Christiani

Technical Institute for Vocational Training

Since 1931

Technical Training 2016

TVET – Made in Germany

christiani-tvet.com

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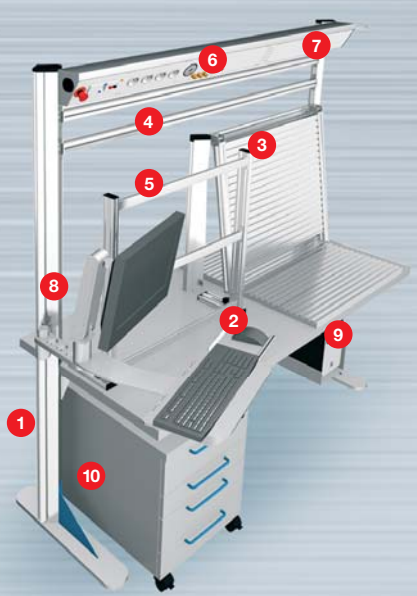
Multifunctional use –
Our training desk system „MAPS“

EXCLUSIVE
BY CHRISTIANI

For training purposes in
- Pneumatics
- Hydraulics
- Machine safety
- PLC-Technology
- Industrial automation

Low entry price due to modular design
Individually configurable
Usable for training for various professions
Single- or double-sided versions



MAPS can be modified in no time to your individual requirements

① Stable construction using aluminium system profile
② Multilayered bench top with HPL laminate
③ Grooved plate for fastening snap-in components (SI), inclination-adjustable
④ Mounting frame for power boxes with tandem snap-in technology (TSI)
⑤ Experimental frame for accommodating A4 training boards, depth-adjustable
⑥ Pre-equipped system channel
⑦ Cable holder for accommodating approx. 40 shrouded plugs
⑧ Monitor bracket incl. extension arm, keyboard support and mouse tray
⑨ PC bracket
⑩ Roller container for storing the components

More information on page 86

Christiani – your expert in technical training and hands-on learning

Hands-on learning is a fundamental aspect of technical training – it helps learners to acquire knowledge, skills and competences which are essential in working life since they are close to the needs of industry. With its products and activities Christiani is promoting and implementing this learning model. Christiani has been active in the field of technical vocational training for over 80 years and stands for high-quality, hands-on training and continuing education. Christiani is further expanding its business abroad – our products are already used in more than 70 countries.

As a consequence the number of teaching materials in foreign languages is steadily growing thus supporting hands-on learning abroad based on the German dual system and its action-based didactic methods.

Services and products:

- Developing of teaching materials
- Manufacturing of learning systems
- Publishing of books & multimedia products
- Providing of examination materials
- Train-the-Trainer, consulting
- Textbooks
- Didactic teaching material
- Interactive learning programs
- Project works, cutaway models
- Teaching systems, training stands
- Laboratory furniture

Important facts & figures:

- Over 15 000 products
- Delivery to over 70 countries
- In the market for more than 80 years
- Global sales network
- Over 50 000 customers
- 150 employees

Our company has been firmly anchored in Constance since 1936 and we wish to contribute with our daily work to make Constance with its universities an important knowledge center. With over 150 employees, we have become one of the most important 'job providers' in the region.

Strong together: Industry and didactics, hand in hand

In developing our innovative products, we work closely with well-known partners from industry and trade. This enables us to combine the technical expertise of the industry with our didactic skills, in order to create unique offers. Our joint aim is to bring young people up to speed in technology matters and to enable them to achieve a successful start to their careers.

Lasting learning success through an overall didactic concept

Media	Hardware	Services
Specialised books	Training stands	Analysis & consultation
Interactive Learning Programmes	Teaching systems	Didactic concepts
Training Software	Workstation systems	Educational services
Tasks for exam preparation	Training lab equipment	Planning of training labs
Distance learning courses	Cut away models	Train-the-trainer
	Material kits	Seminars & workshops
	Projekt Works	In-house production

Mechanics | Electronics | Automation | Automotive | Renewable Energy | School/Physics

85 years experience in technical education

2010
UNIVERSITY
Offering training systems for universities

2009
General & Secondary Schools
Offering teaching aids for technics and physics

2008
Christiani Sharpline Technical Training
An Indo-German Joint Venture, founded 2008 in Mumbai, India

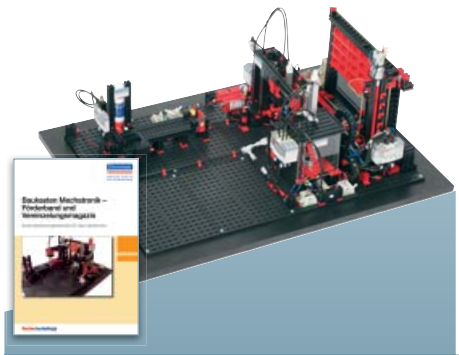
2001
International Business
Opening up to international markets

1971
Vocational Training
Entering the field of vocational training and developing examination tasks

1931
Further Training
Founded as correspondence college in Frankfurt, Germany

Learning example: Mechatronics

This example shows the continuous training concept applied by Christiani. In school, the pupils set up a factory simulation – it's fun and simple. Training continues in a practical and realistic manner in vocational training and in universities. Finally, the further professional training offerings from the Christiani Academy provide your employees with the opportunity to increase their level of specialisation while continuing in full employment.



