

# Fundamentals for Automation Technology



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# Fundamentals for Automation Technology

Multimedia-Based and Practice-Oriented Introduction  
to Automation Technology



## Your benefits

- Combines theory and practice at the same time and location
- High student motivation thanks to integration of PC and modern media
- Students enjoy rapid learning success thanks to guided course design
- Understanding accelerated thanks to theoretical sections enriched with animations
- Hands-on practical skills developed through autonomous experimenting
- Continuous feedback thanks to comprehension questions and tests of knowledge
- Guided troubleshooting with integrated fault simulator
- Using safety extra-low voltage guarantees safety
- Huge selection of courses
- Sample solutions for teachers

# Sensor Technology in Automation

## Industrial Sensors

Sensors are needed for the open-loop control of technical processes using programmable controllers. They convert physical variables into electrical output signals and assume the function of the human senses. As such, sensor technology is fundamental to this field and indispensable for any automation technician.



UniTrain course "Sensor technology in automation"

### Training contents

- Working with capacitive and inductive proximity switches
- Working with various types of sensors such as magnetic field or optical sensors
- Exploring which sensor responds to which material
- Determining the switching gap, hysteresis and operating frequency
- Methods of testing various materials using sensors driven electrically along the X-axis

# Pneumatics in Automation

## Pneumatic Cylinders – Directional Control Valves – Process Control Elements

Use of compressed air to transmit power has become more and more attractive. Pneumatic systems are frequently being used for such tasks as transport, drilling, grinding, winding, sorting, and open- and closed-loop controls. This can be attributed to the fact that in some automation tasks there is simply no better or more efficient tool that can be used.



UniTrain course "Electropneumatics"

### Training contents

- Basics of pneumatics
- How single- and double-acting cylinders work
- Familiarization with various directional control valves
- Operation and design of electropneumatic controls
- Hard-wired controls
- Programmable controls
- Recording displacement/time graphs
- Time-dependent controls

# Hydraulics/Electro-Hydraulics

## Hydraulics for Education

Due to the leakage from loose connecting tubes, it is possible to work safely and cleanly in a classroom, even with pressures of up to 40 bars. The accompanying UniTrain self-learning course guides students through all the fundamental topics of hydraulics. Set up logical operations in the circuit editor included in the software or wire up the required projects in conventional fashion using the control elements built into the board.



**UNITRAIN**  
SYSTEM

UniTrain course "Electro-hydraulics"

### Training contents

- Fundamentals of hydraulics/electro-hydraulics
- Hydraulic and electric circuit diagrams
- Single- and double-acting cylinders
- Extending a cylinder by means of a button
- Extending a cylinder with self-holding
- Normally closed limit switches
- Hydraulic feed control with start requirement
- Start interlocking with random intermediate stop
- Pressure-dependent control
- Mechanical interlocking of a button contact
- Electrical interlocking of a button contact
- High-speed motion circuit
- Time-dependent control
- Recording of displacement/time diagrams

# Multimedia-Based Automation, PLC and Bus Technology

## Programmable Logic Control (PLC)

Today's highly automated industrial landscape is characterised by machines which operate more or less automatically. As a rule these systems are operated by programmable logic control. Developments are leading to more decentralised control systems utilising field bus systems.



**UNI**TRAIN  
SYSTEM

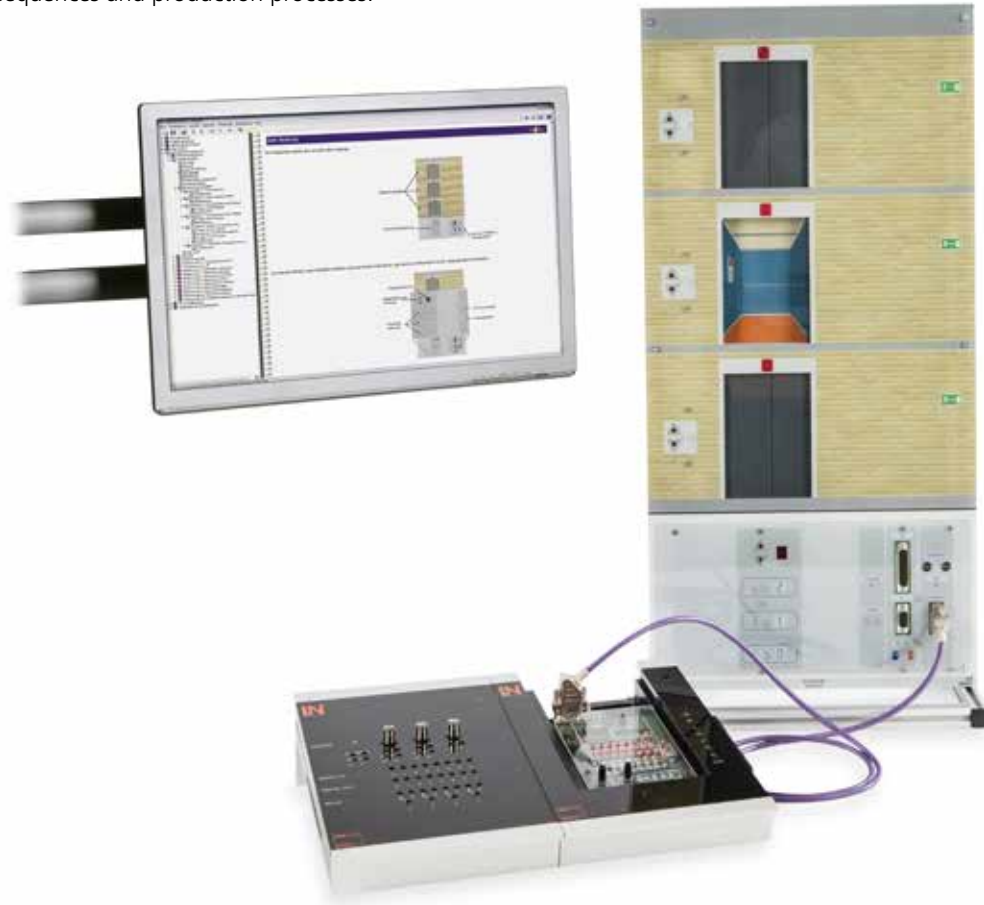
### Training contents

- Introduction to the fundamentals and basic concepts of PLC systems and how they operate
- Introduction to PLC programming
- Implementing logical operations from storage elements all the way to more complex networks
- Programming of times, counters and self-written functions
- Designing a traffic light circuit
- Conversion of non-electrical measurement variables to electrical signals
- Programming with Instruction List (IL) and Structured Text languages using an editor in compliance with IEC 1131-1
- Programming in Function Block Diagram (FBD), Ladder Diagram (LD) and IL languages with STEP 7

# Electrical PLC Process System Models

## Direct Connection to the Control System

With these compact training systems, subjects such as handling as well as transport and positioning processes can be explored. These constitute real life industrial conditions. Consequently they are ideally suited for learning process-oriented control programs and complex movement sequences and production processes.



**UNITRAIN**  
SYSTEM

### Training contents

- Setting parameters, programming and operation of process controls
- Set-up and operation of hardware models, testing and fault finding
- Analysis of process sequences
- Programming in accordance with IEC 1131-1 (IL, LD, FBD)
- PLC sequence control systems
- Programming limit switches
- Manual operation, single-step and automatic operation