MecLab®
Technology for secondary schools

FESTO

MecLab®
Technology for secondary schools

Automation technology in school

Automation technology is one of the most important growth technologies in the world. Automated systems are to be found in virtually every area of life today.

Festo is the innovative leader in industry and process automation. And with our subsidiary Festo Didactic, we are the leading provider of learning and skills-development solutions.

With MecLab®, the new learning system for secondary schools, pupils gain insights into one of the most significant fields of application for automation technology – production technology.

The three MecLab® stations represent simplified models of typical processes to be found in any automated production plant.

The learning objectives of MecLab®

With MecLab® a wealth of teaching topics and curriculum requirements can be covered, because its contents can be adapted accordingly:
– Introduction to industrial production
– Using technical terms correctly
– Planning, developing and setting up technical systems
– Understanding and using technical documentation; creating and using schematic diagrams, circuit diagrams, parts lists and technical drawings
– Building models and creating simulations
– Understanding and applying open- and closed-control loop systems
– System thinking and understanding the interactions of subsystems
– Developing and constructing electric, electronic and pneumatic circuits
– Understanding and using pneumatic and electrical actuators, sensors and controllers
– Using computers as tools for programming and simulation

Realistic and fascinating

– MecLab® replicates real industrial production processes.
– Only industrial components are employed.
– The pupils are presented with a diverse range of modification, expansion and programming possibilities.

The tools required for making modifications are included. The wiring of the electrical components is simple and does not require tools, due to the use of standardised plugs. That lets you utilise MecLab® flexibly in your classes, however you prefer.

This award tells its own tale:
Worlddidac Award 2008

Modular and flexible

The MecLab® stations can be used alone. Each one performs a practical function in itself, offering a wide range of learning possibilities and subject matter.

In addition, the stations can be joined together to form more complex "production lines". This results in many opportunities for project work.

Thus, after a short initial training period, pupils can take on the role of engineer and start working with MecLab®. By interchanging components, the standard exercises can be expanded and changed.

MecLab®
The complete package
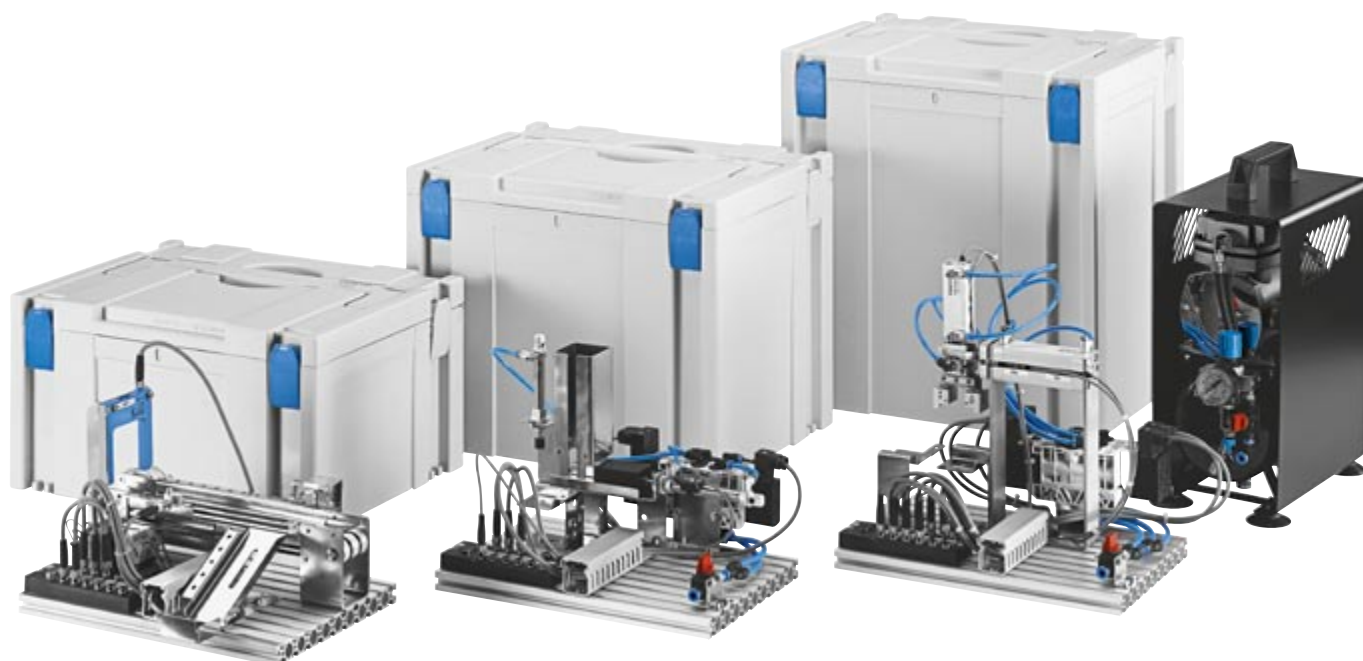
The hardware

MecLab® is delivered in practical, stackable systainers, which function as storage units as well as transport packaging.

MecLab® is delivered fully assembled and ready for immediate use.

MecLab® is sturdy and fully capable of withstanding the rigors of a school environment.

The individual stations have different functions:
– The Stacking Magazine station contains a workpiece storage container and a feed separator.
– The Conveyor station can transport and sort workpieces.
– The Handling station can grip the workpieces and deposit them at defined points.

The accompanying documents on CD-ROM

The complete package includes a CD-ROM with:
– Workbook: Teaching with MecLab®
– Technical book: Fundamentals of automation technology
– Book of exercises with 5 – 7 exercises per station and prepared worksheets in *.doc format with solutions; these can be easily adapted to meet your particular requirements.
– Prepared PowerPoint presentations with extensive visual materials for use in class
– Videos
– Technical data for all components

Control with FluidSIM® software

The stations are controlled with FluidSIM® software and the EasyPort interface.

FluidSIM® is the application for creating and simulating pneumatic and electrical circuits and programmable logic controllers. With its universal PC interface, FluidSIM® can control the MecLab® stations directly. As a result, the pupils can follow a continuous functional chain from the circuit diagram to simulation to control.

Since FluidSIM® is supplied as a classroom licence, the number of pupils who can work with FluidSIM® at one time is limited only by the number of computers. They can use it to try out their solutions in simulation before testing them on the real station. Moreover, FluidSIM® provides information at the click of a mouse button about all components, and many informative animated sequences.

The complete package

Contains everything you need for working with MecLab®:
– 1 Stacking Magazine station
– 1 Conveyor station
– 1 Handling station
– 1 compressor 230 V with connector for DE, FR, NO, SE, FI, PT, ES, AT, NL, BE, GR, TR, IT, DK, IR, ID or 1 compressor 110 V with connector for US, CA, Central America, BR, CO, YU, EC, KR, TW, TH, PH, JP
– 3 x EasyPort to connect the stations to the computer
– 3 x power supply unit with connector for DE, FR, NO, SE, FI, PT, ES, AT, NL, BE, GR, TR, IT, DK, IR, ID or 3 x power supply unit with connector for US, CA, Central America, BR, CO, YU, EC, KR, TW, TH, PH, JP
– FluidSIM®
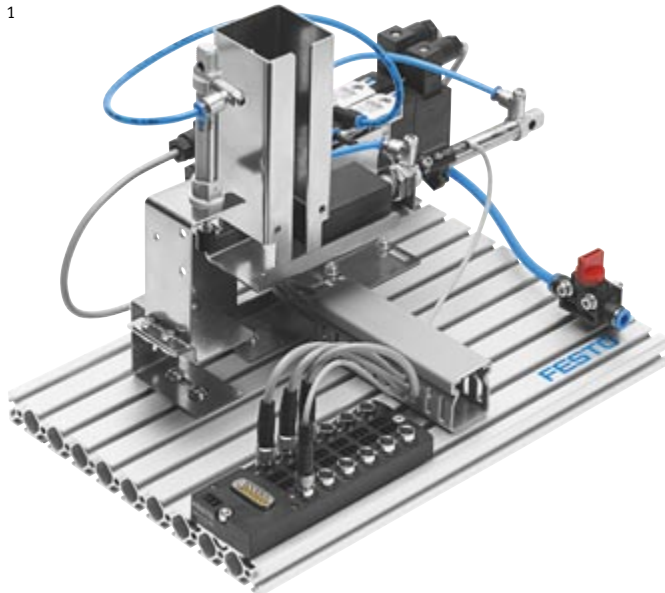– Documents on CD-ROM
– Workpieces
– Tools
– Screw set
– Systainers

Complete package

Complete package	
230 V	549786
110 V	556276

MecLab®
The Stacking Magazine and Conveyor stations

1

2

1 Stacking Magazine station

Functions

In any automated production line, workpieces must be stored and fed into the production process in an orderly way. In MecLab® that is the job of the Stacking Magazine station. It can store both workpieces (lid and can) in the arrangement desired, and can separate them out for feeding. The workpieces stored in the tower magazine are pushed out by the horizontally positioned cylinder. The vertically positioned cylinder can then replicate a press-fit process (e.g. pressing a lid onto a can). All processes are controlled electro-pneumatically. A magnetic limit switch can be used to record the position of a cylinder.

Technical learning objectives

– Fundamentals of pneumatics
– Single-acting cylinders
– Double-acting cylinders
– Solenoid valves
– Sensor technology – magnetic limit switches
– Connecting tubing and wiring
– Relay control systems

Scope of delivery

– Stacking magazine module
– Press-fit unit module
– Multi-pin plug distributor
– 2 solenoid valves
– 2 cylinders
– 1 magnetic limit switch
– Aluminium slotted assembly board
– Tool set
– Workpieces
– Systainer
– Equipment trays
– CD with FluidSIM® and documents

2 Conveyor station

Functions

Transporting workpieces from one manufacturing station to the next is an important task in production. In the real world, driverless transport systems, forklift trucks and above all conveyor belts are used for this purpose. The conveyor in MecLab® allows realistic simulation of an industrial workpiece transport system. The drive motor can run forwards and backwards; workpieces can be detected with the sensors and distinguished from one another. The solenoid allows workpieces to be separated or rejected onto the slide.