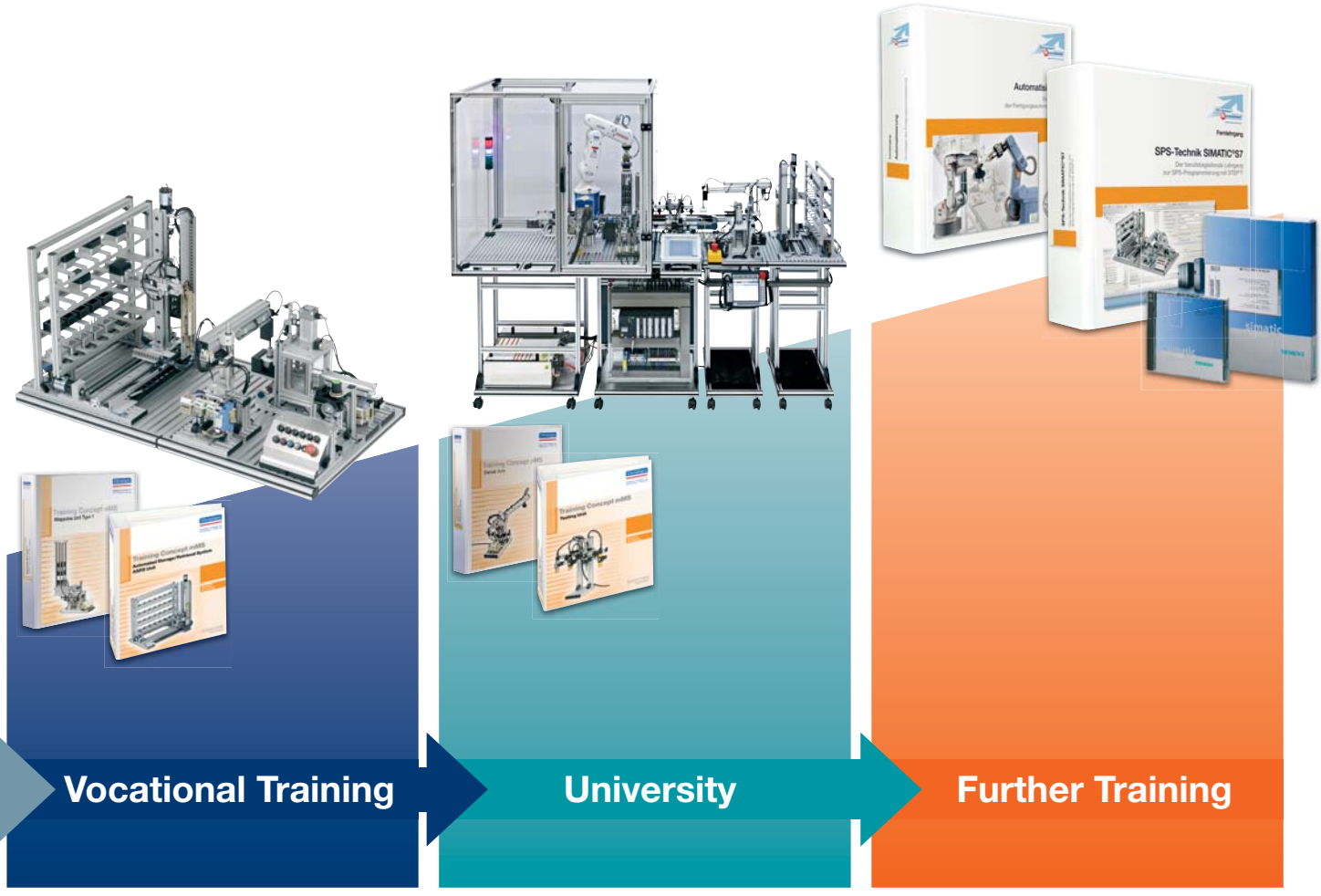
General & Secondary Schools

mMS modular Mechatronic System „junior“

Life-long learning:
Didactics and practice from a single source

Technical training from the outset and life-long learning – that's what Christiani and its teaching materials and service offering stand for. After all, the subject of training is not only relevant for schools and vocational training these days, but rather it accompanies people throughout every phase of their lives.

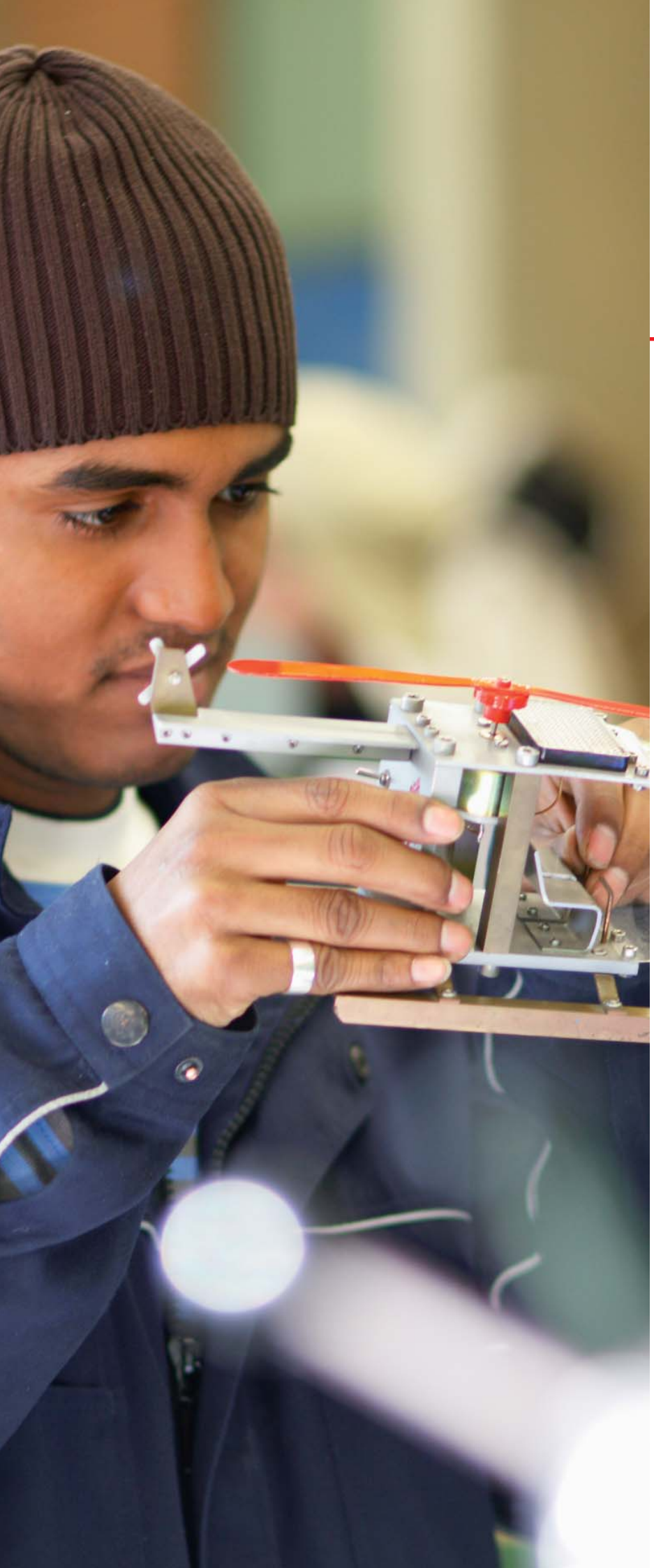
Christiani has been actively involved in the training and education sector for over 80 years. Our expertise: We are a complete provider of all aspects of technical training as well as innovative offers for all training levels – from pre-school, school and vocational training to universities and further professional training. By combining didactic documents and hardware, and by cooperating with partners from schools, industry and trade, we can assure absolute practical relevance.



mMS modular Mechatronic System Cube Assembly Mini V5

mMS modular Mechatronic System Cube Assembly Compact Endless

Courses and distance learning for automation technology and PLC-technology



1 Information

Gathering all information which is needed to fulfill the task. Guiding questions in the documentation and references to other training media assist in examining the skills and information that will be required.

2 Planning

The trainee systematically plans the work process, the use of the correct tools and aids as well as the sequence of the individual work steps. A work plan sheet is provided in the documentation.

3 Deciding

Choosing the best method for completing the project task, taking into account the materials used, time available, tools employed and skills applied. Once made, the selection, work plan and answers to the guiding questions are discussed with the trainer.

4 Action

All work is now performed in the sequence specified during planning.

5 Monitoring

Upon completion of the task, the trainee checks whether the work meets the specified requirements. The inspection and evaluation sheet included with the documents is used for monitoring.

