights adapted to the solar water heating system:
- dimmer control of floodlights
- system protected by lockable wire mesh
- tubular steel structure 60 x 60 with 8 castors
- lifting system to go through door 1.40 m x 2.10 m.

---

**To order**

MD1AA775: solar water heater
MD1AA776: lighting rail for the solar water heater
**Teaching objectives**
- To use and program the control functions of a Premium PLC
- To understand and configure the operation of a control loop

**Package description**
The heating control bench is used to study a central heating system with control loops.

The operational part represents a reduced central heating system comprising:
- a 3-way motorised valve
- a variable speed pump (circulator)
- a heat exchanger (fan-cooled heatsink).

The control part includes a Premium PLC which provides all the control operations, an Altivar variable speed drive and all the associated electrical protection elements.

A graphic operator interface terminal is used to control and monitor the system.

An Ethernet connection allows you to connect a computer and control supervision remotely.

The system is configured to use one of the three following control loops:
- PID loop: central heating with internal temperature sensor (acting on the water flow)
- PID loop + servo: central heating with internal temperature sensor (acting on the three-way valve)
- PID loop: central heating with external temperature sensor and water ratio (acting on the three-way valve).

The system can be disturbed using a set of three motorised fans of variable speed.

**Electrical and mechanical data**
- **Power supply:** 230 V T / 2000 VA
- **Size (H x W x D) - weight:** 1800 x 1000 x 1000 mm - 120 kg

**Main industries**
- Electrical engineering
- Control and monitoring

To order
MD1AE895PR: heating control bench
Didalub: management of public lighting

Teaching objectives
- To discover and implement management and saving of energy
- To study the quality of the electrical network
- To study protection of people and equipment

Electrical and mechanical data
- **Power supply:** 230 V 1Ph + ground, 3.2 kVA
- **Size (H x W x D) - weight:**
  - cabinet: 1950 x 900 x 660 mm - 220 kg
  - enclosure: 810 x 700 x 360 mm - 50 kg

Main industries
- Electrotechnical professional university school
- Electrotechnical technical high school
- Energy and environment technical high school

Other industry
- All environmental and energy industries

The Didalub system is used to treat the following subjects:
- on-line voltage drop (depriming of lamps) and influence of cable cross-section and length
- energy management and savings
- lighting lamp technologies
- light flux setting (luxmeter)
- operation of protective devices (short-circuit, overloads, surge arrester)
- network quality: measurement of qualitative and quantitative energy consumption and supply in reduced and nominal mode upstream and downstream or directly.

Package description
The Didalub system is a device designed to reproduce management of the lighting of an urban zone and to study its electrical consumption and protective devices. The system is made up of a cabinet with various types of lamps and an enclosure incorporating the Lubio VRI type product with a power of 3 kVA, used to:
- start up lighting
- switch lighting on or off according to the geographical location of the site
- move progressively from normal lighting to economic lighting
- prepare a power balance and study energy metering to highlight energy savings.

The package is delivered as standard with:
- a software CD with interface
- 20 to 20 000 luxmeter.

The cabinet consists of a set of lamps representative of public lighting, namely a lighting column, high pressure sodium and metal iodide lamps. These lamps are installed in ramps with various cable lengths. Measurement points allow access to current and voltage information for the various lighting ramps.

To order
MDG99300: complete package cabinet + enclosure
MDG99309: Lubio enclosure support trolley
Reactive energy compensation

Teaching objectives
- To modify, identify and rectify the power factor in an installation
- To highlight and study the influence of:
  - harmonics phenomena on capacitors
  - inrush currents when capacitors are switched on
- To implement suitable solutions

Package description
This product representing a reactive energy capacitor installation includes:
- line and outphasing reactors
- outphasing linear loads to vary the installation's power factor
- a Varlogic varmeter
- a reactive energy multiple step capacitor system controlled by varmetric relay
- a static contactor to limit the capacitor inrush current
- a non-linear load system to highlight anti-resonance phenomena from harmonics circulating in the capacitors
- a correcting device with an anti-resonance reactor
- an operating diagram with controls on the box door.

Notes
Measurements and practical exercises require the use of a universal RMS controller or special instruments such as harmonics analysers.

Electrical and mechanical data
- **Power supply:**
  230 V single-phase + ground / <3.2 kVA
- **Size (H x W x D) - weight:**
  - cabinet: 950 x 600 x 300 mm - 70 kg
  - lamp box: 420 x 800 x 300 mm - 18 kg

Main industry
- Electrical engineering

Other industry
- Industrial technology

To order
MDG99160: REC bench with lamp box
MDG99169: support carriage option
Harmocem: electrical network interference bench

Teaching objectives
- To identify the harmonics generated by different receivers
- To identify interference due to the cohabitation of low and high currents (EMC)
- To implement the correct solutions using the relevant wiring rules

Package description
The package includes 2 boxes for reproducing interference phenomena occurring in an industrial environment and assessing the performance of the solutions used.

The control box includes:
- an electrical distribution structure
- a speed controller
- products providing EMC solutions (filters, capacitors, reactors or capacitance)
- a selection list of components to be used for the relevant solution testing sockets to take the readings required for practical exercises.

The loads box includes:
- non-linear loads (power controllers, lamps, fluorescent tubes…) to illustrate harmonics phenomena
- a loaded asynchronous motor with speed control to study phenomena related to EMC.

Active filter option
An active filter (3A rated compensation) supplied by the control box to complete the study of anti-harmonics solutions (2nd to 25th harmonics rank spectrum). It has been designed for easy connection to the electrical cabinet.

Notes
Optimum use of this bench requires a spectrum (HF) and harmonics (LF) analyser.

Electrical and mechanical data
- Power supply: 230 V AC + ground single phase / <1.5 kVA
- Size (H x W x D) - weight:
  - electrical cabinet with EMC pre equipment: 810 x 700 x 350 mm - 60 kg
  - box with loads (lamps - asynchronous motor): 750 x 700 x 330 mm - 42 kg
  - active filter: 225 x 340 x 340 mm - 8 kg

Main industry
- Electrical engineering

Other industry
- Mechanical engineering

To order
MDG99150: Harmocem bench
MD1AG150H: Harmocem bench with LF analyzer
MDG99158: support carriage option
MDG99159: active filter option
MDG99198: HF spectrum analyzer
Harmotris: 3-phase network harmonic interference bench

Teaching objectives
- To study problems of electrical interference in a 3-phase installation
- To implement the relevant solutions
- To analyse third harmonic and neutral heating phenomena

Electrical and mechanical data
- Power supply:
  400 V 3-phase + N + ground / <3.3 kVA
- Size (H x W x D) - weight:
  1860 x 900 x 570 mm - 230 kg

Main industry
- Electrical engineering

The box at the bottom of the bench includes:
- a lighting ramp with three 500W halogen bulbs
- a ramp of fluorescent, fluocompact or induction lamps
- two fans to cool the surrounding air
- a temperature monitoring probe.

A harmonics analysis device is required for exercises designed for students taking electrotechnical higher vocational education.

Package description
The wheeled bench consists of an electrical cabinet and a box with lighting circuit loads. It has 2 separate power lines representative of a theatre hall to control a lighting circuit and motorised scenery control circuit.

The cabinet includes:
- protection circuit breakers and differentials
- line reactors: 10 and 15 mH
- anti-harmonics reactors: 16 and 45 mH
- resonance reactors: 122 mH
- capacitors: 600V 25 mF
- an isolating transformer: 400/240 V, 2 kVA
- an Altivar speed controller for 1.5 kW motor
- a selection list of components to be used for the relevant solution
- a panel to measure and adjust lamp power.

To order
MDG99190: Harmotris bench
MDG99159: active filter option
MD1AG190H: bench with LF analyser
MDG99198: HF spectrum analyzer
Min-Harmotris: harmonics interference in a 3-phase installation

Teaching objectives
- To study the problems of harmonics in a 3-phase installation
- To analyse third harmonic and neutral heating phenomenon
- To implement and evaluate the impact of solutions

Electrical and mechanical data
- Power supply: 400 V 3-phase + N + ground / <1.2 kVA
- Size (H x W x D) - weight: 1150 x 900 x 450 mm - 80 kg

Main industry
- Electrical engineering

Package description
The Min-Harmotris bench is an electrical cabinet consisting of a lighting power supply line with:
- protection circuit breakers
- a lightning arrester device
- a ramp of halogen lamps
- a ramp of fluorescent, fluo compact or induction lamps
- a transformer and inductors
- a testing points strip
- a lamp selection and adjustment panel
- a cabinet air extraction device.