Technical learning objectives

– Activation of direct currentmotors
– Inductive sensors
– Opto sensors
– Relay circuits
– Polarity reversal circuits
– PLC programming
– Control using logic operations
– Construction and wiring

Scope of delivery

– Conveyor belt module with
– DC motor
– Solenoid as stopper/deflector
– Multi-pin plug distributor
– Inductive sensor
– Opto sensor (light barrier)
– Aluminium slotted assembly board
– Tool set
– Workpieces
– Systainer
– Equipment trays
– CD with FluidSIM® and documents
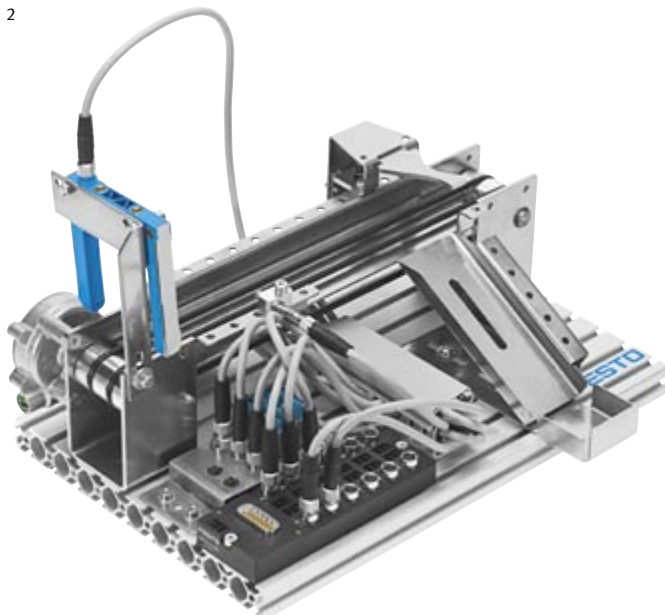
1 Stacking Magazine station	548704

Necessary accessories	
Control package	549787
Compressor ➔ Page 7	

2 Conveyor station	548705

Necessary accessories	
Control package	549787

MecLab®
Handling station und Expansion set

3 Handling station

Functions
No matter whether it's a simple depositing operation or highly complex assembly work – handling systems are always involved. Handling devices range from simple, two-axis handlers up to highly complex industrial robots with six axes. The handler in MecLab® consists of pneumatic cylinders with plain-bearing guides and has two axes. The workpiece is held by a gripper which is likewise pneumatically driven. The handler can transport the workpiece from one station to another or can join two workpiece halves together.

Technical learning objectives
– Fundamentals of pneumatics
– Double-acting cylinders
– Gripper
– Solenoid valves
– Sensor technology – magnetic limit switches
– Connecting tubing and wiring
– Relay control systems
– Control with logic
– PLC controllers
– Sequencing

Scope of delivery
– Handling module
– 3 solenoid valves
– 4 magnetic limit switches
– 2 pneumatic cylinders with plain-bearing guide
– 1 pneumatic gripper
– Multi-pin plug distributor
– Aluminium slotted assembly board
– Tool set
– Workpieces
– Systainer
– Equipment trays
– CD with FluidSIM® and documents

4 MecLab® Expansion set

This expansion set contains a range of components for realising your own project ideas. All in a practical Systainer, of course.

Content
– Two double-acting cylinders with one-way flow control valves
– 2 solenoid valves
– 1 diffuse sensor
– 2 magnetic limit switches
– 1 profile kit
– 1 profile plate
– 1 electrical button
– 1 electrical switch
– 1 indicator light
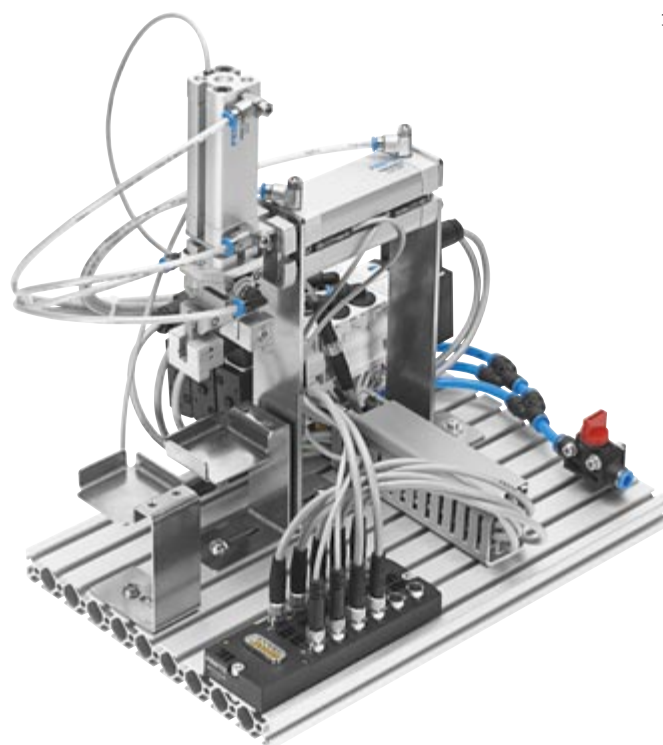
3

4

3 Handling station	548706

Necessary accessories	
Control package	549787
Compressor ➔ Page 7	

4 MecLab Expansion set	556245

MecLab®
Control options

1

1 The control package
EasyPort Mini with power supply unit and connecting cables
The control package contains everything you need for controlling MecLab®:

EasyPort Mini
– 6 digital input and output channels
– Maximum current per output channel 0.7 A, 24 V
– Digital input switching threshold 12 V
– Power supply 24 V DC ±10 %, 3 VA power consumption
– Status LED to indicate the operating status
– USB interface to connect to a PC via mini USB socket
– Including USB connecting cable
– Short circuit proof

Power supply unit
– 24 V DC output voltage
– output current max. 1.88 A
– supply voltage 100 – 24 0 V, 1.5 A, 50 – 60 Hz
– Short circuit proof

Order no.	549787

Necessary accessories

Power cable ➔ Page 7	

2

2 LOGO! Trainer Package 24 V
FluidSIM® contains a software-based minicontroller, e.g. as an introduction to the LOGO!, the minicontroller from SIEMENS. We offer an attractively priced set of 5 LOGO! modules. For industrial colleges and training centres.

Package includes:
– Set of 5 LOGO! 12/24RC
– Programming software LOGO! Soft Comfort
– 1 USB programming cable

Order no.	556235

Set of 4 LOGO! USB PC cables
(without illustration)

Order no.	556237

3

3 Connecting cable
Connecting cable with 15-pin sub-D connector and free cable ends.
– For connecting a Logo! to the multi-pin plug distributor of a MecLab® station.
– Connecting cable for the end-position controller SPC 11 with 4 mm safety plugs.

Order no.	177673

4 FC 100 EduTrainer®
The FC 100 mini control system combines three functions in one unit:
– **Convenient handheld control unit**
  At the push of a button, up to 8 digital inputs and outputs can be set and deleted. The status of the outputs and of up to 8 digital inputs is conveniently shown on the display.
– **Simple programming via „teach-in"**
  In recording mode, the FC 100 records the user's set and delete commands and saves the relevant entry screen as a step enabling condition. Thus, a PLC program can be created simply and played back again and again.
– **CodeSys compatible PLC**
  The FC 100 is also a fully-fledged PLC with 8 digital inputs, 8 digital outputs and an Ethernet interface. The user can create his own PLC programs in accordance with IEC 61131 or with C++ and run them on the FC 100 over the serial interface and the supplied CodeSys software. The FC 100 is powerful enough to control an MPS® Station, for example. Operation is carried out via the FC 100's display.

Includes CD ROM with operating instructions and CodeSys demo. Limited to 2 hours operating time, restart required thereafter.

Order no.	548676

Connecting cable SysLink – Sub-D
(without illustration)
Cable for connection MecLab® stations with sub-assemblies that have a 24-pin SysLink plug.

Order no.	560752

4

5 Training program LOGO! Training
This training program provides an introduction to logic functions. First of all, AND & OR functions and their processing are shown in function tables. Other basic control functions such as memory, timer and counter functions round off the contents. The second part starts by covering the basics of open-and closed-loop control circuits and describes the elements of a controller. It then takes a detailed look at minicontrollers with their features and areas of application.