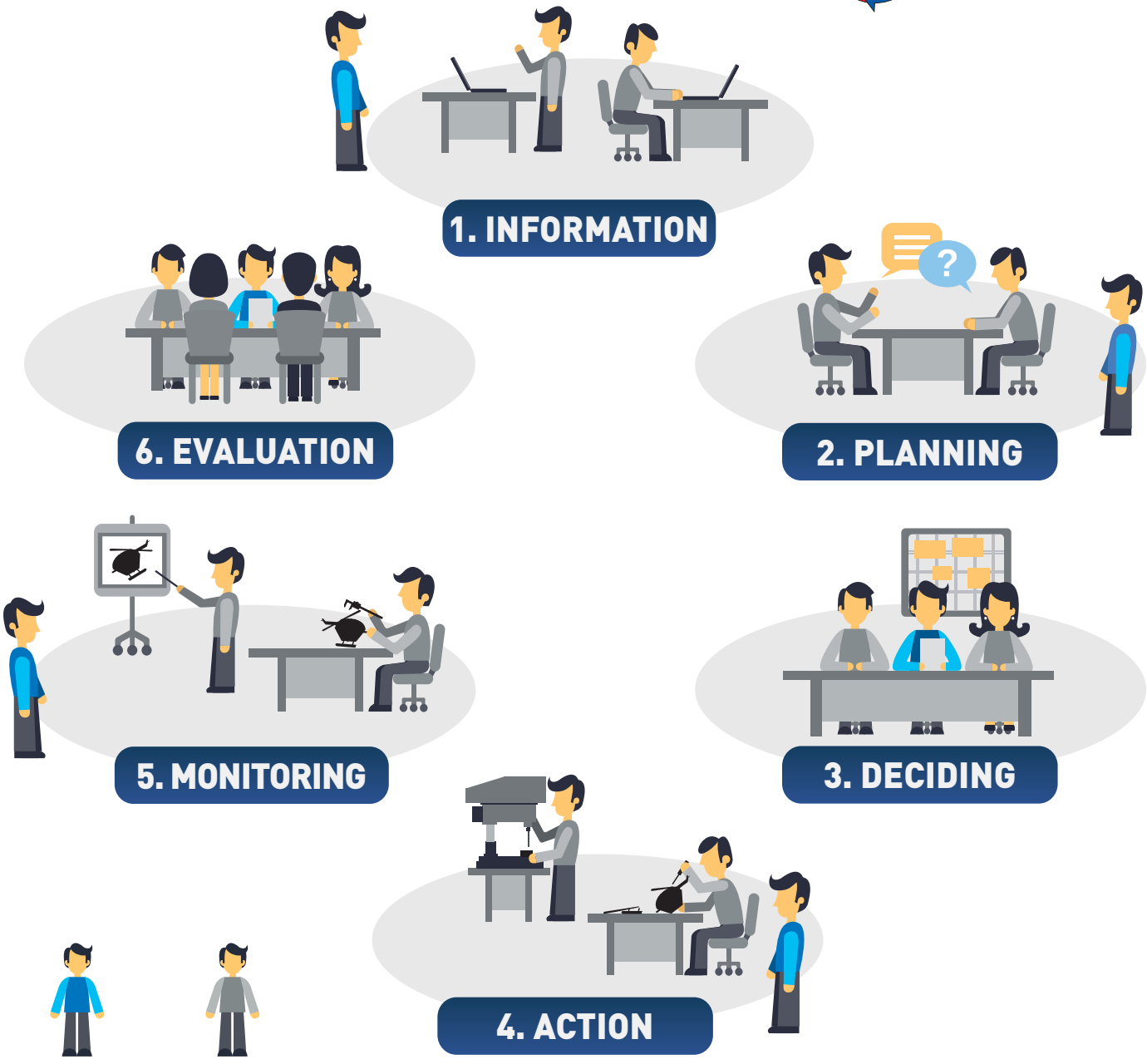
6 Evaluation

The work result as well as the inspection and evaluation sheet are again discussed together with the trainer. This consolidates the experiences gained during the project and minimises errors in the future.

Model of complete action

The concept of complete handling provides for six handling steps: Information, planning, deciding, action, monitoring, evaluation. The person shown in blue is the trainer, who either takes part actively in the individual stages, or is simply on-hand as an observer.

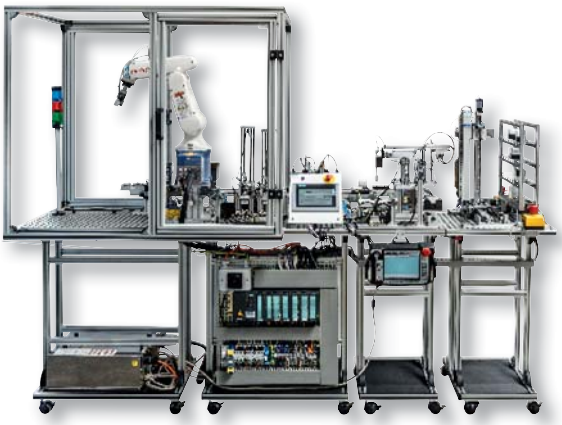
Apart from technical skills, modern working environments also require technicians to act and plan independently and with an awareness of quality issues as well as to work in teams. For the trainee to become accustomed to this style of working early on, it is important to already develop methods during training that he/she will be able to employ successfully as a technician in the future. Christiani products support the trainee in learning to decide, to act and to evaluate independently to an large extent and provides orientation towards the working style of qualified technicians. This action-oriented training method is known as the model of complete action. Christiani products, which are developed according to this model are marked with this symbol:

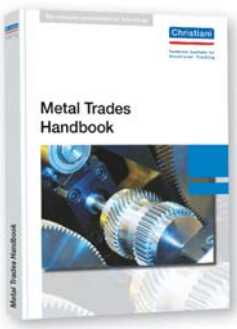


Training equipment and teaching methods

As a single-source provider for technical training, our portfolio covers both the hardware for the training labs and the teaching materials prepared for the lessons. This conclusive overall concept contributes to a lasting learning success!

By means of our know-how and our wide product range, we have clearly developed into a complete supplier in the field of technical training and education.
Our range of teaching materials primarily serves the fields of mechanics, electrical engineering, automation, automotive mechatronics and renewable energies. We provide complete solutions – be it a mechatronic laboratory, an electronics or metal training workshop or a facility for training in automotive jobs.
Whether for vocational institutes, colleges and universities or for small and medium-sized companies and major corporations: We offer to our customers guidance, conception, planning and execution as well as train-the-trainer courses.





Specialised Books

Teaching Systems

Workstation Systems

Project Works

Interactive Learning Programmes

Teaching & Experiment Manuals

Christiani training lab concepts: We accompany you step by step

Whether you want to extend your existing specialised training lab or set up a new one – Christiani is your partner for designing and setting up workshops and laboratories for advanced technical education and technical training. Using our knowledge and expertise as well as our network, we will find the solution to your needs.

Our modules at a glance:

1. Requirements Analysis

2. Planning & Consultation

3. Design

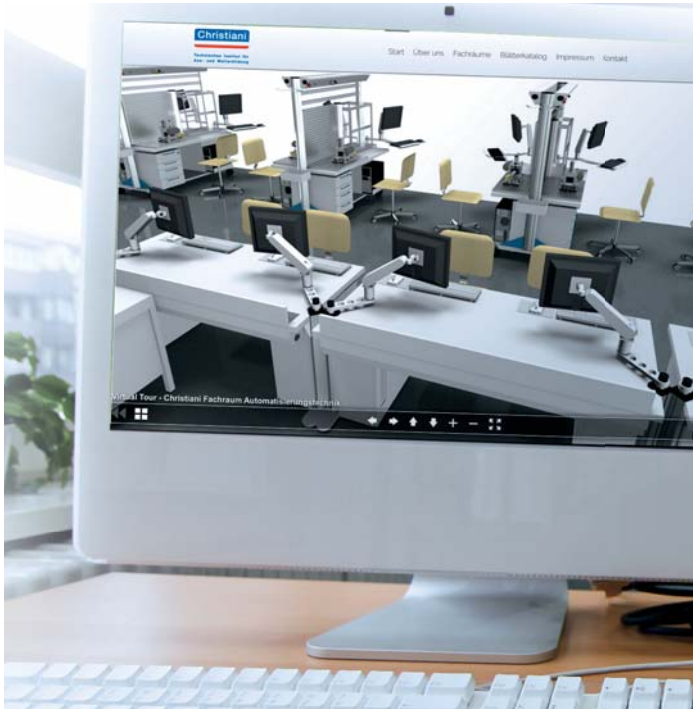
4. Implementation

5. Train-the-Trainer

6. Learning Outcome Test

360° View:
Our training labs are now also available to view online

Visit www.christiani-training-lab.com to „take a stroll“ around our 3D, virtual specialised training labs. You will also find detailed information about each of the showrooms and the learning objectives to be accomplished there.



www.christiani-training-lab.com

Experience our 3D and 360° all-round view of the Christiani technical training labs.