The teaching method targeting electrotechnical students is designed for a gradual approach to problems relative to the third or multiple of harmonic pollution with identification of neutral heating.
- viewing and accounting for the phenomena
- implementation of solutions with anti-harmonics filters
- study of the conductor section bearing in mind the recommendations of the new NFC1500 standard.

To order
MDG99195: Min-Harmotris cabinet
MD1AG195: cabinet with measuring device
Data acquisition and processing
Data acquisition and processing

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Products comply with European Directives

Compliance report provided on request

All our products include:
- hard copy of the technical manual and practical exercise book,
- CD with the same documents in a PDF format and the PLC applications.
Machine safety modular offer

Teaching objectives
- To discover the devices which can be installed to make an industrial machine safe
- To determine the risk levels
- To know the legislation in force

Electrical and mechanical data
- Power supply: 230 V AC
- Size (H x W x D) - weight:
  - Structure: 1030 x 400 x 910 mm - 6.5 kg
  - Modules: 70 x 150 x 245 mm - 0.7 kg approx.

Main industries
- Electrical engineering
- Industrial engineering and maintenance

Package description
This offer allows trainees to conduct a risk evaluation analysis and implement solutions compliant with the relevant standards:
- EN/ISO 12100: general design principles
- EN 954-1: safety solution category
- EN ISO 13849-1: maximum performance level of the solution
- EN IEC 62061: maximum safety integrity level (SIL) of the solution

This latter standard (SIL: safety integrity level) considers the use of new technologies in the products and safety solutions and suggests guidelines for calculating the probability of a breakdown. The safety integrity level (SIL) is the new evaluation, defined by standard IEC 61508, concerning the probability of failure of a function or a safety system.

The machine safety modular offer implements certain safety components. These modules ensure maximum protection for all safety functions present in an automation system.

The safety functions covered are:
- monitoring the emergency stop and safety switches
- monitoring coded magnetic switches
- controlling the zero speed by connecting to a key operated safety switch.

Installation components:
- safety switch with turret head
- safety limit switch
- coded magnetic switch
- safety limit switch with electrical interlock
- category 3 safety module for monitoring the emergency stop
- category 4 safety module for monitoring the emergency stop and the safety switch
- category 4 safety module for monitoring the magnetic switch
- category 3 safety module for controlling the zero speed
- contactor relay module for connecting to the Preventa module outputs.

The operational part simulates the movement of a machine (protected by a screen) and a fan (also protected by a screen). The operational part and the control part are linked by means of safety sockets.

Emergency stop module

Safety switch monitoring module

Zero speed control and time delay module
Contents of the machine safety kit:
- a safety module for emergency stop monitoring (MD1AM9001)
- a safety module for emergency stop and limit switch monitoring (MD1AM9002)
- a coded magnetic switch monitoring module (MD1AM9003)
- a time delay monitoring module (MD1AM9004)
- a zero speed monitoring module (MD1AM9005)
- a time delay monitoring module (MD1AM9006)
- a 24 V DC, 2.5 A power supply module (MD1AM4001)
- two contactor relay modules (MD1AM1011)
- a support frame (MD1AM000)
- a thermal magnetic circuit-breaker module (MD1AM1003)
- a contactor module (MD1AM1008).

Modules can be ordered separately.
Detection workshop

Teaching objectives
- To study the principles of industrial detection
- To learn about detection technologies
- To implement sensors

Electrical and mechanical data
- Power supply: 230 V single phase + ground
- Size (H x W x D) - weight:
  - box: 170 x 260 x 230 mm - 5 kg
  - grooved plate: 80 x 760 x 460 mm - 8 kg
  - parts and target kit: 130 x 420 x 380 mm - 8 kg
  - sensor kit: 130 x 520 x 420 mm - 5 kg

Main industry
- Industrial technology

Other industries
- Electrical engineering
- Mechanical engineering

Package description

The grooved plate is used to:
- position sliding vices on an Y-axis rail (460 mm long) in relation to the X-axis (600 travel)
- quickly mount and dismantle the sensors and targets
- measure the detection distances with graduated rulers.

The parts kit includes:
- two quick-opening and tight-screwing vices
- two vice-raising supports also used as reflector holders
- a vice with a 75 opening and screw tightening (M12) to hold the targets
- a 15°, 30°, 45°, 90° cam for tests with limit switches
- a set of steel, aluminium and brass targets for inductive sensors
- a set of targets for metallic colour, cardboard, reflecting strip, glass, mirror and neutral reflection
- a set of reflectors and cylindrical targets
- a set of coloured labels.

The pre-wired sensor kit includes:
- a set of limit switches to analyze rectilinear and angular movement detection
- a set of inductive and capacitative sensors (in 2/3 wire technology for material detection
- a set of photoelectric sensors (beam, reflex, optic fibre, background suppression, etc.).

Power supply kit:
Adjusted, the kit supplies variable DC voltage via a 0-24 V potentiometer for testing sensor operation.
The sensors are connected to safety sockets of 2 and 4 mm in diameter. Sensor status is displayed by indicators which make real output loads (100 m A/24 V and 20 m A/24 V).

Sensor kit:
Three photoelectric sensors to read labels and marks and detect colours are available as a separate option. Parts for the practical exercises on these sensors are supplied with the parts kit.

Sensor and accessories cases

To order
MD1AA501: full detection workshop (MD1AA500, MD1AA502, MD1ACAVR)
MD1AA500: grooved plate and parts kit
MD1AA502: sensor kit
MD1AA509: sensor case
MD1ACAVR: power supply box

Power supply case

To order
MD1AA501: full detection workshop (MD1AA500, MD1AA502, MD1ACAVR)
MD1AA500: grooved plate and parts kit
MD1AA502: sensor kit
MD1AA509: sensor case
MD1ACAVR: power supply box
Teaching objectives
- To study and implement analogue measurement sensors
- To study the related electrical and electronic assemblies
- To study analogue-to-digital and digital-to-analogue conversions
- To understand PID regulation

Package description
The measurement and control bench includes five workstations:
- Weight measurement (plastic, aluminium or steel) by a strain gauge
- No-contact distance measurement with an industrial analogue photoelectric sensor
- Contact distance measurement with a linear potentiometer
- Speed control (PID) with a motor and a speed controller with a tacho-generator feedback
- Heat control (discrete and PID) with a mini-enclosure equipped with a heating system (lamp), temperature measurement device (PT100 probe + interface) and an interference system (fan).

A TSX Micro PLC (digital 16I/12O, analogue 8I/2O) is used to control the workstations and run them from:
- A Magelis type terminal
- Preset PL7 operating monitors
- Ethernet links (ETZ510 plug-in and HTML pages).

The discrete PLC inputs/outputs and measurement sockets can also be used on 4mm safety terminals.

Software is provided to view speed and temperature change curves on a PC.

To order
MD1AA620: measurement and control bench
Teaching objectives

- To understand the concepts of traceability and identification
- To install and use the components
- To program and configure the various elements

Package description

The RFID case demonstrates the concepts of traceability and identification used in numerous applications, such as logistics, access control and baggage tracking and sorting.

The RFID case includes a PLC connected to two compact read/write stations via an Ethernet connection box. A Magelis human-machine interface tool is used to write and/or read information from electronic tags.

The case contains:
- ten badges
- five labels
- two compact read/write stations
- Ethernet connection box
- Twido Ethernet PLC
- 24 V power supply
- XBTN Magelis terminal
- two protection circuit breakers
- a set of cables
- Ethernet switch.

This kit is supplied with technical and training documentation in both printed and electronic format (CD).

Electrical and mechanical data

- Power supply: 230 V single-phase
- Size (H x W x D) - weight: 155 x 600 x 450 mm - 8 kg

Main industry

- Electronics

Other industries

- Electrical engineering
- Industrial engineering and maintenance

To order

MD1AAVRFID: RFID case
Teaching objectives

- To use a control panel to drive an operating section
- To programme a TSX Micro PLC using PL7 Micro, PL7 Junior or PL7 Pro software
- To programme a Magelis dialogue terminal using XBTL1003 software

Package description

The console includes a Magelis dialogue terminal, a TSX Micro or M340 PLC with inputs/outputs connected to safety sockets or connectors to be linked with your operating sections.

**TSX Micro** equipped with:
- discrete 16E/12S TSXDMZ28DR card
- analogue 4E TSXAED400 card
- analogue 2S TSXASZ200 card
- a TSXETZ510 Ethernet module.

**M340 version** equipped with:
- an Ethernet/Modbus CPU
- a BMXDDM32 card (16I/16O)
- a BMXAMM0600 card (analog 4I/2O)

The discrete and analogue inputs are wired to a Jaeger connector. The discrete inputs are also wired to status simulation switches. The discrete and analogue outputs are connected to double-sink safety sockets.