From the contents:
– Basic technical functions (AND & OR function, memory function, timer function, counter function)
– Digital minicontrollers (differentiation between open- and closed-loop control)
– Control components
– Positioning with digital minicontrollers
– Design and function of a minicontroller
– Cyclical programme processing
– Areas of application
– Programming languages

Training time: approx. 2 hours

E.g. single licence on CD-ROM, with online activation DE/EN/ES/FR

Order no.	540941

with network licence connector DE/EN/ES/FR

Order no.	540943

5

MecLab®
Compressors and power supply units

1 Compressor for MecLab®
Low-cost compressor for MecLab®.
Only 54 DB (A), therefore well suited
for use in classrooms.
Supplies up to 4 stations.
– Pressure: max. 400 kPa (4 bar)
– Suction capacity: 14 l/min
– Reservoir capacity: 2,5 l
– Dimensions: 310 x 150 x 370 mm

Design: 230 V/50 Hz, 135 W
With mains cable suitable for:
DE, FR, NO, SE, FI, PT, ES, AT, NL, BE,
GR,TR, IT, DK, IR, ID

Order no.	548707

Design: 110 V/60 Hz, 70 W
With mains cable suitable for:
US, CA, Central America, BR, CO, YU, EC,
KR, TW, TH, PH, JP

Order no.	556275

2 Compressor
Oil-lubricated, extremely quiet (45
dB (A)) compressor. Ideally suited
for use in classrooms. With pressure
regulator and water separator.
Supplies up to 8 stations.
– Pressure: 800 kPa (8 bar)
– Performance: 50 l/min
– Reservoir capacity: 25 l
– Compressed air outlet: ¼"

Design: 230 V/50 Hz
With power cable suitable for:
DE, FR, NO, SE, FI, PT, ES, AT, NL, BE, GR,
TR, IT, DK, IR, ID,

Order no.	91030

Design: 100 – 120 V/50 – 60 Hz
With fully insulated socket

Order no.	565440

Necessary accessories

Mains cable	

Accessories:
Coupling socket, coupling plug, tubing

Order no.	102725

3 Tabletop power supply unit
– Input voltage: 85 – 265 V AC
  (47 – 63 Hz)
– Output voltage: 24 V DC,
  short-circuit-proof
– Output current: max. 4.5 A
– Dimensions: 115 x 155 x 200 mm
Without power cable

Order no.	162416

With power cable, 1.3 m, suitable for:
DE, FR, NO, SE, FI, PT, ES, AT, NL, BE, GR,
TR, IT, DK, IR, ID

Order no.	162417

US, CA, Central America, BR, CO, EC, KR,
TW, TH, PH, JP

Order no.	162418

GB, IE, MY, SG, UA, HK

Order no.	162419

AU, NZ, CN, AR

Order no.	162380

CH

Order no.	162381

ZA, IN, PT, SG, AE, HK, (GB)

Order no.	162382

4 Power cable
One side designed as a connector
and one side with a country-specific
plug.
DE, FR, NO, SE, FI, PT, ES, AT, NL, BE, GR,
TR, IT, DK, IR, ID

Order no.	247661

US, CA, Central America, BR, CO, EC, KR,
TW, TH, PH, JP

Order no.	350362

GB, IE, MY, SG, UA, HK

Order no.	350363

AU, NZ, CN, AR

Order no.	350364

CH

Order no.	350366

ZA, IN, PT, SG, AE, HK, (GB)

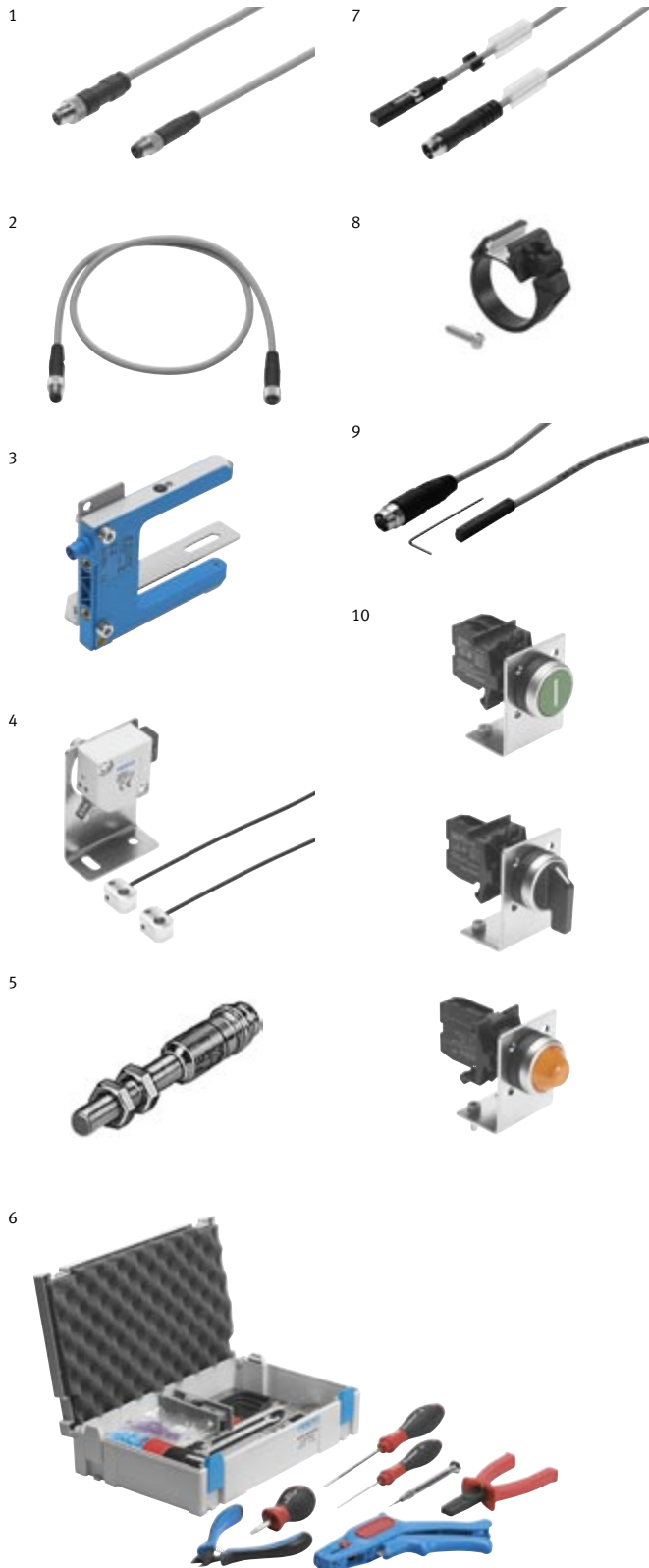| Order no.	350367

1

2

3

4

MecLab®
Extensions for sensors

With these components, new functions can be implemented with MecLab®. The perfect extension of MecLab® for project work.

1 Connecting cable between MecLab® stations
Cable data connection between two MecLab® stations. Connects the input channel of one station to the output channel of another station. Length 0.5 m, with two 3-pin M8 plugs.

Order no.	549790

2 Sensor/actuator cable M8/M8, 50 cm
Extension cable with 3-pin M8 plug connector or socket for extending sensor or actuator cables.

Order no.	175488

3 Light barrier
Fork light barrier, fork gap 50 mm, complete with connecting cable and mounting accessories.

Order no.	549791

4 Retro-reflective sensor
Fibre-optic diffuse sensor, complete with optical fibres, connecting cable and mounting accessories.

Order no.	549792

5 Inductive sensor
Inductive sensor, cylindrical design with M5 male thread, 0.6 mm sensing distance, complete with connecting cable and mounting accessories.

Order no.	549793

6 Tool set
The tool set is an aid to easy working on stations.
A practical mini-systainer includes:
– 200 mm steel rule
– Open-jawed spanners size 7, 8, 9, 10
– Adjustable spanner
– Side cutter
– Insulation-stripping pliers
– Wire end sleeve pliers
– Screwdriver set, hex, 1.5 – 6
– Screwdriver, hex, 0.9; 1.3
– Screwdriver, cross-head, PZ02 – short
– Screwdriver, flat, 2.5 x 75; 4.0 x 100
– Screwdriver, flat, 1.2 – 1.6
– Tubing cutter
– Fibre-optic cable cutter
– Workpiece, red, black, silver
– 100 x cable binders 2.5 x 100
– 100 x wire end sleeves 0.25
– 100 x wire end sleeves 0.75

Order no.	539767

7 Magnetic limit switch
Limit switch for detecting the pneumatic cylinder piston position, for round and profile cylinders, with connecting cable.

Order no.	543861

8 Mounting of proximity switches on circular cylinders
Kit for magnetic limit switch, Order no. 543861, on circular cylinders.

Order no.	175092

9 Magnetic limit switch for gripper
Limit switch for detecting end positions at the gripper on the Handling station.

Order no.	526679

10 Signal input/output
– 1 electrical button
– 1 switch
– 1 indicator light each
Complete with mounting materials and connecting cable.

Order no.	556249

MecLab®
Extensions for actuators

1 Stopper/deflector
Solenoid for mounting on both sides of the conveyor, stopper or deflector function, complete with connecting cable and mounting accessories.

Order no.	549795

2 Bistable 4/2-way solenoid valve
Manual override with detent, complete with fittings, silencer, mounting bracket and mounting screws.

Order no.	549803

3 Monostable 4/2-way solenoid valve
Monostable 4/2-way solenoid valve, can be converted to 3/2-way function, manual override with detent, complete with fittings, silencer, mounting bracket and mounting screws.

Order no.	549804

4 Stamping unit
Press-fit unit for attaching to the stacking magazine station or conveyor, comprising single-acting cylinder with 25 mm stoke and 10 mm diameter, complete with one-way flow control valve, mounting bracket and mounting screws.

Order no.	549805

5 Double-acting cylinder
Double-acting cylinder, 10 mm diameter, 50 mm stroke, complete with one-way flow control valves, foot mounting and mounting bolts.

Order no.	556248

6 Vacuum gripper
Handling station vacuum gripper kit as a substitute for the mechanical gripper, complete with vacuum generator, 20 mm diameter suction gripper and mounting accessories.

Order no.	549796

7 Stop cock
Manually operated stop cock with 3/2-way function for tubing diameters of 6 mm, complete with mounting bracket and mounting screws.