Technical Training in:

- Mechanics
- Automation Technology
- Electronics
- Renewable Energy
- Sanitation /HVAC
- Automotive Technology

Train-the-trainer:
We train your training staff

A well-equipped technical training lab is only one half of the story. A further component in our overall educational concept for sustainable and practical training is qualified training staff.

References Christiani train-the-trainer international

Peru: Automotive training stands and train-the-trainer seminar for technical institute TECSUP.

Tunisia: Automotive and renewable energy - equipment for training centers in Ariana and Kebili.

Romania: Seminars on modern teaching methods for Romanian teachers.

We train your staff according to the latest standards, while also showing you how much potential our teaching systems hold and how you can make the best possible use of this potential.

The meeting place for Technology

Christiani
Seminars and Workshops

Working in small seminars, you will learn details about:

- Which products are required to cover which training content
- How to best combine the use of media and teaching systems in the classroom
- How you can organise and communicate the teaching material so that it is both interesting and practical
- What options you have for monitoring learning and perfomance

We would also be happy to come to you:

Depending on the subject and the size of the group, the events take place at training centres or other educational establishments. Having agreed an appointment beforehand, we would also welcome the opportunity to visit you on your premises.

Christiani international: Technical training throughout the world

We offer an extensive portfolio of teaching materials for vocational training and further professional training for international training markets. We support companies in providing training and qualifying personnel according to German standards abroad too: with a wide range of teaching systems and foreign language teaching media, seminars, workshops and complete technical training labs.

Christiani projects international

BRAZIL
Christiani equipped the State University in Rio de Janeiro with a mechatronic system, incl. training for professors.

CHINA
Training stands for the training in the field of automotive technology, incl. training the trainers.

ETHIOPIA
In 2015 in Ethiopia, six automotive training centres are being equipped. Christiani is substantially involved in this project by supplying numerous high-quality training stands.

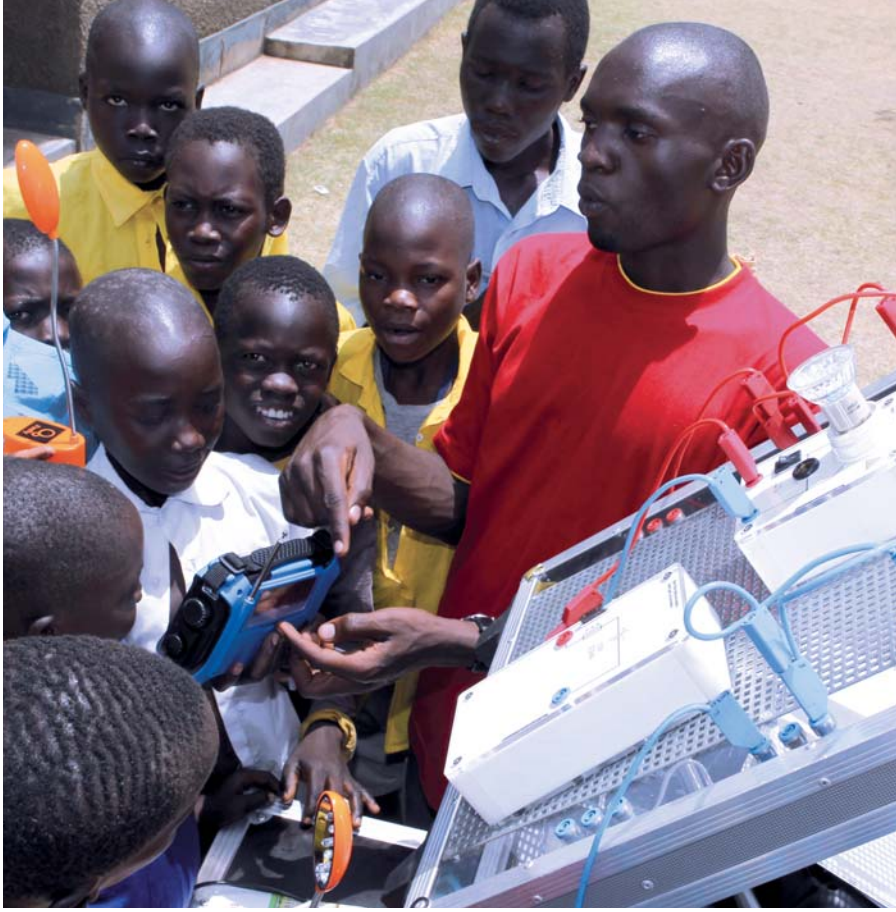
INDIA
Joint venture CSTT: Together with Sharpline, Christiani maintains a training centre in Mumbai, Courses are conducted mainly in the fields of CNC, PLC and mechatronics.

IRAQ
Christiani supplied training stands for the automotive sector to the University of Salahaddin in Erbil, northern Iraq. In addition to this, Train-the-Trainer courses.

LEBANON
Successful setup of an examination system in cooperation with the MEHE (Ministry of Education and higher Education).

LUXEMBOURG
Creation of a mechatronics training concept for the Luxembourg Ministry of Education.

MALAYSIA
Mechatronics teaching systems for five polytechnical colleges, incl. training the trainers.



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Entering the world of technical training: by cklicking on the desired region you will be re-directed to the website or contact of your national representative.

MEXICO

Equipping a training centre in Mérida with automotive mechatronics equipment, incl. training the trainers.

MONGOLIA

Christiani is a partner in a GIZ project in Mongolia, which involves a 3-year training project in the industrial mechanics, electrotechnical and construction sectors.

MOROCCO

In 2014 in Morocco, Christiani contributed to equipping of a renewable energies training centre by supplying training stands.

PERU

Establishment of an automotive training centre at the technical educational institute TECSUP, incl. training the trainers.

ROMANIA

Seminars for teachers and trainers in mechatronics about the basics of the action-oriented training, incl. didactical documents and teaching systems.