Cables included:
- set of I/O cables with Jaeger plugs
- PC/TSX link cable
- PC/XBT link cable.

Operator dialogue:
- Magelis XBTR with 4 lines of 20 characters
- 12 function keys and 6 service keys.

There is a switch to use the Magelis without altering the wiring:
- in programming mode from a PC equipped with XBTL software (not included)
- in operating mode from the TSX Micro.

A simulator can be provided solely with the TSX Micro version. This simulator allows twelve discrete outputs, one input and one analogue output to be tested.

**To order**

MD1AE160ETH: TSX Micro panel with ETH plug-in
MD1AE165: M340 panel with modbus and Ethernet
MD1AE169: simulator for TSX Micro control desk
Training PLCs

Teaching objectives
- Zelio: to program in Ladder language or logic with Zelio Soft 2 software
- Twido: to program in TwidoSuite language (List, Ladder or Grafcet)
- Micro, M340 and Premium: to program in PL7 Micro, Unity or PL7 Pro language

Presentation of baseplates
These kits are used for teaching PLC programming languages (List, Ladder, Grafcet or Structured Text) using Zelio Soft, TwidoSuite, PL7 Micro, PL7 Pro or Unity software. They allow trainees to perform debugging operations on automation systems of increasing complexity, by working with different functions (time delay, comparator, register, calculations, process controls, communication, etc.).

The baseplates are equipped with:
- a PLC
- a simulator for the inputs (except on the Zelio baseplate)
- safety sockets connected to the inputs/outputs
- a Phaseo 24 V DC, 3 A power supply
- a PC/PLC cable.

Baseplate contents:

Zelio baseplate:
- a Zelio 12 in/8 out module (without simulator)
- Zelio Soft programming software.

Twido baseplate:
- a compact 14 in/10 out Twido PLC
- TwidoSuite programming software.

Electrical and mechanical data
- Power supply: 230 V AC
  - TSX Micro: 150 VA
  - Twido: 80 VA
  - Zelio: 72 VA
  - Premium: 100 VA
  - M340: 120 VA
- Size (H x W x D) - weight:
  - TSX Micro: 220 x 400 x 410 mm - 5 kg
  - Twido: 150 x 290 x 310 mm - 3 kg
  - Zelio: 130 x 290 x 310 mm - 2 kg
  - Premium and M340: 230 x 410 x 470 mm - 7 kg

Main industry
- Industrial science and technology
Training PLCs

**TSX Micro baseplate:**
- a Micro TSX3722 PLC
- 16 inputs and 16 outputs linked to sockets
- 3 analogue inputs and 1 analogue output linked to sockets

**M340 baseplate:**
- a 6-slot rack
- an Ethernet/Modbus processor
- 16 inputs and 16 outputs linked to sockets
- 4 analogue inputs and 2 analogue outputs linked to sockets.

**Premium baseplate:**
- an 8-slot rack
- an Ethernet processor (PL7 or Unity)
- 16 inputs and 16 outputs linked to sockets
- 4 analogue inputs and 4 analogue outputs linked to sockets.

For the M340 and Premium baseplates, it is possible to adapt the I/O cards or intelligent modules on request.

The programming software is not provided except for Zelio and Twido.

### To order

- **MD1AE110:** TSX Micro baseplate
- **MD1AE120:** Twido baseplate
- **MD1AE125:** Zelio baseplate
- **MD1AE130:** Premium baseplate
- **MD1AE150:** M340 baseplate
- **MD1AE130UTY:** Premium + Unity baseplate
**Teaching objectives**
- To study and use different types of PLC
- To study human-machine dialogue
- To understand the fundamental principles of communication

**Teaching objectives**

**Package description**

The automation modular offer demonstrates:
- different types of PLC (Twido, M340 and Premium)
- industrial buses and networks (Modbus, CANopen, ASi, Ethernet)
- different human-machine operator interface terminals
- communication between PLCs, variable speed drives, networked motor starters and human-machine dialogue tools.

According to choice, trainees will be able to study various programming software, communication or process control functions. They can use this offer to build automation architectures using the most common components and communication networks.

The standard offers include:
- a Twido discovery kit containing:
  - a Twido module with 24 inputs and 16 outputs
  - a module with 16 discrete inputs with cabled connector
  - a 24 V DC, 2.5 A power supply module with cable
  - a Magelis XBTR 411 module
  - a machine control module
  - a support frame.
- an M340 discovery kit containing:
  - an M340 module with 1 card with 16 inputs and 16 outputs
  - a module with 16 discrete inputs with cabled connector
  - a module with 16 discrete outputs with cabled connector
  - a 24 V DC, 2.5 A power supply module with cable
  - a Magelis XBTR 411 module
  - a machine control module
  - a support frame.

This offer can be customised by obtaining modules separately (see the offer details on the website).

**Main industries**
- Electrical engineering
- Industrial engineering and maintenance

**Other industry**
- Industrial science and technology
Automation modular offer: operational part

Teaching objectives
- To connect an operational part to a PLC
- To use a basic system to simulate the operation of a PLC

Package description
The operational parts of the automation system modular offer are used to connect a control section to a system simulating a real basic process.

The different operational parts provided are:
- a 230/400 V – 180 W base-mounted asynchronous motor for connection to a starter, variable speed drive or DOL starter
- a table-mounted conveyor belt with asynchronous motor, equipped with 2 sensors, for connection to the PLC I/O
- a traffic management module. This operational part represents a set of traffic lights at a crossroads and is intended for the study of industrial PLC programming
- an automatic barrier for simulating operation of a real system, taking account of safety features
- a temperature controller. This operational part represents an oven in which the heating element is an incandescent lamp. It integrates a PT100 probe and a measurement transmitter. The lamp is controlled over a range of 0-10 V. This module is intended for process control studies
- an electric shutter controlled by two commands - raise and lower. Automatic cut-out is provided at the upper position (shutter open) and the lower position (shutter closed)
- a process control module that simulates a punching system.

All these operational parts can be connected in complete safety to all the modules in the modular offer.

To order
MD1AMP001: motor
MD1AMP002: conveyor belt
MD1AMP003: traffic management
MD1AMP004: 15 W lamp
MD1AMP005: automatic barrier
MD1AMP006: temperature controller
MD1AMP007: electric shutter
MD1AMP008: process control

Main industries
- Electrical engineering
- Industrial engineering and maintenance

Electrical and mechanical data
- Power supply:
  - 230/400 V AC + E for the motor and the conveyor
  - 24 V DC or 48 V DC depending on module
- Size (H x W x D) - weight:
  - conveyor belt: 250 x 390 x 205 mm - 7 kg
  - motor: 250 x 390 x 205 mm - 7 kg
  - modules: 70 x 110 x 250 mm - 1 kg

Other industry
- Industrial science and technology
Didaflex baseplates

Teaching objectives
- To study pneumatic and electro-pneumatic technologies
- To install and control pneumatic automation system functions
- To wire electro-pneumatic components

Didaflex baseplates on a magnetic board are used to demonstrate the various implementation technologies for creating automation functions on electro-pneumatic machines.

Three technologies are covered:
- pneumatic: single-acting and double-acting cylinders, monostable or bistable solenoid valves and isolation valve with regulator
- electro-pneumatic: magnetic or roller limit switch sensors and control of directional control valves using a control station
- automation system: programming in various languages on different PLCs.

These kits can also be combined with the range of PLCs in the modular offer.

Didaflex kit contents:

<table>
<thead>
<tr>
<th>Description</th>
<th>MD1PMXZTW</th>
<th>MD1PMXTSX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumo-electric interface</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Pneumatic limit switch sensor with rollers</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Electric limit switch sensor with rollers</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Magnetic cylinder position sensor</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3/2 monostable solenoid valve</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4/2 monostable solenoid valve</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4/2 bistable solenoid valve</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Single-acting cylinder D16-C50 mm</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Double-acting cylinder D16-C100 with 2 sensors</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Double-acting cylinder 16-C100 mm</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Magnetic board and frame</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Control station: 1ES-2PB-1C3P - 1 green LED</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Isolating valve + regulator</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Double 3/2 solenoid valve</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Power supply: 24 V DC and compressed air at 6 bars
Size (H x W x D): 600 x 450 x 250 mm - 25 kg

To order
- MD1PMXZTW: kit for use with Zelio and Twido training PLCs
- MD1PMXTSX: kit for use with TSX Micro, Premium and M340 training PLCs
### Pneumatic manipulator with rotary base

#### Teaching objectives
- To understand an electropneumatic components handling system
- To learn about the techniques of application
- To program and develop the machine cycle sequences
- To study the operating and failure modes (GEMMA) of an industrial system

#### Package description
This manipulator arm is used to handle parts weighing up to 1 kg according to five axes. Based on a specification sheet, the trainee will be responsible for creating his/her own application: cabling and programming. This equipment consists of three complementary parts.