Order no.	549809

8 T-distributor
T-distributor for plastic tubing, 2 of each for tubing diameters 4 mm and 6 mm.

Order no.	549810

9 Plastic tubing

4 x 0.75 Silver 10 m	151496
3 x 0.5 Silver 5 m	197118
6 x 1 Silver 5 m	152963

Minimum order quantity/packaging unit quantity: 50 m

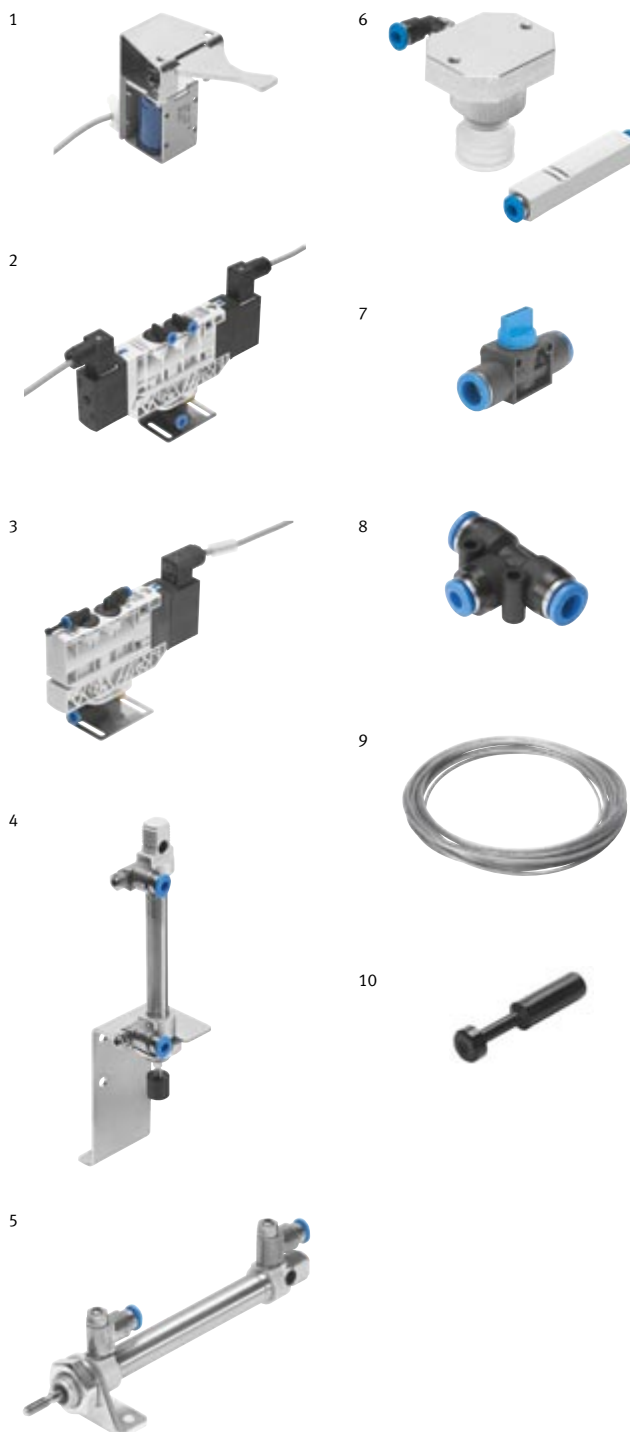| 4 x 0.75 Silver	152584
4 x 0.75 Blue	159662
4 x 0.75 Black	159663
4 x 0.75 Red	178410
4 x 0.75 Yellow	178417
4 x 0.75 Green	178424

10 Blanking plugs
Blanking plug for sealing QS-4 fittings of valves, for example.
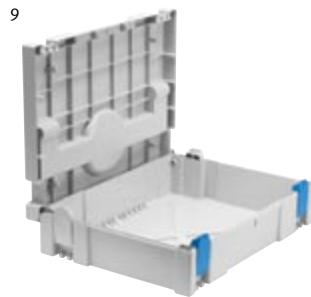Nominal diameter 4 – QSC-4H

Minimum order quantity/packaging unit quantity: 10 pieces

Order no.	153267

MecLab®
Mechanical components
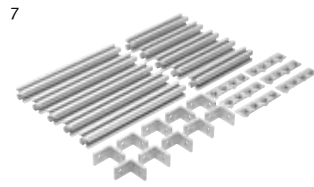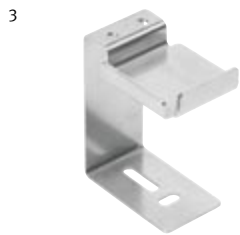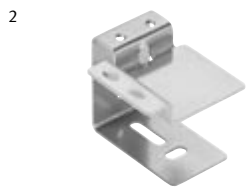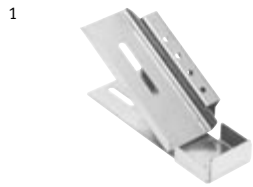
1 Slide
Slide for transporting or storing workpieces, 40 mm in diameter, for maximum 3 workpieces, mounting surface for sensors and actuators Complete with mounting accessories.

Order no.	549797

2 Tray, low
Holding tray for retaining workpieces 40 mm in diameter and 39 mm in height. Complete with mounting accessories.

Order no.	549798

3 Tray, high
Holding tray for retaining workpieces 40 mm in diameter and 62 mm in height. Complete with mounting accessories.

Order no.	549799

4 Workpiece set
Workpiece set consisting of 6 plastic cans in silver, red and black (2 of each), diameter 40 mm, height 25 mm, and 6 lids.

Order no.	549800

5 Rail
Cover for ejecting opening in the conveyor, length 140 mm, with mounting surface for sensors or actuators. Complete with mounting accessories.

Order no.	549801

6 Profile connector
Connector for two aluminium slotted assembly boards with 20 mm grid dimension. Complete with mounting screws.

Order no.	549802

Screw kit MecLab®
Bag of replacement screws and T-head nuts (without illustration).

Order no.	556255

7 Assembly kit
Selection of aluminium profiles, 20 x 20 mm in lengths of 140 and 70 mm. Complete with mounting materials.

Order no.	556247

8 Profile plate for MecLab®
Profile plate with dimensions 200 x 300 mm, thickness 20 mm, slot spacing 20 mm. Complete with self-adhesive rubber feet.

Order no.	556246

9 Systainer
Stackable interlocking case system, made of light grey plastic with light blue snap fasteners.

Size 0 (Mini-Systainer): 50 x 248 x 158 mm
Order no.	533014
Größe 1: 72 x 377 x 277 mm
Order no.	526714
Size 2: 124 x 377 x 277 mm
Order no.	526715
Size 3: 176 x 375 x 274 mm
Order no.	526716
Size 4: 279 x 377 x 272 mm
Order no.	526717
Size 5: 395 x 360 x 272 mm
Order no.	544375
Soft foam insert for lid
(for Systainer sizes 1 – 3)
Order no.	526814
(Interior dimensions W x H x D respectively)

10 Trolley for Systainer
Trolley for transporting Systainers sizes 1 to 5, can carry up to 5 Systainers.
With 2 adjustable heights:
height 1: 105 cm, height 2: 97.5 cm.
Tare weight 4 kg, load bearing capacity 50 kg.

Order no.	549788

11 Dolly truck for Systainer
Dolly truck for transporting Systainers sizes 1 to 5.
4 castors with a brake.

Order no.	549789

Rubber ring conveyor
The conveyor belt of the conveyor station is a wearing part and deliverable as a spare part (without illustration).

Order no.	701221

MecLab®
Digital training programmes and print media

Digital training programmes

Excellent solutions for ...
– learning and teaching
– programming
– experimentation
– simulation
– visualisation
– management
– play
– operation and observation

... and more in digital format.

To complement the teaching potential of MecLab®, we recommend the following learning programs:
– WBT Fascination of technology
– WBT LOGO! Training
– WBT Actuators – DC motor
– WBT Open- and closed-loop control
– WBT Pneumatics
– WBT Electropneumatics
– WBT Electrical engineering 1 and 2
– WBT Electronics 1 and 2
– WBT Sensor technology 1 and 2

Detailed information and free demo versions:
www.festo-didactic.com

Courseware

Theory and practice – tailored to meet your needs, we have a wide range of textbooks and workbooks, dictionaries, sets of overhead transparencies, posters and other work materials.

Our recommendations for MecLab®:
– Textbook: Pneumatics, Basic level
– Textbook: Electropneumatics, Basic level
– Textbook: Proximity sensors
– Practical knowledge: Basic pneumatic controllers
– Set of posters on pneumatics

Detailed information, free sample extracts, and online download of books:
www.festo-didactic.com

The fascination of technology

LOGO! Training
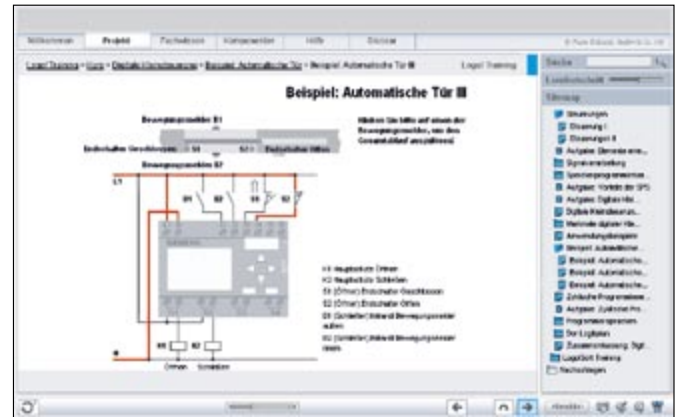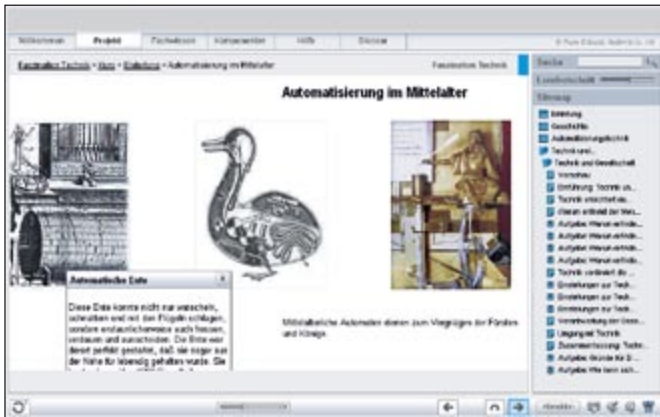
This exciting journey through the history of technology shows how inventions have changed the world. New forms of work have been created: from the hunter to the engineer. „The fascination of technology" is an interactive journey through the world of automation. The program contains many different multimedia components to help you on your journey. Experience the excitement of discovery and learning – this is pure edutainment! The programme consists of 4 modules:

Technology and automation

Every day we come across technology and automated processes. This introduction illustrates, with practical examples, just how much life is affected by technology, in earlier times too but particularly today.