SWITZERLAND

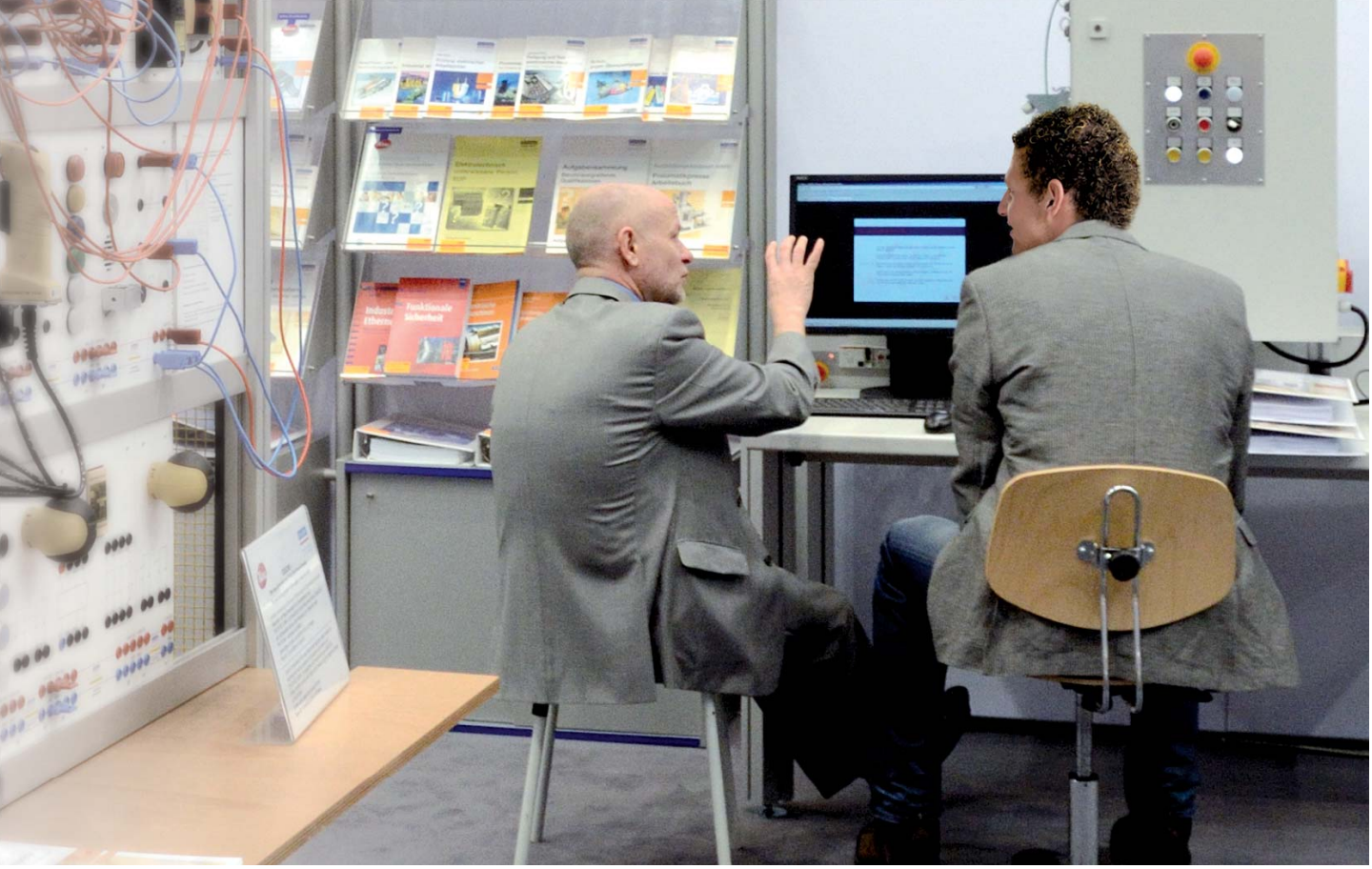
Equipment of four solateur schools (solarthermic profession) with teaching systems for the sector renewable energy.

TUNISIA

Equipping training centres in Kebili and Ariana, with training stands for the automotive and renewable energy sectors.

UGANDA

„Energy Explorers“ campagne for renewable energy with Christiani products.



Our international team is pleased to advice you

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Enter into the world of training at www.christiani-tvet.com

On the home page, select the desired region and you will be taken directly to the corresponding online shop or contact partner, who will provide you with assistance. In the online shop, you can find our complete range of teaching materials for technical-industrial training. There is a wide range of options to enable you to navigate your way straight to your desired products in the blink of an eye.

Our online shop offers a wide range of products for technical training. Use our shop and take the advantage of the following:

- **Direct contact** with Christiani consultants
- **Detailed product descriptions** as well as additional information, such as readings, videos, etc.
- **Navigation by media type**, subject or profession
- **Stay up-to-date** with news about product innovations

Furnishing, machines, working utilities – centralised performance by Christiani

We have created this example configuration to show you the wide range of options open to you when compiling your technical training lab. The fixtures, fitting, machines and equipment shown here offer you a brief overview of our product portfolio.

COMPACT INFO

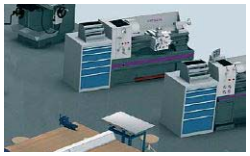
Technical Training Lab for Metal Engineering

Metalworking machines:

- Drills
- Drilling-milling machines
- CNC milling machines
- Lathes
- CNC lathes
- Metal band saws
- Metal circular saws
- Grinding machines
- Bending machines
- Sheet-metal cutters
- Comprehensive accessories
- Company facilities
- Furniture and fittings
- Tools, resources and test materials
- Workbenches
- Measuring and marking plates
- Surface plate

VIRTUAL TOUR

Experience the Christiani Training Labs now online in 3D.



More information:
www.christiani-training-lab.com

Technical Training Lab for Manual Material Processing

Topics/learning objectives:

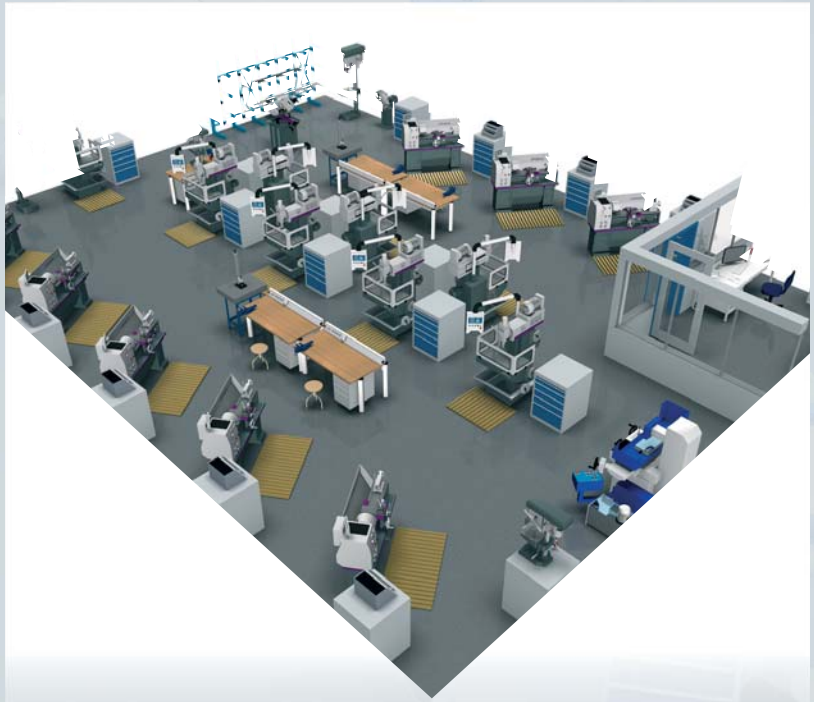
Manufacturing construction components using manual tools
- Filing, marking out, punching, sawing, chiselling, drilling, grinding, cutting, bending
- Partial, group and assembly drawings
- Technical documentation and information sources
- Fundamentals and processes of trimming and forming

Producing basic assemblies
- Tools and fixtures
- Fundamentals of force-fit, form-fit and bonded joining
- Standard parts
- Function check

Manufacturing individual parts using machine tools
- Cutting processes
- Machining parameters
- Cutting materials, main usage time

360° VIRTUAL TOUR
www.christiani-training-lab.com

Technical Training Lab for Machine-Based Material Processing



Topics/learning objectives:

Manufacturing components with machines
- Drilling, countersinking, reaming, milling, turning, grinding
- Functional units of machines and how they work
- Service life of tools
- Manufacturing data and its calculation

Maintaining technical systems
- Basic maintenance terminology, maintenance plans

Manufacturing individual parts with machine tools
- Cutting processes
- Machining parameters
- Cutting materials, main usage time

360° VIRTUAL TOUR
www.christiani-training-lab.com

Technical Training Lab for Hydraulics

Topics/learning objectives:

- Identification of the components
- Commissioning
- How is pressure generated
- Directional valves, travel direction of the cylinder
- Load pressure
- Setting speeds, inlet throttle
- Adjusting the pressure difference using system pressure
- Adjusting the pressure difference using load pressure
- Pressure transmission, outlet throttle
- Pressure reduction

360° VIRTUAL TOUR
www.christiani-training-lab.com

Technical Training Lab for Pneumatics

Topics/learning objectives:

Integrating components of the PLC and control technology

- Compressed air generation and compressed air distribution
- Compressed air treatment
- Cylinder and directional control valves

Installing and operating control systems

- Supply air and exhaust air flow control
- AND members/OR member
- Sequence control with individual valves
- Sequence control with chain of steps

Ensuring the operating ability of automated systems

- Measurements of voltage and current
- Solenoid valves
- Basic circuits with contacts
- Relay, lock
- Time relay
- Pneumatic-electric converter

360° VIRTUAL TOUR
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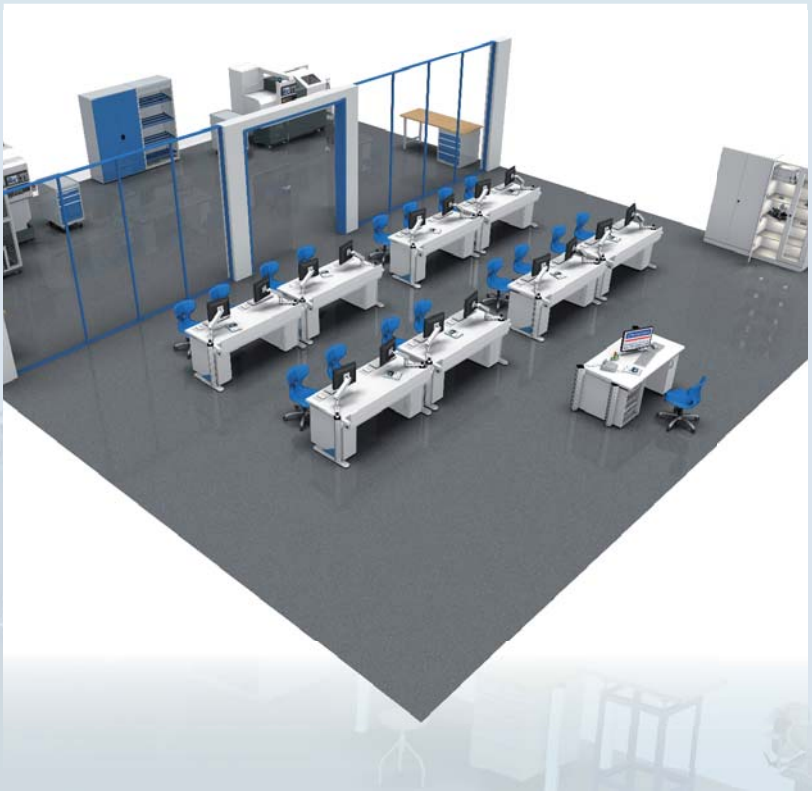
Technical Training Lab for CAD-CAM-CNC



Topics/learning objectives:

Manufacturing using numerically controlled machines

- Work plan, tool plan, set-up sheet
- Design and function of CNC machines
- Coordinate systems
- Reference points
- Geometric data
- Technology data
- Programme architecture
- Tool correction

360° VIRTUAL TOUR
www.christiani-training-lab.com

Technical Training Lab for Electrical Engineering

Topics/learning objectives:

- Analysing electrical systems and testing functions
- Planning and executing electrical installations
- Installing electrical operating equipment in compliance with safety aspects
- Analysing and adjusting control systems
- Configuring the hardware and software of assemblies

360° VIRTUAL TOUR
www.christiani-training-lab.com

Technical Training Lab for Control Technology

Topics/learning objectives:

- Operational and technical communication
- Measuring and testing electrical variables
- Designing and testing electric, pneumatic and hydraulic control systems
- Programming mechatronic systems
- Testing and setting functions on mechatronic systems
- Commissioning and operating mechatronic systems
- Maintaining mechatronic systems

360° VIRTUAL TOUR
www.christiani-training-lab.com

Technical Training Lab for Renewable Energy/Sanitation/HVAC

Topics/learning objectives:

Establishment of in-depth knowledge of planning, setup and configuration of systems

- Photovoltaics
- Solar heating
- Heat pump
- Gas technology
- Bathroom installation
- Drinking water

Gaining sound knowledge on

- Optimising heating systems, including troubleshooting, fault assessment and elimination

360° VIRTUAL TOUR
www.christiani-training-lab.com

Technical Training Lab for Renewable Energy

Topics/learning objectives:

Conveying basic skills of energy technology
Establishment of in-depth knowledge of planning, setup and configuration of systems

- Photovoltaics
- Solar heating
- Heat pump

360° VIRTUAL TOUR
www.christiani-training-lab.com

Technical Training Lab for Sanitation/HVAC

Topics/learning objectives:

Planning, setup and configuration of systems

- Gas technology
- Bathroom installation
- Drinking water
- Photovoltaics
- Solar heating
- Heat pump

Gaining sound knowledge on

- Optimising heating systems,including troubleshooting, fault assessment and elimination

360° VIRTUAL TOUR
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Technical Training Lab for Automotive Technology

Topics/learning objectives:

- Working with maintenance schedules, wiring diagrams, symbols, terminal designations, wires and wiring connections
- Measuring and evaluating electrical variables and signals
- Using repair manuals, function diagrams, troubleshooting schedules during diagnosis
- Occupational safety and accident prevention when working with electrical components
- Making use of the possibilities offered by commonly used workshop diagnosis testers
- Encoding control units, adapting software statuses and checking data communications wires, taking account of legal stipulations and manufacturer specifications
- Documenting work results and evaluating by comparing with calculated variables and manufacturer specifications

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www.christiani-training-lab.com

Theory Room

Example arrangement:

Represents particularly in large rooms the best conditions for a lively class lesson.
For instance, the remaining part of the room can be used for demonstrations purposes on teaching systems or other illustrative materials.
All benches are equipped with power and ethernet connection so that this theory room is ideal for programming of for example mechatronic systems placed in the centre of the room.

Mechanics

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Christiani materials are available in many different languages. Visit:

christiani-tvet.com

You can directly access the online shops and the contacts for the respective regions.

Training equipment and teaching methods

With our range of teaching equipment in mechanics you can cover all subjects related to mechanical/metal professions. Starting from manual material processing, milling and turning up to CNC techniques, pneumatics and hydraulics. Training stands are completed with documentation and manuals. Using our training courses and project works teachers and trainees find a hands-on training method which prepares perfectly for working life.

Whether for vocational institutes, colleges and universities or for small and medium-sized companies and major corporations: We offer to our customers guidance, conception, planning and execution as well as train the trainer courses.

As a single-source provider for technical training, our portfolio covers both the hardware for the training labs and the teaching materials prepared for the lessons. This conclusive overall concept contributes to a lasting learning success!