**The operative part, consisting of:**
- a set of five pneumatic actuators: rotating body, vertical axis, horizontal axis, clamp rotation and clamp
- two gripping positions
- a 3/2, 24 V DC valve
- a progressive starter with pressure gauge and manual isolating valve
- a pressure detection pressure switch
- a group of five 5/2 bistable 24 V DC distributors
- two detection types: electrical and electropneumatic
- 4 mm safety sockets and/or sub-D connector for system monitoring and control.

**The control section** is made up of one of the educational programmable logic controllers from our range. Choose a PLC containing at least 16 inputs and 16 outputs, equipped with sockets or sub-D connector. Possibility to control the system by PC via a socket interface.

**The console, consisting of:**
- a box equipped with a connection operating diagram and safety switches
- control and indicating devices allowing cabling of the safety circuit and management of operating modes (automatic, manual and fault indication).

#### Electrical and mechanical data
- **Power supply:** 230 V 1Ph + 5 bar filtered dry air
- **Size (H x W x D) - weight:**
  - operational part: 300 x 400 x 500 mm - 14 kg
  - control desk: 130 x 300 x 250 mm - 2 kg

#### Main industries
- Mechanical engineering
- Industrial technology

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**To order**
- MD1AE973: control desk
- MD1AE974: manipulator
- MD1AE975: manipulator with desk

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Control desk

PLC Control (see page 59)
Zelio case

Teaching objectives
- To learn about programmed logic
- To program an automated system

Electrical and mechanical data
- Power supply: 230 V single-phase + E / < 30 VA
- Size (H x W x D) - weight: 130 x 350 x 380 mm - 3.5 kg

Main industry
- Electrical engineering

Other industries
- Civil engineering
- Mechanical engineering
- Industrial technology

Package description
The case comprises:
- Zelio 10 I/O module with wired input and output switches linked to indicator lights
- Programming software and computer wiring
- Complete gradual teaching method using different programming systems (Ladder, Grafcet, FBD functions) to learn about the performances of the Zelio module.

To order
MD1ZELIO: Zelio case

Traffic control

Teaching objectives
- To study the operation of traffic lights at a road junction
- To indicate a pedestrian crossing

Electrical and mechanical data
- Power supply: 230 V single phase + ground / < 30 VA
- Size (H x W x D) - weight: 300 x 290 x 210 mm - 4 kg
  - Control unit
  - Operating unit: 270 x 350 x 80 mm - 2 kg

Main industry
- Industrial technology

Other industries
- Civil engineering
- Mechanical engineering

Package description
The complete package includes:
- A control unit:
  - A traffic light to control according to day and night conditions
  - Pedestrian calls, priority choices, etc.

- An operating unit:
  - A control unit: TSX Micro (16I/12O) or Twido (28I/16O) or Zelio (16I/10O) or M340 (32 in/32 out) PLC. PLC and wires for connection to the operating unit.

To order
MD1AE214: traffic management operational part
MD1AE217: TSX Micro complete assembly
MD1AE217MR: M340 complete assembly
MD1AE715TW: Twido complete assembly
MD1AE715ZL: Zelio complete assembly
For the control part only, please contact us
Lift

Teaching objectives
- To understand how to program and implement a PLC
- To study the timer, counter and storage functions of a Grafcet
- To manage priorities and allocate tasks

Electrical and mechanical data
- Power supply: 230 V single phase + ground / < 150 VA
- Size (H x W x D) - weight:
  - control unit: 300 x 290 x 210 mm - 5 kg
  - operational unit: 1015 x 615 x 635 mm - 24 kg

Main industry
- Industrial technology

Other industries
- Electrical engineering
- Mechanical engineering

Package description
Operating unit
- a 5-floor lift with:
  - landing door contact
  - car floor call control
  - landing call buttons
  - car arrival sensors.

Control unit
- a PLC mounted and wired to a support:
  - TSX Micro or Twido or M340
  - two ribbon cables for quick connection to the operating unit.

To control
MD1AE224: lift operational part
MD1AE227: TSX Micro complete lift
MD1AE227MR: M340 complete lift
MD1AE227TW: Twido complete lift
For the control part only, please consult us

Hanged cage surface treatment equipment

Teaching objectives
- To approach sequential programming
- To manage the stop/start modes of an automated system (DGOSM)
- To study the Grafcet and its timer, counter and storage functions

Electrical and mechanical data
- Power supply: 230 V single phase + ground / < 100 VA
- Size (H x W x D) - weight:
  - micro control unit: 210 x 380 x 350 mm - 5 kg
  - Twido control unit: 170 x 290 x 310 mm - 2 kg
  - operating unit: 400 x 700 x 350 mm - 18 kg

Main industries
- Electrical engineering
- Mechanical engineering

Other industry
- Industrial technology

Package description
The operating unit modelling a surface treatment system includes:
- a double-motion hanged cage
- a loading/unloading station.

The control unit includes:
- a TSX Micro or Twido or M340 PLC
- a base with connection layers.

To order
MD1AE224: surface treatment operational part
MD1AE227: TSX Micro complete lift
MD1AE227MR: M340 complete lift
MD1AE227TW: Twido complete lift
For the control part only, please consult us
Display panel

Teaching objectives
- To analyse and arrange panel functions
- To capture and process data
- To represent a mechanical part
- To study the power conversion chain

Electrical and mechanical data
- Power supply: 230 V single phase + ground / < 230 VA
- Size (H x W x D) - weight: 1845 x 750 x 850 mm - 92 kg

Package description
The panel is built with aluminium rails for rotating four posters automatically or manually.

This true-to-life application is used to learn:
- the elements of power distribution
- speed-controller
- poster positioning by inductive sensors
- poster rotation cycle management.

The practical exercise programme is particularly designed for Engineering Sciences Initiation classes and is used to learn about an automated system.

Automation management is ensured by:
- a Zelio 2 (12E / 8S) logical module
- an Altivar speed controller for asynchronous motors.

To order
MD1AE875: complete panel

Main industry
- Electrical engineering

Other industries
- Mechanical engineering
- Industrial technology
Teaching objectives

- To learn and understand automated system structures
- To analyse operation by wired or programmed logic
- To study and comply with safety rules and user protection devices
- To program door operation (list, Ladder, Graftec)

Package description

Operating unit
The “Safe Automatic Door” teaching module consists of a swinging door implementing all the operation safety devices required by relevant standards:

- XUL photoelectric barrier cells with double output contact
- Mobile panel obstruction detection by XUD optic fibres and photoelectric cells
- Mechanical open/close end-of-travel switches
- Door motion indicator lamps
- Safe access zone lighting indicators.

Mechanical motion is controlled by an AC motor with a speed reducer and an adjustable torque limiter. The mobile panel is driven by pinion and chain gear with ball bearing rail guides.

Control unit
An industrial electrical box includes:

- The standard protection devices: fuse isolator, thermal magnetic circuit breaker and thermal relay
- The components needed to achieve the two operating modes
- Depending on the version, the PLC is a TSX Micro (16I/12O), a Twido (16I/12O) or a Zelio (12I/8O) module
- In manual mode, door motion and safety devices are controlled by limit switches
- In automatic mode, the motion and safety devices, keyboard access and signals are controlled by a PLC.

Main industry
- Electrical engineering

Other industries
- Mechanical engineering
- Industrial technology

To order

- MD1AE774: automatic door operational part
- MD1AE176: TSX Micro control part
- MD1AE177: TSX Micro complete assembly
- MD1AE173TW: Twido control part
- MD1AE175TW: Twido complete assembly
- MD1AE173ZL: Zelio control part
- MD1AE175ZL: Zelio complete assembly
## Numerical axis

### Teaching objectives
- To highlight the influence of mechanical and energetic stress in metered or close looped positioning of a moving part
- To implement an axis card

### Electrical and mechanical data
- **Power supply:**
  - 230 V single-phase + ground / < 400 VA
- **Size (H x W x D) - weight:**
  - Operating section:
    - 400 x 920 x 430 mm - 40 kg
  - Control section:
    - 600 x 560 x 310 mm - 30 kg

### Main industries
- Electrical engineering
- Mechanical engineering

### Package description
The axis control teaching module consists of two subunits.

#### The operating section includes:
- An 800 mm long axis with inertia of 2 to 70.10^-4 kg/m^2
- A moving part driven by a stainless steel ball screw and nut system, diameter: 16 mm, thread: 5 mm, travel: 600 mm
- A variable load of 1-5 kg
- A DC motor (3000 rpm - 200 W) with built-in tacho-generator (7 V/1000 rpm), transmission by pulleys and notched belt
- An electronic speed controller
- A rotating incremental encoder fitted to the end of the axis (definition 400 ppr)
- A protective casing with opening detection
- A diagram with testing points on regulation loop elements: set point, motor current and voltage, speed feedback.