The history of automation technology

Mankind has always tried to make work easier through mechanisation and automation. Fascinating examples show how hard this development has sometimes been and how impressive the results can be.

Fundamentals of automation technology

This training module goes more deeply into practical examples. A manufacturing process previously carried out manually is automated: you learn about the parts (sensors, actuators) and processes (material flow, energy flow, signal flow) involved in an automated process.

Technology and ...

Technology and society have always been closely interwoven. This training module uses easy-to-understand examples to show how technology and society influence each other. The module also covers the limitations of technology – and possible negative impacts on society.

Training time: approx. 6 hours

E.g. single licence on CD-ROM
with online activation DE/EN/ES/FR

Order no.	540899

with network licence connector DE/EN/ES/FR

Order no.	540901

Further languages on request.

This training program provides an introduction to logic functions. First of all, AND & OR functions and their processing are shown in function tables. Other basic control functions such as memory, timer and counter functions round off the contents. The second part starts by covering the basics of open-and closed-loop control circuits and describes the elements of a controller. It then takes a detailed look at minicontrollers with their features and areas of application.

From the contents:
– Basic technical functions (AND & OR function, memory function, timer function, counter function)
– Digital minicontrollers (differentiation between open- and closed-loop control)
– Control components
– Positioning with digital minicontrollers
– Design and function of a minicontroller
– Cyclical programme processing
– Areas of application
– Programming languages

Training time: approx. 2 hours

E.g. single licence on CD-ROM
with online activation DE/EN/ES/FR

Order no.	540941

with network licence connector DE/EN/ES/FR

Order no.	540943

Actuators – DC motor

Open- and closed-loop control
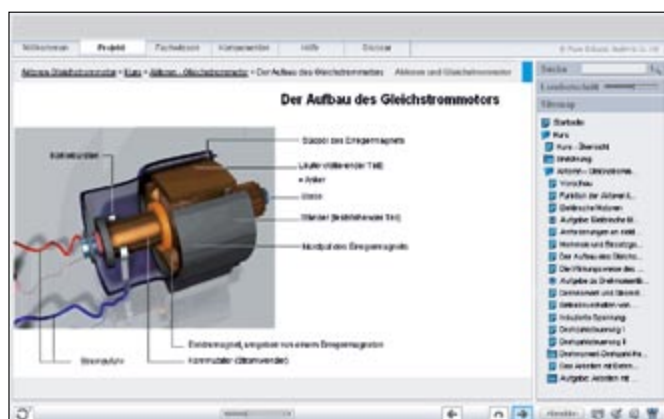
Using the everyday example of a car park access control system, the trainee learns the basics of a mechatronic system.

Building on this, the training program determines what function the actuators have in the controller. A DC motor is then studied in more detail as an example of a typical actuator, e.g. its structure and the laws which govern its operation. Further chapters cover speed control and the use of data sheets as well as the transmission ratios which can be achieved by using a gearbox.

From the contents:
– The function of actuators in mechatronic systems
– Electric motors
– DC motor
– Torque and current
– Behaviour of DC motors
– Induced voltage and speed control
– Characteristic torque/speed curve
– Working with data sheets
– Determining the transmission ratio

Training time: approx. 2 hours

E.g. single licence on CD-ROM
with online activation DE/EN/ES/FR

Order no.	540953

with network licence connector DE/EN/ES/FR

Order no.	540955
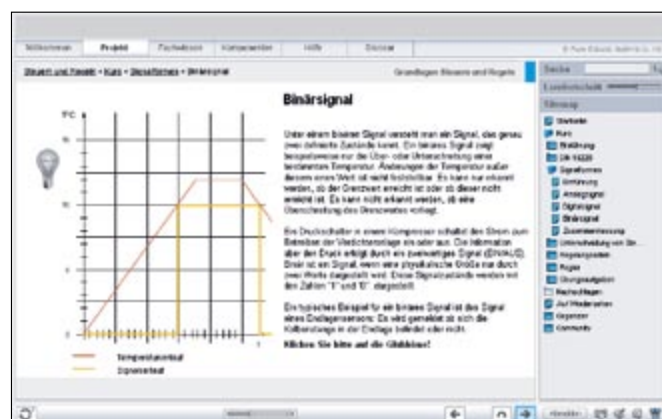
The training program uses practical examples to show the difference between open- and closed-loop control in automation. Easy-to-understand tasks are used first to examine the overall process of a simple functioning system. Later sections then look at different types of controllers, the different ways in which signals are represented and processed and the ways in which programs are implemented.

From the contents:
– Differences between open- and closed-loop control (characteristics of controllers, characteristics of regulators
– DIN 19226
– Signal types
– Differences between types of control
– Signal processing (synchronous control, controlling links, asynchronous control, process control)
– Types of control (regulating to fixed values, tracking values)
– Regulators (P, I and D controllers, combined controllers such as PI or PID controllers)

Training time: approx. 2 hours

E.g. single licence on CD-ROM
with online activation DE/EN/ES/FR

Order no.	540947

with network licence connector DE/EN/ES/FR

Order no.	540949

Pneumatics

Electropneumatics

Everything on the subject of pneumatics in about 12 hours of learning. The program is divided into technical knowledge and coursework.

Technical knowledge
This interactive self-taught program covers the basics of pneumatic control. Participants learn to find practical and theoretical solutions to the key tasks of a basic course on pneumatics, e.g. as part of a basic vocational training course.

Course
In this course the theoretically acquired technical knowledge is reinforced. A wide range of exercise types makes the course interesting and successful: participants have to draw symbols and circuit diagrams, answer multiple-choice questions and set up and connect circuits in PC-based video clips.

From the contents:
– Physical basics (units, properties, laws)
– Energy supply (production, preparation and distribution of compressed air)
– Circuit diagram (circuit diagram, symbols)
– Drive components (applications, linear drives, rotational drives)
– Valves (designs, directional valves, stop valves, pressure control valves, flow control valves, valve combinations, logic elements)
– Signalling components (manual signalling, endpoint detection)
– Additional requirements

Training time: approx. 12 hours

E.g. single licence on CD-ROM
with online activation DE/EN/ES/FR

Order no.	540911

with network licence connector DE/EN/ES/FR

Order no.	540913

Further languages on request.

The Electropneumatics training program builds on the Pneumatics training program and reinforces material already learned from practical projects. Starting with concrete industrial applications, fundamental electropneumatic circuits are produced. With the help of numerous exercises, learnt material will be revised, applied and further developed by you. During an exercise, the programme reacts to each answer with varying feedback.

The trainee is supported by the basic knowledge module, which provides fundamental knowledge on electropneumatics in a structured, systematic manner. In the components module, the structure, function and application of typical electropneumatic components is described. Various supporting materials are available to complete the exercise such as PDF documents, a variety of downloads and a comprehensive glossary.

From the contents:
– Advantages and drawbacks of electropneumatics
– Safety in electropneumatic circuits
– Fundamentals of electrical engineering
– Pneumatic circuit diagram
– Electrical circuit diagram
– Basic logic functions
– Direct and indirect electrical control, time and pressure dependent process controls
– Signal storage in the power and in the control unit, latching circuit
– Documentation for a control unit
– Maintenance and repair of electropneumatic systems
– Solenoid actuated valves
– Double-acting cylinders
– Electrical buttons and switches
– Sensors
– Relays and contactors, timed relays
– Pressure switch
– Standardised circuit diagrams, electrical and pneumatic circuit diagrams

Training time: approx. 12 hours

E.g. single licence on CD-ROM
with online activation DE/EN/ES/FR

Order no.	540923

with network licence connector DE/EN/ES/FR

Order no.	540925

Further languages on request.

Electrical engineering 1
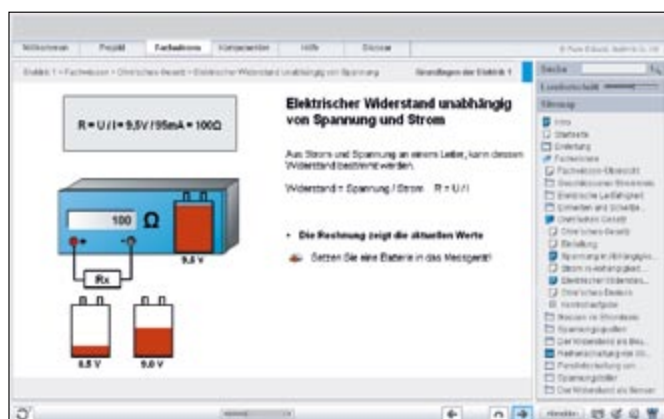
The „Electrical Engineering 1" training program is one of a series of new programs in the field of electrical engineering and electronics. These programs are practically oriented and authentically structured. Case studies from practice provide a concise illustration of the matters covered. All training content is taught by means of audio clips. Additionally, the narrative text can be viewed on the sitemap.

Trainees experience a regular exchange of input and output, with phases of presentation and explanation alternating with phases of activity and interaction. This enhances motivation and learning.

Progress monitoring exercises are scheduled after a maximum of five pages of learning. The aim of this is to have trainees repeat, apply and develop what they have learned themselves. Exercises are incorporated during teaching, at the end of each learning step and within the case studies. During an exercise, the program responds to each of the trainee's answers with the appropriate feedback.

Various tools are built-in to the training program, such as Excel worksheets, an integrated calculator, PDF files and various downloads. The training programs include an extensive glossary and a full text search facility.