Metal Working Machines

Training Systems

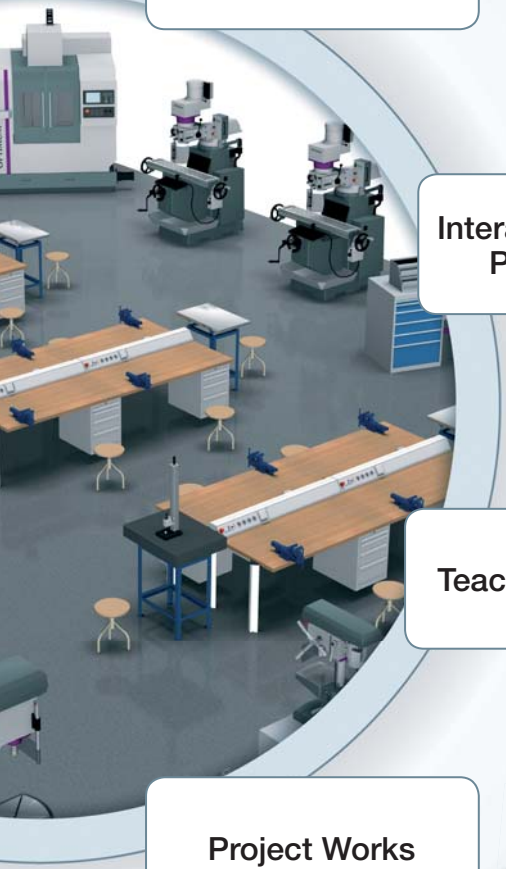
Laboratory Benches

Christiani materials are available in many different languages. Visit:

christiani-tvet.com

You can directly access the online shops and the contacts for the respective regions.

Cutaway Models



Interactive Learning Programmes

Teaching Manuals

Project Works

Establishing basic principles of metalworking and plastic processing

In this training lab, your trainees will learn the key fundamentals of metalworking and plastic processing. Skills will be acquired in the field of manual material processing by training at manual workplaces.

Our modules

- Requirements analysis
- Planning and consultation
- Conceptual design
- Implementation
- Train-the-trainer

VIRTUAL TOUR

Experience the Christiani Training Labs now online in 3D.

More information:
www.christiani-training-lab.com

COMPACT INFO

Technical Training Lab for Manual Material Processing

Example configuration for 16 workplaces:

- 3 hexagonal workbenches, including vice, tool cabinets and power channel
- 3 measuring and marking places
- 2 surface plates
- 2 upright drills
- 2 table drills
- 2 grinding machines
- 1 sawing machine
- 1 set of plate shears
- 1 folding

Suitable for:

- Metalworking professions

Topics/learning objectives:

Manufacturing construction components using manual tools

- Filing, marking out, punching, sawing, chiselling, drilling, grinding, cutting, bending
- Partial, group and assembly drawings
- Technical documentation and information sources
- Fundamentals and processes of trimming and forming

Producing basic assemblies

- Tools and fixtures
- Fundamentals of force-fit, form-fit and bonded joining
- Standard parts
- Function check

Manufacturing individual parts using machine tools

- Cutting processes
- Machining parameters
- Cutting materials, main usage time

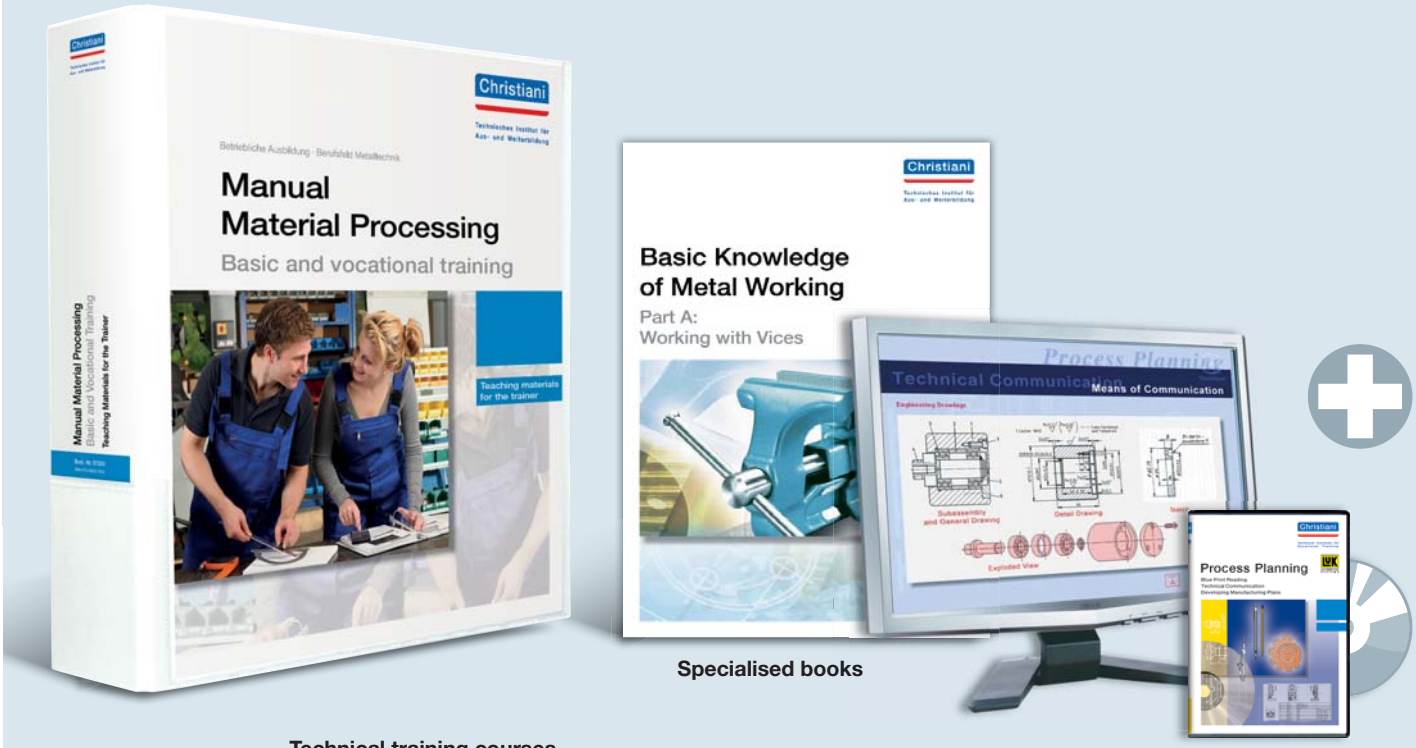
The Christiani technical training lab for manual material processing offers you the following:

- Theory and practice from a single source
- Motivation to learn and sustainable learning success
- Didactic diversity and practically oriented training media
- Strong partnerships with industry
- Professional consulting – from the planning stage, all the way up to implementation

Technical Training Lab for Manual Material Processing
Teaching Methods and Practice from a Single Source

Practically Oriented Training Media

At Christiani, technical training lab equipment and didactic training materials are precisely matched to one another. With this uniform holistic concept, you can offer state-of-the-art training, as well as conveying practically oriented specialist knowledge and the necessary personal skills. In developing our innovative products, we work closely with strong partners from the industrial sector.



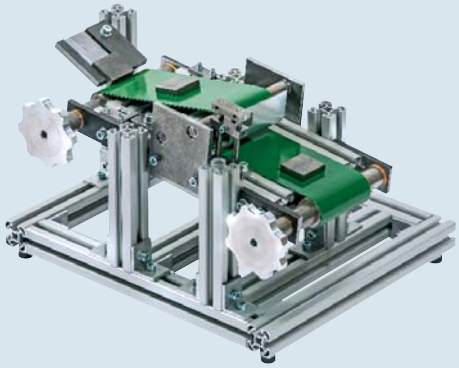
Technical training courses

Specialised books

Interactive learning programmes

Company metalworking training courses form the didactic focus for vocational training. We offer a wide range of training materials, learning methods, tools, furniture and fittings, auxiliaries and testing instruments in and around the field of vocational training and for trade schools. We would be happy to advise you on putting together the ideal package for your specific requirements.