This subunit can be used in a horizontal or vertical position.

#### The control box includes:
- A Premium PLC equipped with discrete 16I/16O and a TSXCAY21 axis control module
- A Magelis XBT dialogue terminal
- Protection and power supply circuits
- Plug-in connectors for connection to the operating section.

### To order
- MD1AE794: operating section of numerical axis
- MD1AE795: complete numerical axis

### Data acquisition and processing

### Control enclosure

### Opérative section

### Load detail
Nivoreg process control bench

Teaching objectives
- To study the behaviour of a process control system with or without pure time delay
- To study simple, cascaded or feedforward control loops
- To study the accuracy and stabilisation parameters of a process

Package description
Nivoreg allows trainees to analyse, understand and implement a control-command system linked to a simple process.

This control bench is made up of a monobloc frame containing:
- an operational part made up of two water columns
- a control part with an M340 PLC
- a Magelis XBTGT terminal for control, configuration and displaying the curves needed to identify the process.

The Nivoreg system covers the following types of loop:
- P, PI, PD, PID with digital output
- two states ON/OFF with discrete output
- three states ON/OFF with outputs
- hot/cool with digital outputs
- split-range with digital outputs
- IMC (model-based controller) with digital output
- feedforward (predictive control) with digital output.

Main industries
- Electrical engineering
- Energy engineering

To order
MD1AE885: Nivoreg process control bench

Electrical and mechanical data
- Power supply: 230 V AC / 200 VA
- Size (H x W x D) - weight: 800 x 600 x 600 mm - 25 kg

To order
MD1AE885: Nivoreg process control bench

Electrical and mechanical data
- Power supply: 230 V AC / 200 VA
- Size (H x W x D) - weight: 800 x 600 x 600 mm - 25 kg

Main industries
- Electrical engineering
- Energy engineering

To order
MD1AE885: Nivoreg process control bench

Educational solutions catalogue 2010-2011
Communication case

**Teaching objectives**
- To learn and master the basic principles of communication
- To implement exchanges between modems, PLCs and display units
- To study the features of PLCs and view the contents of different protocols
- To handle examples of communication architecture in industrial machines

**Electrical and mechanical data**
- **Power supply:**
  - Communication case:
    - 230 V + ground single-phase / < 120 VA
  - PABX case:
    - 230 V + ground Single-phase
- **Size (H x W x D) - weight:**
  - Communication case:
    - 560 x 470 x 330 mm - 20 kg
  - PABX case:
    - 600 x 500 x 250 mm - 10 kg

**Main industry**
- Electrical engineering

**Other industries**
- Mechanical engineering
- Industrial technology

**Package description**

The main case containing a Premium, an Ethernet Twido and a Magelis display unit is used to study:
- RS232 point-to-point local communication: ASCII characters, format, output, control, PC and PLC configuration
- Sensor actuator ASI bus: master/slave, addressing, polling principles
- Multipoint industrial UniTelway and Modbus bus: protocol, transparency and system query principles
- Exchange between a PC and a PLC: dialogue construction
- Internet technology on Ethernet LAN with the TSX Web server function: PC and internet browser configuration, site update and creation of HTML pages
- OFS, OPC Factory Server: object concept enabling computer applications (VB, C++) to access a PLC memory
- Remote access to a PLC via a LAN: Xway addressing, IP, use of XIP driver on Ethernet
- Exchanges between PLCs via an Ethernet LAN: data read/write on remote system
- Internet technologies on an Ethernet LAN: IP address, subnetwork name, SNTP server
- Remote maintenance or programming with HTML pages or PL7 Pro software and XIP driver.

There are two optional units with two V92 (MD1AE848) modems and a private automatic branch exchange (MD1AE849) to learn:
- The Hayes protocol (modem-to-modem communication standard)
- Modem configuration and operation
- Remote access to a system, creation and configuration of a remote connection on a computer
- Configuration and use of an internet browser
- Remote maintenance via the phone network
- Internet technology on a switched telephone network; computer, web server and internet browser configuration.

The PABX provides an independent phone network, which leaves real lines free and gives a wider spectrum of opportunities for practices.

It is also possible to analyse exchange frames using the provided testing points.

**To order**
- MD1AE845TW: Communication case
- MD1AE849: PABX case
- MD1AE848: Set of 2 modems
Comsi case

Teaching objectives
- To study Ethernet and ASi communication tools
- To program a PLC in PL7

Package description
This case is adapted from the MD1AE845 communication case industrial engineering and technology applications.

This compact case enables:
- easy connections to a local system and network
- connection to a local network by TCP/IP protocol
- the use of HTML pages linked to the module’s built-in website via the FactoryCast software tool supplied with the product.

In its basic version, the case contains:
- a TSX Micro (3722) PLC
- a TSX DMZ 28DR (16 in/12 out) I/O card
- a TSX ETZ 510 module supplied with the FactoryCast software
- a PC/PLC communication cable
- an RS485 cable suitable for the PLC AUX port
- a hub and two standard RJ45 cables
- 16 in/12 out (discrete) connected to safety sockets
- 4 in/1 out (analogue) connected to safety sockets
- a SUB-D connector connected to the PLC counter channels.

Additional hardware is available as an option for studying the ASi fieldbus.

Electrical and mechanical data
- Power supply: 230 V single-phase / <150 VA
- Size (H x W x D) - weight:
  - Comsi case: 500 x 450 x 270 mm - 12 kg
  - ASi baseplate: 220 x 290 x 310 mm - 3 kg
- Main industry
  - Industrial technology
- Other industries
  - Mechanical engineering
  - Electrical engineering

Main industry
- Industrial technology

Other industries
- Mechanical engineering
- Electrical engineering

To order
MD1AE845SI2: comsi case
MD1AE848SI: ASi baseplate
Grafcet - training software

Teaching objectives
- To read and use a grafcet
- To understand how an automated system works

Package description
The “grafcet and automation” training software is a tool explaining and animating, in simple and user-friendly manner, the concepts and basic elements of sequential automation systems.

You will deal with grafcet management concepts such as:
- switching
- single and simultaneous sequences
- time delays
- etc.

Each new item of knowledge acquired is checked by an exercise or test. The training software ends with an attractive final assessment allowing you to evaluate what you have learnt.

Training software contents
- automation structure
- single sequence grafcet
- exclusive switching grafcet: repeating sequences, skipping step(s), summary on the exclusive switching grafcet
- simultaneous sequence grafcet
- time delays
- simultaneous actions
- latched actions
- final test.

Electrical and mechanical data
- Hardware configuration: A PC W98/2000, XP microcomputer

To order
MD1LD210: company license (french version only)
Processim: operational part simulator

Teaching objectives

- To understand programmed logic
- To learn how to program an automation system in Grafcet or Ladder language
- To validate learnt skills on a virtual operational part

Package description

Processim is a system for learning how to program and maintain automated systems. It introduces trainees to automated system operation by allowing them to validate their acquired skills on a simulated operational part.

The software can be used to:

- **run the simulation of an operational part**
  The animation editor manages a library of configurable objects (cylinders, motors, detectors, conveyors, drills, stacking area for continuous processes, etc.) which can be linked intuitively, with automatic assignment of the I/O in conjunction with the program editor. Therefore, it is possible to devise an operational part or to recreate the simulation of an existing process.

- **learn programming (Grafcet and Ladder)**
  The program editor is used to learn the reasoning and principles of programming in Grafcet and Ladder languages and to test the program on the resulting animation. A graphics-based method avoids syntax-related constraints. It is also possible to work on logic equations and associate them with truth tables. When the program is running, the realtime Grafcet or timing diagram animation of the state of the inputs and outputs follows the simulated process as closely as possible.

- **program directly using a PLC**
  The software can operate connected to a PLC to control the simulated operational part in PL7 language. The PLC, connected to a real operational part, uses the simulated animation to monitor the operational part.