Content extracts:
– Closed circuit
– Electrical conductivity
– Units and symbols
– Ohm's Law
– Measuring in the circuit
– Voltage supplies
– The resistor as a component
– Series connection of resistors
– Parallel connection of resistors
– Voltage divider
– The resistor as a sensor
– Battery-powered screwdriver
– Measuring range extension
– Temperature controlled heating
– Level detection

Training time: approx. 4 hours

E.g. single licence on CD-ROM
with online activation DE/EN/ES/FR

Order no.	549623

with network licence connector DE/EN/ES/FR

Order no.	549625

Further languages on request.

Electrical engineering 2
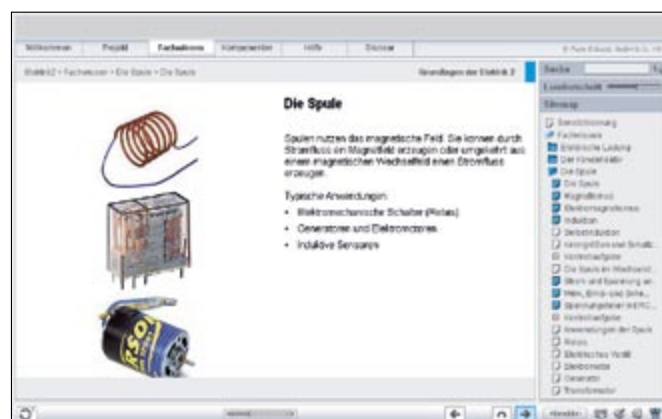
The „Electrical Engineering 2" training program is one of a series of new training programs in the field of electrical engineering and electronics. These programs are practically oriented and authentically structured. Case studies from practice provide a concise illustration of the matters covered. All training content is taught by means of audio clips. Additionally, the narrative text can be viewed on the sitemap.

Various tools are built into the training program, such as Excel worksheets, an integrated calculator, PDF files and various downloads. The training programs include an extensive glossary and a full text search facility.

Content extracts:
– Electric charge
– Capacitor
– A capacitor in a DC circuit
– A capacitor in an AC circuit
– Applications of the capacitor
– Variable capacitor
– Coil
– A coil in a DC circuit
– A coil in an AC circuit
– Applications of the coil
– Physical variables
– Calculating with changing values
– Light switch-off delay
– Electrical behaviour of a grinder
– Power generation and transmission

Training time: approx. 4 hours

E.g. single licence on CD-ROM
with online activation DE/EN/ES/FR

Order no.	549626

with network licence connector DE/EN/ES/FR

Order no.	549628

Further languages on request.

Electronics 1

Electronics 2

The „Electronics 1" training program is one of a series of new programs in the field of electrical engineering and electronics. These programs are practically oriented and authentically structured. Case studies from practice provide a concise illustration of the matters covered. All training content is taught by means of audio clips. Additionally, the narrative text can be viewed on the sitemap.

Trainees experience a regular exchange of input and output, with phases of presentation and explanation alternating with phases of activity and interaction. This enhances motivation and learning.

Progress monitoring exercises are scheduled after a maximum of five pages of learning. The aim of this is to have trainees repeat, apply and develop what they have learned themselves. Exercises are incorporated during teaching, at the end of each learning step and within the case studies. During an exercise, the program responds to each of the trainee's answers with the appropriate feedback.

Various tools are built into the training program, such as Excel worksheets, an integrated calculator, PDF files and various downloads. The training programs include an extensive glossary and a full text search facility.

Content extracts:
– Semiconductor technology
– Diodes
– Bipolar transistors
– Field-effect transistors
– Regulated power supply
– Audio amplifier
– Audio amplifier with sound control

Training time: approx. 4 hours

E.g. single licence on CD-ROM
with online activation DE/EN/ES/FR

Order no.	549629

with network licence connector DE/EN/ES/FR

Order no.	549631
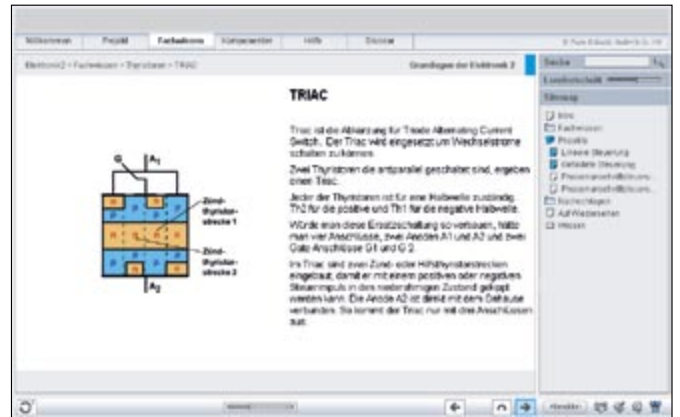
The „Electronics 2" training program is one of a series of new programs in the field of electrical engineering and electronics. These programs are practically oriented and authentically structured. Real case studies provide a concise illustration of the matters covered. All training content is taught using audio clips. Additionally, the narrative text can be viewed on the sitemap.

Various tools are built into the training program, such as Excel worksheets, an integrated calculator, PDF files and various downloads. The training programs include an extensive glossary and a full text search facility.

Content extracts:
– Signal types
– Integrated circuits
– Operational amplifier (OpAmp)
– AC voltage of various frequencies
– Characteristic values of amplifying circuits
– Circuit technology of amplifiers
– Filters
– Bistable flip-flop
– Single flip-flop
– Sine wave generator
– Rectangle generator
– Thyristor-controlled drilling machine
– Brightness control with triac
– Adjusting the speed of an electric screwdriver

Training time: approx. 4 hours

E.g. single licence on CD-ROM
with online activation DE/EN/ES/FR

Order no.	549632

with network licence connector DE/EN/ES/FR

Order no.	549634

Sensor technology 1

Sensor technology 2
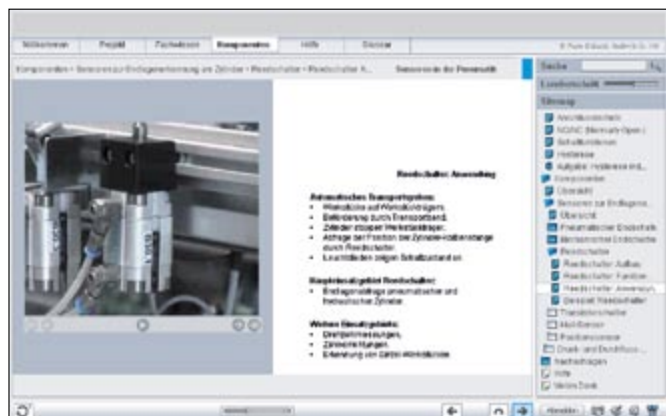
Sensors in pneumatics

This training program deals in detail with the sensors used to detect end position on cylinders and with pressure and flow sensors in pneumatic systems. Based on a complex example from industrial practice, trainees are taught to select suitable sensors. The necessary basic knowledge for this is provided in the Technical Knowledge and Components modules, to which they can refer at any time.

All training content is taught by means of audio clips. Additionally, the narrative text can be viewed on the sitemap.

Content extracts:
– Project: Selection of sensors in one of the clamping units of a processing centre
– Advantages and disadvantages of various end position sensors on cylinders
– Simple displacement encoders on cylinders
– Use of pressure sensors to improve safety in pneumatic systems
– Use of flow sensors to safeguard system cycle times
– Output signals from sensors
– Connection technology
– NO/NC (Normally Open, Normally Closed)
– Switching functions
– Sensors for end position detection: Pneumatic and mechanical limit switch, reed switch, transistor switch, Hall sensor, position sensor
– Types of pressure measurement
– Sensors for pressure measurement: Mechanical pressure switch, electronic pressure sensor,
– Sensors for flow measurement: Volumetric flow meter, effective pressure principle, ultrasonic flow meter, mass flow meter, heat-loss method

Training time: approx. 2 hours

E.g. single licence on CD-ROM
with online activation DE/EN/ES/FR

Order no.	549752

with network licence connector DE/EN/ES/FR

Order no.	549755
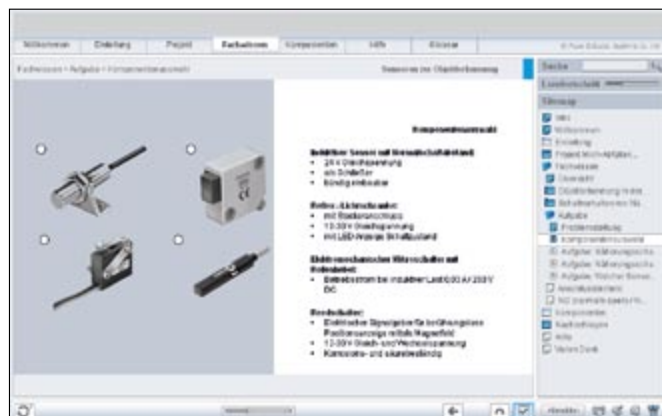
Sensors for object detection

This training program deals in detail with the sensors used to detect objects in automated systems. Based on a complex example from industrial practice, trainees are taught to select the suitable sensors. The necessary basic knowledge for this is provided in the Technical Knowledge and Components modules, to which they can refer at any time.

All training content is taught by means of audio clips. Additionally, the narrative text can be viewed on the sitemap.

Content extracts:
– Project: Selection of sensors in a milk bottling plant
– Object detection in industrial practice
– Switching characteristics of proximity switches
– Hysteresis
– Connection technology: Two-wire technology, three-wire technology, four-wire technology
– NO/NC (Normally Open, Normally Closed)
– Inductive sensors: Construction and mode of operation, factor-1 sensors, special designs, flush fitting sensors, application examples
– Optical sensors: Diffuse sensor, through-beam sensor, retro-reflective sensor, background fade-out, fibre optic cable, light types, reflection types, adjustment, contrast sensor, colour sensor
– Capacitive sensors: Construction, mode of operation, usage and examples
– Ultrasonic sensors: Construction, mode of operation, applications

Training time: approx. 2 hours

E.g. single licence on CD-ROM
with online activation DE/EN/ES/FR

Order no.	549758

with network licence connector DE/EN/ES/FR

Order no.	549761

Technical book and workbook MecLab®

Supplementary print media

Technical book: Fundamentals of automation technology

The technical book deals with all essential fundamentals of automation technology in a compact form, specially adapted for the MecLab® training system for secondary schools.