Main industry

- Electrical engineering

Other industries

- Mechanical engineering
- Industrial technology

Electrical and mechanical data

- **PC:**
  - Multimedia PC (W95/98, NT or XP)
  - CD-ROM containing the simulation software, ready-to-use applications and the operating instructions

To order

MD1LD200D: Processim discovery simulator
MD1LD200D10: Processim discovery simulator for 10 workstations
MD1LD200P: Processim professional simulator
MD1LD200P10: Processim professional simulator for 10 workstations

Logic equations screen

I/O assignment screen

Lift simulation screen
**3D Simulator**

**Teaching objectives**
- To simulate the operational parts interactively
- To understand how to program an automation system on TSX Micro, M340 or Premium PLCs

**Recommended configuration**
- **Processor:** Pentium IV or AMD K8 at 1GHz
- **RAM:** 256 MB
- **Disk space:** 200 MB removable disk space
- **Operating system:** Windows XP (Service Pack 2), Vista or 7
- **Graphics card:** Direct X 9.0 compatible, 64 MB and supporting vertex/pixel shader 1.1
- **USB:** 2 USB 1.1/2.0 ports
- **PLC:** A PLC with 16 discrete inputs and 10 discrete outputs

**Main industries**
- Electrical engineering
- Industrial engineering and maintenance

**Other industry**
- Industrial science and technology

**Package description**

The 3D simulator is an educational software package for learning how to program TSX Micro, M340 and Premium industrial PLCs. Based on the latest IT technologies, this simulator makes PLC training easy and fun through the medium of simulated operational parts. The virtual environments used are very realistic because of the total interactivity offered on the one hand and the quality of the real-time 3D graphic animations, dynamics and sounds on the other. The result is a simulated environment, made up of several systems, which can be connected to a PLC.

**The operational parts available are:**
- A sorting system, for transporting boxes from a feed conveyor to goods lifts, sorting them by size
- A mixer simulating a paint mixing process, for mixing the three primary colours (red, green and blue) to obtain the desired colour
- An automatic palletizer, for creating pallets with a maximum of three levels of boxes
- A “Pick & Place” system, which places parts inside a box using a three-axis manipulator
- An automated warehouse, which moves, stores and retrieves boxes on the shelves.

**The five virtual models have common features, such as:**
- Supply and removal areas where moving objects (pallets, boxes, parts) are automatically added or removed from the area
- The number of objects present in the area at any one time is limited to 16. If this number is exceeded, the first object added is automatically removed
- The maximum number of sensors (PLC inputs) is 16 and the number of actuators (PLC outputs) is 10
- An operator panel with an AUTO mode, an emergency stop and 3 pushbuttons (START, STOP, RESET)
- Five predefined camera positions and the possibility of moving the camera viewpoint within the area
- The 3D sound produced depends on the position of the camera.
Three versions are available:

- A complete PLC with 16 inputs and 16 outputs, pre-wired terminals, the necessary software and interfaces.
- A 16-input card, a 16-output card, pre-wired terminals, the necessary software and interfaces.
- Pre-wired terminals, the necessary software and interfaces.

To order:

- **MD1S3DTSX37API**: software + interfaces + TSX Micro
- **MD1S3DTSX37ES**: software + interfaces + I/O cards for TSX Micro
- **MD1S3DTSX37BORN**: software + interfaces + I/O terminals for TSX Micro
- **MD1S3DM340API**: software + interfaces + M340
- **MD1S3DM340ES**: software + interfaces + I/O cards for M340
- **MD1S3DM340BORN**: software + interfaces + I/O terminals for M340
- **MD1S3DTSX57API**: software + interfaces + M340
- **MD1S3DTSX57ES**: software + interfaces + I/O cards for M340
- **MD1S3DTSX57BORN**: software + interfaces + I/O terminals for Premium

Malfunction on sorting system
Automated systems
Automated systems

Xylophonis: brushless axis ................................................................. 78
5-axis manipulator ........................................................................... 79
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Products comply with European Directives

Compliance report provided on request

All our products include:
• hard copy of the technical manual and practical exercise book,
• CD with the same documents in a PDF format and the PLC applications.
Xylophonis: brushless axis

Teaching objectives
- To discover and use the specific features and capacities of the brushless motor
- To implement a Lexium 05 servo controller
- To study the interlocking principles
- To highlight the kinematic positioning problems of a mobile on a real system

Electrical and mechanical data
- Power supply: 230 V 1Ph + ground / 200 VA
- Size (H x W x D) - weight: 680 x 780 x 500 m - 50 kg

Main industries
- Mechanical engineering
- Electrical engineering

Other industry
- Industrial technology

Package description
Xylophonis is made up of a brushless numerical axis, a mobile electromagnet, a xylophone and a control part. This simple but complete package is designed to verify the qualities of this motor family combining dynamics, performance and compact size.

A number of subjects are dealt with:
- monitoring and configuration in local mode (directly on the controller or using the PowerSuite software)
- the various operating modes: positioning, speed or current
- safety (cabled, programmed, operating modes…)
- kinematic calculation and overall sizing: controller - motor - reduction gear - braking resistance...

The operative part contains:
- a xylophone with fourteen notes requiring rapid movement of an electromechanical striker to respect tune and tempo
- a vertical axis moving a trolley and intended to study kinematics and positioning on four quadrants. Trolley useful travel is 330 mm
- a trolley guided by two shafts equipped with linear ball bearings, driven by a notched belt. Trolley weight varies through the addition of one or two weights (trolley weight = 1.3 kg / 2.2 kg / 3.1 kg)
- a 8:1 planetary gear unit
- a BSH 0551T brushless servo motor (6000 rpm - peak torque 1.4 Nm) equipped with a parking brake
- a protective casing with opening detection.

The control part consists of:
- a Twido or M340 PLC equipped with 14 discrete inputs and 10 discrete outputs and a CANopen communication module
- a CANopen servo controller with setpoint consideration times of the order of one millisecond
- a dialogue terminal and controls to manage operating modes, compose a specific tune, configure movement characteristics and visualise position.

Main industries
- Mechanical engineering
- Electrical engineering

Other industry
- Industrial technology

To order
MD1AE965TW: Xylophonis, Twido version
MD1AE965MR: Xylophonis, M340 version
5-axis manipulator

Teaching objectives
- To learn about industrial manipulators and defaults
- To study start and stop modes (DGOSM) in an assembly machine
- To program and adjust machine cycle sequences
- To maintain the system: create and identify breakdowns

Package description
This equipment is based on an industrial electro-pneumatic assembly station. Very comprehensive, it is designed to help trainees to learn start and restart modes (automatic, manual step-by-step).

The operating section includes:
- a product feed station
- a 5-axis pneumatic manipulator (X, Y, Z, rotation and grip)
- a swaging station
- a parts outlet station
- a set of parts
- a control panel.

The assembly is provided in an encased structure with secured access.

The control section includes:
- a TSX Micro or M340 with a discrete 32I/24O
- a set of ribbon layers for connection.

The design is used to study:
- pneumatic technology with 3/2, 4/2 double-acting cylinders and distributor
- mechanical translational movement guidance
- a rack gripper system
- inductive, magnetic, photo-electric and electro-pneumatic detection.

Electrical and mechanical data
- Power supply: 230 V single-phase + ground / < 30 VA
- Compressed air supply: 6 bars
- Size (H x W x D) - weight: 570 x 800 x 510 mm - 32 kg

Main industries
- Mechanical engineering
- Industrial technology

To order
MD1AE913: TSX Micro control part
MD1AE914: operational part only
MD1AE915: complete manipulator in TSX Micro
MD1AE916MR: M340 control section
MD1AE917MR: complete manipulator in M340

To order
MD1AE913: TSX Micro control part
MD1AE914: operational part only
MD1AE915: complete manipulator in TSX Micro
MD1AE916MR: M340 control section
MD1AE917MR: complete manipulator in M340
Formatris: automatic part sorting system

Teaching objectives
- Introduction to an actual industrial system for controlling and sorting parts (control section, interface and operating section)
- To customize and implement the different identification technologies
- To programme and fine-tune the different machine cycle sequences

Electrical and mechanical data
- Power supply: 230 V single phase + 6-bar filtered dry air
- Size (H x W x D) - weight: 460 x 850 x 640 mm - 46 kg

Main industry
- Mechanical engineering

Other industry
- Industrial technology

Package description
This equipment sorts parts according to the following criteria:
- Type of material (plastic or metallic)
- Dimension (presence of hole and/or groove)
- Weight of the part.