Contents
– What is automation technology?
– How do engineers work?
– Fundamentals of electrical engineering
– Fundamentals of pneumatics
– Fundamentals of electrical drives
– Fundamentals of control technology

F. Ebel, S. Idler, G. Prede, D. Scholz, A. Hüttner, R. Pittschellis
Edition 2008, 106 pages, 90 illustrations, bound

DE	562069

Other languages on request.

Workbook: Teaching with MecLab®

The workbook describes the commissioning of the stations and provides information on how they are implemented in class.

Contents
– Didactic reasoning
– Significance and commissioning of the stacking magazine station
– Significance and commissioning of the conveying station
– Significance and commissioning of the handling station
– Tips for lesson planning
– Project work

A. Hüttner, R. Pittschellis, M. Klaus, M. Hübsch, M. Striegel, T. Lust, J. Schwarz, F. Ebel
Edition 2008, 86 pages, 50 illustrations, coloured, bound

DE	562070

Other languages on request.

Pneumatics, Basic level

This book is intended for basic training in pneumatic control technology and teaches physical fundamentals of pneumatics as well as the function and use of pneumatic components. Numerous diagrams facilitate and ensure comprehension. Pneumatic circuits are explained using examples. Model solutions and detailed explanations improve the student's knowledge of circuit design and sequences.

P. Croser, F. Ebel
Edition 2003, 280 pages, bound

DE	93130
EN	93131
ES	94384
FR	93132

Electropneumatics, Basic level

This textbook represents an impressive synthesis of years of experience gained in Festo Didactic courses and the requirements of company and college training. It explains basic equipment and modern installation-saving components that require little maintenance. An extensive description of methods of representation showing motion sequences and circuit states makes complex circuits easy to understand. A detailed example provides students with the necessary knowledge for planning and implementing an electropneumatic circuit.

G. Prede, D. Scholz
Edition 2001, 296 pages, bound

DE	91180
EN	91181
ES	90877
FR	90872

Supplementary print media
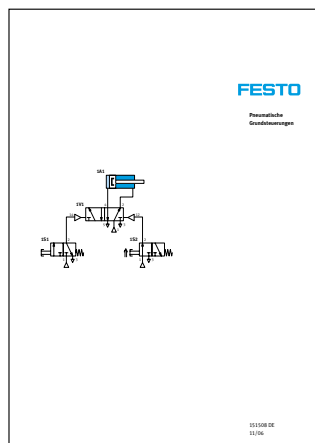
Practical knowledge:
Basic pneumatic controllers

This booklet has been created for practitioners who need to implement small projects quickly and effectively. The various circuit examples facilitate the creation of many simple tasks. The examples shown are complementary. If something is not clear, the previous step can be referred to. This means that even those with little experience can quickly get to grips with the subject matter.

Reference work for circuit planning symbols

A detailed overview of the most important circuit planning symbols shows the structure of controllers and gives hints on the practical implementation of circuit diagrams that have been developed.

W. Braungard, P. Löbelenz, G. Mark
Edition 2006, 80 pages, booklet

DE	151508

Proximity sensors
Textbook

This sensor textbook deals in detail with proximity sensors for handling and processing systems. The book can be used both to support basic and further training programs and for self-tuition. It is made up of a course section, a fundamentals section and a section with solutions to the exercises in the course section. The contents of the book are matched to the corresponding workbook while a glossary of keywords provides rapid access to information on particular types of sensors.

F. Ebel, S. Nestel
Edition 2003, 278 pages, bound

DE	93045
EN	93046
ES	94342
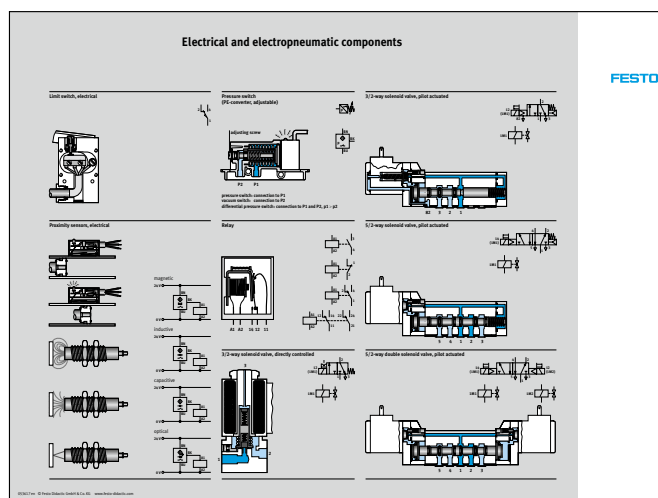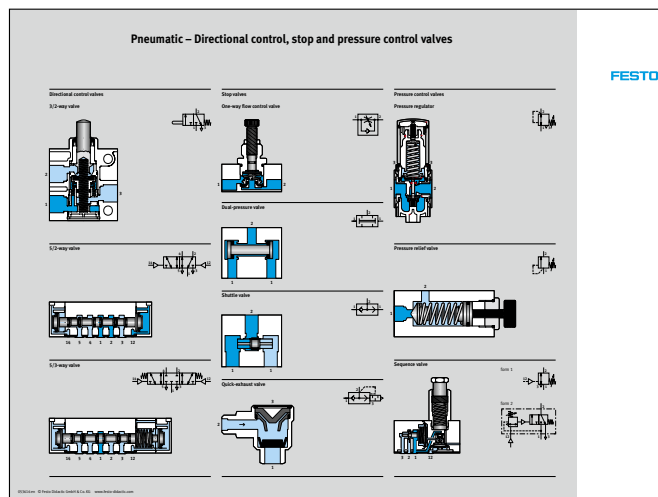
Everything that you need to know:
5 posters on pneumatics

Now the updated version of the popular A1 poster is supplied rolled up, quickly providing a comprehensive overview. All symbols and terminology correspond to the current standards ISO 1219-2 and DIN/EN 61346-2.

Subjects on the poster:
– Electrical, pneumatic and logic symbols
– Systematic control diagram of a pneumatic control system
– Electrical and electropneumatic components
– Pneumatic – Directional control, stop and pressure control valves
– Pneumatic – Power components

DE	193129
EN	551015
ES	551014
FR	551013

Festo worldwide

Argentina
Festo S.A.
Edison 2392
(B1640 HRV) Martinez
Prov. Buenos Aires
Tel. ++54 (0)11/47 17 82 00, Fax 47 17 82 82
E-mail: info@ar.festo.com

Australia
Festo Pty. Ltd.
Head Office (Melbourne)
179-187 Browns Road, P.O. Box 261
Noble Park Vic. 3174
Call Toll Free 1300 88 96 96
Fax Toll Free 1300 88 95 95
Tel. ++ 61(0)3/97 95 95 55, Fax 97 95 97 87
E-mail: info_au@festo.com.au

Austria
Festo Gesellschaft m.b.H.
Linzer Straße 227
1140 Wien
Tel. ++43 (0)1/9 10 75-0, Fax 9 10 75-250
E-mail: automation@festo.at

Belarus
IP Festo
Minsk, 220035
Mascherov Prospekt, 78
Belarus
Tel. ++375 (0)17/204 85 58, Fax 204 85 59
E-mail: info_by@festo.com

Belgium
Festo Belgium sa/nv
Rue Colonel Bourg 101
1030 Bruxelles/Brussel
Tel. ++32 (0)2/702 32 11, Fax 702 32 09
E-mail: info_be@festo.com

Brazil
Festo Automação Ltda.
Rua Guiseppe Crespi, 76
KM 12,5 - Via Anchieta
04183-080 São Paulo SP-Brazíl
Tel. ++55 (0)11/50 13 16 00, Fax 50 13 18 68
E-mail: info_br@festo.com

Bulgaria
Festo EOOD
1592 Sofia
9, Christophor Kolumb Blvd.
Tel. ++359 (0)2/960 07 12, Fax 960 07 13
E-mail: info_bg@festo.com

Canada
Festo Inc.
5300 Explorer Drive
Mississauga, Ontario L4W 5G4
Tel. ++1 (0)905/624 90 00, Fax 624 90 01
E-mail: info_ca@festo.com

Chile
Festo S.A.
Mapocho 1901
6500151 Santiago de Chile
Tel. ++56 (0)2/690 28 00, Fax 695 75 90
E-mail: info.chile@cl.festo.com

China
Festo (China) Ltd.
1156 Yunqiao Road
Jinqiao Export Processing Zone
Pudong,
201206 Shanghai, PRC
Tel. ++86 (0)21/58 54 90 01, Fax 58 54 03 00
E-mail: info_cn@festo.com

Colombia
Festo Ltda.
Avenida El Dorado No. 98-43
Bogotá
Tel. ++57 (0)1/404 80 88, Fax 404 81 01
E-mail: festo@festo.com.co

Croatia
Festo d.o.o.
Nova Cesta 181
10000 Zagreb
Tel. ++385 (0)1/619 19 69, Fax 619 18 18
E-mail: info_hr@festo.com

Czech Republic
Festo, s.r.o.
Modøanská 543/76
147 00 Praha 4
Tel. ++420 261 09 96 11, Fax 241 77 33 84
E-mail: info_cz@festo.com

Denmark
Festo A/S
Islevdalvej 180
2610 Rødovre
Tel. ++45 70 21 10 90, Fax ++45 44 88 81 10
E-mail: info_dk@festo.com