The machine is fed with 12 different parts. At the control console, the operator chooses the criteria which he or she will use to define 'a correct part'. Then, he or she puts the products on a conveyor belt. The machine segregates the products, one by one, and moves them to a control station equipped with three on-off sensors of different types of technology and two analogue sensors. The product is then moved to the output of the machine and directed, depending on the test result, either to the correct product feeder or the incorrect one. In particular, with the dialogue terminal it is possible to monitor the result of the measurements and to adjust the analogic measurement device. The supplied application controls the complete system and proposes three types of operating modes: automatic, step-by-step and manual. The programming software (not supplied), allow to customise the operation, offer a dynamic display of the Grafcet cycle and the data tables.

Control unit:
- A TSX Micro PLC or M340. (Grafcet language, Ladder logic and structured literal) and a programmable LCD dialogue terminal
- 4/2 bistable electropneumatic interfaces and control relays.

Operating unit:
- A conveyor belt equipped with a gear motor
- Four bistable pneumatic cylinders
- A photoelectric cell, an induction sensor, two capacitive sensors, a 0-10 travel analogical sensor, an analogical weight sensor, 4 - 20 mA.

To order
MD1AE955MI: complete system in Micro
MD1AE955MR: complete system in M340
Tapiris: sorting belt

Teaching objectives
- To implement automated management of a sorting system
- To study communication via ASi, CANopen and Ethernet
- To communicate between a PLC and a PC (database)

Electrical and mechanical data
- **Power supply:**
  230 V single phase + ground / 150 VA
- **Compressed air supply:**
  6 bars
- **Size (H x W x D) - weight:**
  - operational unit:
    500 x 1400 x 400 mm - 40 kg
  - control panel:
    230 x 410 x 470 mm - 5 kg

Main industries
- Electrical engineering
- IT engineering

Other industries
- Industrial engineering and maintenance
- All STI subjects

Package description
Tapiris simulates a unit to sort parcels identified by a barcode or a digital code.

The operating unit includes:
- a conveyor belt 1.4 metres long with a 180 W speed reducer
- an Altivar speed controller
- an automatic parcel loading unit
- XUD photoelectric cells to detect parcel presence
- a barcode sensor to identify the parcels
- outlet cylinder units
- a set of parcels with identity labels.

The control unit includes:
- a TSX Micro 16I/12O or M340 or Premium
- an ASi or CANopen plug-in
- an Ethernet plug-in
- a control button box and a XBT.

The teaching analysis involves automated management of a sorting system:
- parcel identification and directing
- study and implementation of automated components (sensors, cylinders, speed controllers)
- study and implementation of an ASi or CANopen bus.

For the IT industry (IRIS), the analysis also includes study and implementation of API and PC data exchange.

The parcel management database can be used (real-time reading, display) via:
- the built-in Ethernet plug-in Web server
- the OPC (OFS) server (Excel, Visual Basic)
- the Factory Cast program (html, Java).

Link panel:

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<tr>
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<th>MD1AE854TC</th>
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To order
- MD1AE854T: Tapiris operational part in ASi
- MD1AE854TC: Tapiris operational part in CANopen
- MD1AE858: Tapiris control section in TSX Micro
- MD1AE858P: Tapiris control section in Premium
- MD1AE858MR: Tapiris control section in M340 Canopen
- MD1AE858MRA: Tapiris control section in M340 ASi
Percetris: automated machine tool

Teaching objectives
- To operate a multiple-technology industrial system
- To learn to control production cycles
- To adopt a mechanical safety approach
- To choose and size electrical and mechanical actuators
- To program a PLC

Electrical and mechanical data
- Power supply: 230 V + ground single-phase / < 3 kVA
- Compressed air supply: 6 bars
- Size (H x W x D) - weight: 1820 x 1450 x 600 mm - 195 kg

Main industry
- Mechanical engineering

Other industries
- Electrical engineering
- Industrial technology

Package description
This industrial equipment is used to build the following production cycle:
- control parts feeding on the control station
- control part placing
- detect various materials
- control part size
- carry out drilling or not
- sort and off-load on the basis of these features chosen by the operator.

The module consists of a monoblock framework containing:
- a part’s conveyor belt
- a buffer
- a part of control station (presence and depth of groove)
- a drilling unit
- a sorting and off-load station
- a control box with the automated devices required for operating the machine.

The package is designed for optimised use of the equipment in “Industrial Technology” work. This is why it includes:
- different sensor technologies and characteristics (inductive, capacitive, photoelectric, linear, analogue, magnetic and pressure)
- pneumatic automated devices (cylinders and distributors)
- an operator panel (button, selector, led, version MD1AE825 only) and an operator dialogue on Magelis terminal (choice aid, message, configuration, etc.)
- a Premium PLC
- an Altivar speed controller driving the motor of the 0.18 kW drilling unit
- safety switches with Preventa module
- a set of parts.

A simplified version with XTB incorporated and fewer functions is also offered for a lower cost.

To order
MD1AE825L: Percetris system, simplified version
Goods lift

Teaching objectives
- To learn how a lift operates
- To maintain a lift
- To configure and adjust a dedicated Lift drive
- To study the safety standards governing lift manufacture and installation

Electrical and mechanical data
- **Electrical power supply:**
  240 V single-phase or 400 V three-phase depending on model, 1 kVA
- **Size (H x W x D) - weight:**
  2400 x 820 x 885 mm - 200 g

Main industries
- Electrical engineering
- Industrial engineering and maintenance

Mechanical sub-system:
- Module with guillotine door: mechanically welded structure with expanded metal on four sides including:
  - a guillotine door on partition wall
  - a mechanical lock with shunt opening control
  - an aluminium control panel on the front equipped with anti-vandal pushbuttons, a fault indicator and a car presence indicator
  - a floor stop shaft contact.
- Module with swing door: mechanically-welded structure with expanded metal on four sides including:
  - a sheet metal door 400 x 500 mm wide
  - a mechanical lock with shunt opening control
  - an aluminium control panel on the front equipped with anti-vandal pushbuttons, a fault indicator and a car presence indicator
  - a floor stop shaft contact.
- Module with suspension failure safety gear system: mechanically-welded structure with expanded metal on four sides including:
  - an aluminium control panel on the front equipped with a red fault indicator light during operation of the safety gear
  - a cable slack contact on the car frame.

Package description
The basic version includes two user levels and one machine room level with two types of door technology (swing door and guillotine door).

The control enclosure for the basic version employs electromechanical technology with an Altivar variable speed drive.

An 0.55 or 0.75 kW asynchronous motor is used for motorisation.

The lift load is 25 kg. The safety gear is designed for 80 kg.

This system incorporates standard lift technologies:
- swing door for level 0
- guillotine door for level 1
- machine room door on the top section
- full length inspection panel on the left side

The lift car is driven between guide rails by a motor with a 165 mm diameter drum driven by a variable speed drive.

There is a 165 mm diameter rope pulley, a suspension failure safety gear and an electric roller contact on the roof of the lift car.

The landing control column includes:
- upper and lower floor stop
- upper and lower limit switch
- upper and lower deceleration contacts
- safety gear reset contact
- junction boxes.

The landing control stations include:
- green presence indicator light
- red fault indicator light
- presence buzzer
- anti-vandal lift call button
- anti-vandal lift return button.

Main basic enclosure:
- electromechanical technology
- Altivar 12 servo drive.

The following alternative options are also available:
- Twido PLC with Ethernet connection to communicate with the vocational diploma teaching low voltage switchboard
- Altivar 31 Lift or Altivar 312 variable speed drive
- control station sets specific to the type of lift installation:
  - lift pit control station
  - inspection control station
  - maintenance control station.

To order
Consult us for study and quotation
Productis: integrated production system

Teaching objectives
- To operate, manage, maintain, adjust and control an integrated production and packaging system for tablets
- To ensure multi-product production management with a combination of manual and automatic workstations
- To study a workshop’s organisation methods (operation time management, production changeovers, quality monitoring)
- To control maintenance with replacement or addition of sensors
- To carry out maintenance operations

Electrical and mechanical data
- Power supply:
  400 V three-phase + N + E / 2.6 kVA
- Supply of compressed air:
  6 bars
- Size (H x W x D) - weight:
  1850 x 1150 x 2150 mm - 340 kg

Main industry
- Mechanical engineering

Other industry
- Electrical engineering

Package description
Productis is constructed around a computer-integrated pallet transfer system used in an industrial environment. It is designed for filling tablet bottles and includes:
- A mechanically welded frame with a slat conveyor for transferring pallets
- A 90 W asynchronous motor
- Removable transparent protective casings with safety switches
- Two fixed sub-assemblies for filling and closing the bottles, which perform the tablet counting, bottle capping and faulty product rejection functions
- Two equivalent, removable sub-assemblies for carrying out maintenance, dismantling/assembly and adjustment operations under production conditions
- A Premium or M340 PLC
- An Ethernet-based communication architecture
- A human-machine interface enclosure for controlling and monitoring production using a Magelis terminal
- A set of accessories (pallets, ball bearing and bottles with caps).

The following steps are carried out during the production process:
- Manual loading of the pallet (bottle and cap)
- Dosing by counting the tablets
- Closing the bottle and inspection
- Removal of the pallet.

The removable sub-assemblies are independent and operate by replacing the reference functions for the dynamic test.

The Productis production management system developed in the training course is used to:
- Set up a multi-product production system with a combination of manual or automatic workstations
- Study a workshop’s organisation methods (operation time management, production changeovers, quality monitoring)
- Dismantle or re-assemble sub-assemblies and adjust operation settings (moving units, cylinders and sensors)
- Troubleshoot and repair workstations (including machine assistance with possibility of inhibition) using the operating modes dedicated to maintenance teams included in the workstation programming.

Workstation

Premium PLC
Productis: integrated production system

The Productis system can be supplied either with 2 fixed workstations (bottle filling and closing), or with 4 workstations (2 fixed workstations and 2 removable workstations). Changing from a 2-workstation to a 4-workstation version is easily done by acquiring the 2 removable sub-assemblies.

**RFID option**
This option allows you to assign an electronic product code (manufacturing order number) to a memory integrated in the pallets. This code is used at the workstations to manage operations and track production depending on the different types of packaging. All the configurations are made by the operator from the operator terminal.

**Description of sub-systems**
Both sub-systems are supplied with cables and support frames. They can be connected to a training PLC to provide independent, standalone operation of the Productis machine.

**The bottle filling station includes:**
- a transparent hopper to store tablets, with two separating disks for their distribution
- a photo-electric sensor to control the level of tablets in the hopper
- a double-acting rotary cylinder to position the discs and distribute the tablets
- a fibre optic sensor to count the tablets
- two inductive sensors to control the position of the cylinder
- a convergent optical head to check the presence of bottles on the workstation
- a photo-electric sensor to check if the bottle is capped.

**The bottle closing station includes:**
- two inductive sensors for the presence of pallets
- a pneumatic manipulator with dual axis gantry (horizontal and vertical) with four sensors to check the position of movements
- a venturi system for picking and placing the caps on the bottles.

**To order**
- MD1AE905TSX: Productis Premium with 4 workstations
- MD1AE905TSXP2: Productis Premium with 2 workstations
- MD1AE909RFID: RFID option
- MD1AE903: bottle filling station
- MD1AE904: bottle closing station
Industrial shrink wrapping machine

Teaching objectives
- To operate, manage and adjust a packaging machine
- To make production changeovers
- To carry out maintenance operations
- To use the ASi bus

Electrical and mechanical data
- Power supply: 400 V three-phase + E / 12 kVA
- Supply of compressed air: 6 bars
- Size (H x W x D) - weight: 2000 x 3500 x 1800 mm - 800 kg

Main industries
- Industrial engineering and maintenance
- Electrical engineering

Package description
The shrink wrapper is a manually-loaded industrial packaging machine. This system includes:
- An operational part containing the following six elements:
  - Input conveyor
  - Loader
  - Welding station
  - Shrink tunnel
  - Output conveyor
  - Film feeder.
- An electrical control cabinet controlling the 6 motors, the oven and the pneumatic actuators.
- The system is controlled by a TSX Micro, M340 or Premium PLC. The belt motor is controlled by an Altivar 312 variable speed drive and the human-machine interface is provided by a Magelis XBTGT touch screen terminal.
- The bus and networks available on the machine are:
  - Ethernet TCP-IP
  - Modbus TCP-IP
  - ASi bus.
- This complete system allows trainees to study the main components of an automation system:
  - Commissioning
  - Change of product range (adjustments, parameter settings)
  - Troubleshooting - electrical, pneumatic, automation system and mechanical breakdowns
  - Communication network (Ethernet TCP-IP, ASi)
  - Operator terminal with supervision (XBTGT and Vijeo Designer)
  - Industrial maintenance
  - Program modification depending on product ranges.
- Two sub-systems are available:
  - A supply conveyor
  - A film dispenser.
- Rolls of film are also available separately.

To order
Consult us for study and quotation
Automated flexible assembly line

Teaching objectives
- To study, install and control an industrial assembly line
- To manage production flows
- To manage the operating and safety modes
- To manage the production range
- To program and supervise
- To maintain the system: creating and locating faults

Package description
The flexible assembly line is designed for production-related training. All the industrial sectors of activity (automotive, electronics, cosmetics, agriculture & food, chemical, etc.) are covered by this type of manufacturing process. The basic version of the flexible assembly line is designed for assembling different control station models. However, it is an open-ended system which can be adapted to suit requirements. It introduces trainees to areas of application such as process design and manufacturing resource planning, industrialisation methods, maintenance, production management and production system control.

Your Schneider Electric representative will help you define the most appropriate system for your needs, based around the following standard elements:
- A central automated transfer control loop with product transportation pallets for managing product flows in real time
- One (or more) manual workstation(s): loading the primary parts (concept of "picking"), unloading the finished products with control and management of product faults
- One (or more) automatic material transformation workstation(s)
- One (or more) automatic assembly and control workstation(s)
- A supervisory station for managing manufacturing orders and displaying the assembly line status and production activity report.

Selection by industry
The flexible assembly line concept allows a multitude of possibilities and adapts to all types of teaching.

Examples of systems built in France:
- An automatic assembly line (vocational training centres in Nancy and Douai)
- A flexible robotic assembly line (technology platform used at the training campuses in Aix-en-Provence (Lycée Vauvenargues) and Nantes (Ecole des Mines)
- A flexible production line (Institute of Technology - Quality, industrial logistics and organisation department in Cambrai, Alençon and Béthune)
- A control station assembly line (Industrial and Commercial Training Institute in Tourcoing - Automated production systems control engineering diploma).

Electrical and mechanical data
- Power supply: 400 V three-phase + E / < 32 A
- Compressed air supply: 6 bars
- Size (H x W x D): 5000 x 3500 x 2000 mm (according to installation)

Main industries
- Automated production systems control engineering diploma
- Institute of technology - Quality, industrial logistics and organisation department

Other industries
- Industrial engineering and maintenance
- Electrical engineering

To order
UEMAAS: consult us for study and quotation
Miscellaneous
## Miscellaneous

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Training courses

Our courses
- Electrical distribution in the LV and MV fields. Application equipment: Multi 9, Compact NS and Masterpact circuit breakers, SM6, MCset, Fluair, VM6 and RM6 switchgear units and Sepam protection relays.
- Industrial automation. Application equipment: TSX Micro, Premium and Quantum M340 PLCs, Altivar variable-speed drives and Altistar starters.

The Schneider Electric Training serves customers worldwide

We offer training courses tailored to your needs. Training can be provided in our premises or on your site. Our training staff is ready to travel anywhere in the world. The contents of our standard courses can be customised to take into account your specific needs and your installation. Courses can also take into account your processes, wiring diagrams and other working documents. The courses and documentation are in English, but other languages are available on demand.

Practical exercises on your equipment can be added to form comprehensive training suitable for your specific needs. Our training sessions can be adapted taking into account:
- the availability and the specifications of your teams
- your business orientations
- your company culture…
Our publications

Automation solution guide
A guide valued by automation engineers, from the educational world to systems integrators, from the electrician to machine manufacturers, dedicated entirely to the design and implementation of industrial installations.
You will find:
- a global approach to the design of the automation system architecture
- a reminder of the fundamental, updated knowledge on electrical distribution and safety regulations
- guides on the choice of automation system architectures incorporating Schneider Electric’s latest technologies.

Electrical installation guide
Aimed at professional electricians from companies, design offices, auditing bodies, to educators and trainers, this guide compiles the regulatory, standard and technical data on electrical installation.
New chapters:
- energy efficiency of electrical distribution
- photovoltaic installations.

Technical specifications on CD ROM
The technical specifications put together on CD ROM provide you with technical answers and material solutions in terms of electrotechnical engineering:
- automation systems and information networks
- the basics of electrotechnical engineering
- electrical distribution
- electrical and environmental constraints
- energy efficiency
- safety: security, availability, etc.
- shut-off techniques and switchgear
- electrotechnical applications

Services

To help you
with installing and handling educational equipment, we offer you implementation and/or training actions.

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Discover all solutions, products and services on Internet site www.schneider-electric.com

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Training, a profitable investment

More information

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Technical publications

Sustainable development and foundation
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