Estonia
Festo OY AB Eesti Filiaal
Laki 11B
12915 Tallinn
Tel. ++372 666 15 60, Fax ++372 666 15 61
E-mail: info_ee@festo.com

Finland
Festo OY
Mäkituvantie 9, P.O. Box 86
01511 Vantaa
Tel. ++358 (09)/87 06 51, Fax 87 06 52 00
E-mail: info_fi@festo.com

France
Festo Eurl
Numéro Indigo Tel. 0820/204640, Fax 204641
ZA des Maisons Rouges
8 rue du Clos Sainte Catherine
94367 Bry-sur-Marne cedex
Tel. ++33 (0)1/48 82 64 00, Fax 48 82 64 01
E-mail: info_fr@festo.com

Germany
Festo Didactic GmbH & Co. KG
Postfach 10 07 10
73707 Esslingen
Rechbergstraße 3
73734 Esslingen
Tel. ++49 (0)711/3467-0
Fax ++49 (0)711/347-54 88500
E-mail: did@de.festo.com

Greece
Festo Ltd.
40 Hamosternas Ave.
11853 Athens
Tel. ++30 210/341 29 00, Fax 341 29 05
E-mail: info_gr@festo.com

Hong Kong
Festo Ltd.
Unit C&D, 7/F, Leroy Plaza
15 Cheung Shun Street
Cheung Sha Wan, Kowloon
Hong Kong
Tel. ++ 852/27 43 83 79, Fax 27 86 21 73
E-mail: info_hk@festo.com

Hungary
Festo Kft.
Csillaghegyi út 32-34.
1037 Budapest
Tel. ++36 1/436 51 11, Fax 436 51 01
E-mail: info_hu@festo.com

India
Festo Controls Private Ltd.
237B,
Bommasandra Industrial Area,
Bangalore Hosur Highway,
Bangalore 560 099
Tel. ++91 (0)80/22 89 41 00, Fax 783 20 58
E-mail: info_in@festo.com

Indonesia
PT. Festo
JL. Sultan Iskandar Muda No.68
Arteri Pondok Indah
Jakarta 12240
Tel. ++62 (0)21/27 50 79 00, Fax 27 50 79 98
E-mail: info_id@festo.com

Iran
Festo Pneumatic S.K.
2, 6th street, 16th avenue,
Tehran 1581975411
Km 8, Special Karaj Road, P.O.Box 15815-1485
Tehran 1389793761
Tel. ++98 (0)21 44 52 24 09,
Fax ++98 (0)21 44 52 24 08
E-mail: Mailroom@festo.ir

Ireland
Festo Limited
Unit 5 Sandyford Park
Sandyford Industrial Estate
Dublin 18
Tel. ++ 353(0)1/295 49 55, Fax 295 56 80
E-mail: info_ie@festo.com

Israel
Festo Pneumatic Israel Ltd.
P.O. Box 1076, Ha'atzma'ut Road 48
Yehud 56100
Tel. ++972 (0)3/632 22 66, Fax 632 22 77
E-mail: info_il@festo.com

Italy
Festo S.p.A
Via Enrico Fermi 36/38
20090 Assago (MI)
Tel. ++39 02/45 78 81, Fax 488 06 20
E-mail: info_it@festo.com

Japan
Festo K.K.
1-26-10 Hayabuchi, Tsuzuki-ku
Yokohama 224-0025
Tel. ++81 (0)45/593 56 10, Fax 593 56 78
E-mail: info_jp@festo.com

Korea South
Festo Korea Co., Ltd.
470-1 Gasan-dong, Geumcheon-gu
Seoul #153-803
Tel. ++82 (0)2/850 71 14, Fax 864 70 40
E-mail: info_kr@festo.com

Latvia
Festo SIA
Deglava 60
1035 Riga
Tel. ++371 67/57 78 64, Fax 57 79 46
E-mail: info_lv@festo.com

Lithuania
Festo UAB
Karaliaus Mindago pr. 22
3000 Kaunas
Tel. ++370 (8)7/32 13 14, Fax 32 13 15
E-mail: info_lt@festo.com

Malaysia
Festo Sdn.Berhad
10 Persiaran Industri
Bandar Sri Damansara, Wilayah Persekutuan
52200 Kuala Lumpur
Tel. ++60 (0)3/62 86 80 00, Fax 62 75 64 11
E-mail: info_my@festo.com

Mexico
Festo Pneumatic, S.A.
Av. Ceylán 3
Col. Tequesquinahuac
54020 Tlalnepantla, Edo. de México
Tel. ++52 (01)55/53 21 66 00, Fax 53 21 66 55
E-mail: festo.mexico@mx.festo.com

Netherlands
Festo B.V.
Schieweg 62
2627 AN Delft
Tel. ++31 (0)15/251 88 99, Fax 261 10 20
E-mail: info@festo.nl

New Zealand
Festo Limited
MT. Wellington
Auckland NZ
Tel. ++64 (0)9/574 10 94, Fax 574 10 99
E-mail: info_nz@festo.com

Nigeria
Festo Automation Ltd.
Motorways Centre, First Floor, Block C
Alausa, Ikeja,
Lagos, NIGERIA
Tel. ++234 (0)1/794 78 20, Fax 555 78 94
E-mail: info@ng-festo.com

Norway
Festo AS
Ole Deviks vei 2
0666 Oslo, Norway
Tel. ++47 22 72 89 50, Fax ++47 22 72 89 51
E-mail: info_no@festo.com

Peru
Festo S.R.L.
Calle Amador Merino Reyna #480, San Isidro
Lima, Perú
Tel. ++51 (0)1/222 15 84, Fax 222 15 95

Philippines
Festo Inc.
KM 18, West Service Road
South Superhighway
1700 Paranaque City, Metro Manila
Tel. ++63 (0)2/776 68 88, Fax 823 42 19
E-mail: info_ph@festo.com

Poland
Festo Sp. z o.o.
Janki k/Warszawy, ul. Mszczonowska 7
05090 Raszyn
Tel. ++48 (0)22/711 41 00, Fax 711 41 02
E-mail: info_pl@festo.com

Romania
Festo S.R.L.
St. Constantin 17
010217 Bucuresti
Tel. ++40 (0)21/310 29 83, Fax 310 24 09
E-mail: info_ro@festo.com

Russia
Festo-RF OOO
Michurinskiy prosp., 49
119607 Moskow
Tel. ++7 495/737 34 00, Fax 737 34 01
E-mail: info_ru@festo.com

Singapore
Festo Pte. Ltd.
6 Kian Teck Way
Singapore 628754
Tel. ++65/62 64 01 52, Fax 62 61 10 26
E-mail: info_sg@festo.com

Slovakia
Festo spol. s r.o.
Gavlovicová ul. 1
83103 Bratislava 3
Tel. ++421 (0)2/49 10 49 10, Fax 49 10 49 11
E-mail: info_sk@festo.com

Slovenia
Festo d.o.o. Ljubljana
IC Trzin, Blatnica 8
1236 Trzin
Tel. ++386 (0)1/530 21 00, Fax 530 21 25
E-mail: info_si@festo.com

South Africa
Festo (Pty) Ltd.
22-26 Electron Avenue, P.O. Box 255
Isando 1600
Tel. ++27 (0)11/971 55 00, Fax 974 21 57
E-mail: info_za@festo.com

Spain
Festo Pneumatic, S.A.
Tel. 901243660 Fax 902243660
Avenida Granvia, 159
Distrito económico Granvia L'H
ES-08908 Hospitalet de Llobregat, Barcelona
Tel. ++ 3493/261 64 00, Fax 261 64 20
E-mail: info_es@festo.com

Sweden
Festo AB
Stillmansgatan 1, P.O. Box 21038
20021 Malmö
Tel. ++46 (0)40/38 38 40, Fax 38 38 10
E-mail: info_se@festo.com

Switzerland
Festo AG
Moosmattstrasse 24
8953 Dietikon ZH
Tel. ++41 (0)44/744 55 44, Fax 744 55 00
E-mail: info_ch@festo.com

Taiwan
Festo Co., Ltd.
Head Office
24450, No. 9, Kung 8th Road
Linkou 2nd Industrial Zone
Linkou Hsiang, Taipei Hsien, Taiwan, R.O.C.
Tel. ++886 (0)2 26 01 92 81,
Fax ++886 (0)2 26 01 92 86-7
E-mail: festotw@festo.com

Thailand
Festo Ltd.
67/1 Moo 6 Phaholyothin Road
Klong 1, Klong Luang,
Pathumthani 12120
Tel. ++66 29 01 88 00, Fax ++66 29 01 88 33
E-mail: info_th@festo.com

Turkey
Festo San. ve Tic. A.S.
Tuzla Mermerciler Organize
Sanayi Bölgesi, 6/18 TR
34956 Tuzla - Istanbul/TR
Tel. ++90 (0)216/585 00 85, Fax 585 00 50
E-mail: info_tr@festo.com

Ukraine
Festo Ukraina
Borisoglebskaja 11
Kiev 04070
Tel. ++380 (0)44/239 24 33, Fax 463 70 96
E-mail: info_ua@festo.com

United Kingdom
Festo Limited
Applied Automation Centre, Caswell Road
Brackmills Trading Estate
Northampton NN4 7PY
Tel. ++44 (0)1604/66 70 00, Fax 66 70 01
E-mail: info_gb@festo.com

United States
Festo Corporation (New York)
Call Toll-free 800/993 3786
Fax Toll-free 800/963 3786
395 Moreland Road, P.O.Box 18023
Hauppauge, N.Y. 11788
Tel. ++ 1(0)314/770 01 12, Fax 770 16 84
E-mail: info_us@festo.com

Venezuela
Festo C.A.
Av. 23, Esquina calle 71, No. 22-62
Maracaibo, Edo. Zulia
Tel. ++58 (0)261/759 09 44, Fax 759 04 55
E-mail: festo@festo.com.ve