Examination Materials



Optimum examination preparations:
We provide you with the material for the examination pieces, as well as the accompanying examination tasks from past years.

Project Work

With Christiani project works, trainees practice important working methods and manufacturing processes. All project work consist of a materials kit and didactic documentation.

Powerful Specialised Lab Components

Hexagonal workbench
with power channel

The Christiani technical training lab is equipped with modern training equipment and training systems. All machines and devices comply with industry standards and have been specifically matched to the requirements of schools and educational establishments.

„Train-the-Trainer“

We train your training staff to the latest standards and show how you can most effectively use our training systems and materials.

Please feel free to get in touch with one of our customer consultants.

“Whether you are looking to expand your existing specialised training lab or are planning something new – we are happy to support you with the necessary advice and expertise. Tell us about your individual requirements. We can then advise you on all questions.”

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Hands-on learning: machine-based material processing and the safe use of machine tools

Training in the field of metal engineering opens up a large number of different career options. Machine-based material processing ranks as one of the key qualifications of all metalworking trades. In this technical training lab, trainees learn the basic skills of metalworking and how to safely use the corresponding machine tools, finally focussing on examination preparations.

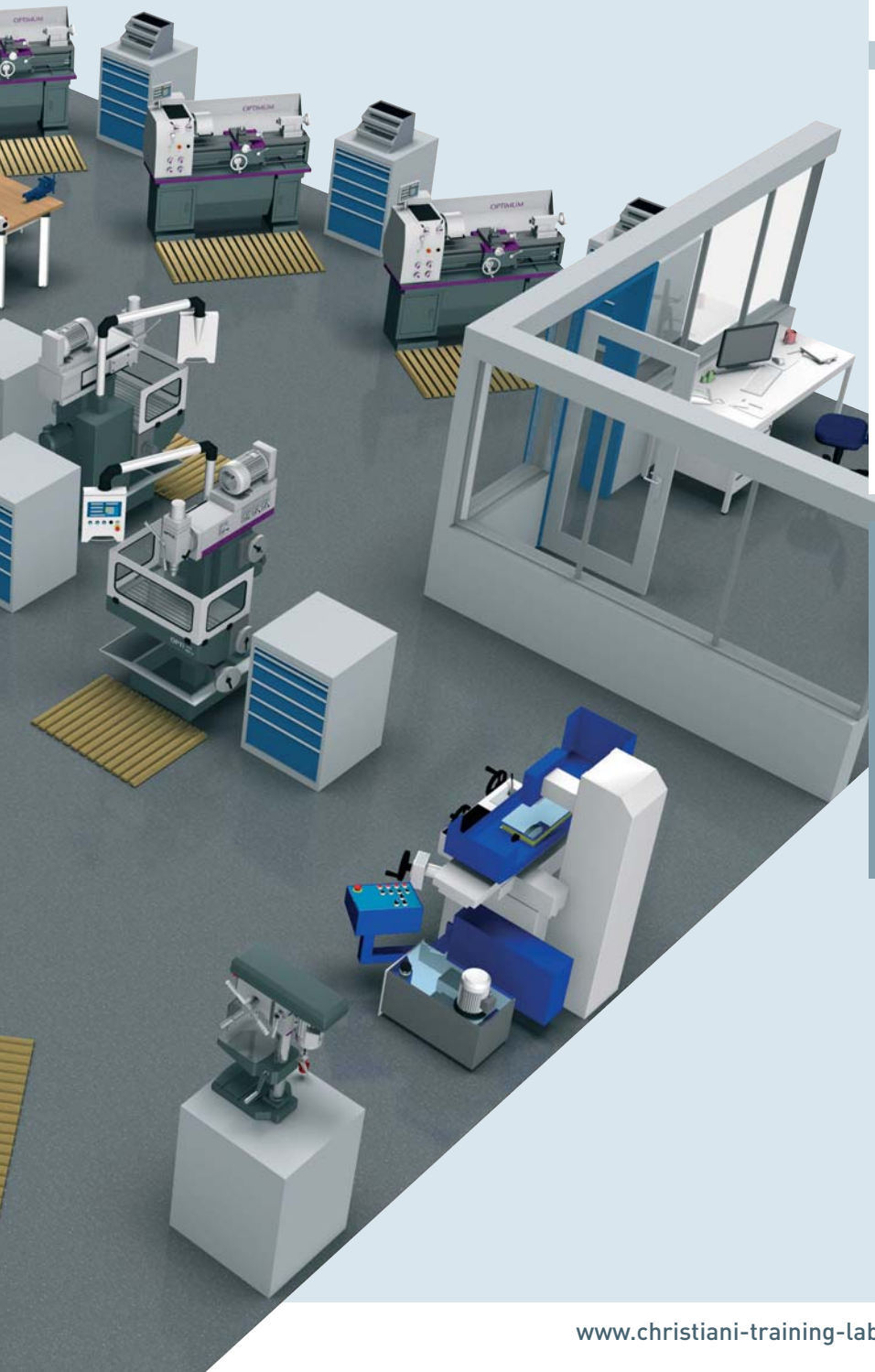
Our modules

- Requirements analysis
- Planning and consultation
- Conceptual design
- Implementation
- Train-the-trainer

VIRTUAL TOUR

Experience the Christiani Training Labs now online in 3D.

More information:
www.christiani-training-lab.com



COMPACT INFO

Technical Training Lab for Machine-Based Material Processing

Example configuration for 16 workplaces:

- 8 lathes
- 8 milling machines
- 2 upright drills
- 2 table drills
- 2 grinding machines
- 1 sawing machine
- 1 Surface-grinding machine for pillar

Suitable for:

- Metalworking professions

Topics/learning objectives:

Manufacturing components with machines
- Drilling, countersinking, reaming, milling, turning, grinding
- Functional units of machines and how they work
- Service life of tools
- Manufacturing data and its calculation

Maintaining technical systems
- Basic maintenance terminology, maintenance plans

Manufacturing individual parts with machine tools
- Cutting processes
- Machining parameters
- Cutting materials, main usage time

The Christiani technical training lab for machine-based material processing offers you the following:

- Theory and practice from a single source
- Motivation to learn and sustainable learning success
- Didactic diversity and practically oriented training media
- Strong partnerships with industry
- Professional consulting – from the planning stage, all the way up to implementation

Technical Training Lab for Machine-Based Material Processing
Teaching Methods and Practice from a Single Source

Practically Oriented Training Media

The Christiani brand has stood for high-quality, practical qualifications and further training for many decades. Thanks to our many years of expertise and comprehensive full-scope offer in and around vocational training, we are the recognised partner in trade and industry, as well as at trade schools. When it comes to arranging their training and qualifi cation measures, more than 70,000 small, mid-sized and large enterprises, including international concerns, have been putting their trust in Christiani's quality for years.

Technical training courses

Specialised books

Books of tables

Whether classic textbooks, vocational training courses, project work, examination preparations, interactive media, machine tools or company training and teaching room facilities – Christiani can offer you everything from a single source.

Interactive Learning Programmes

Interactive learning programmes as CBT (computer-based training), WBT (web-based training) or on the Christiani learning portal are ideal media for independent learning on your PC. We offer more than 20 topics in the field of basic metal knowledge.

Project Work

With Christiani project work, trainees practice important working methods and manufacturing processes. All project work consists of a materials kit and didactic documentation.

Powerful Specialised Lab Components

Milling machine OPTImill with digital 3-axis position display

„Train-the-Trainer“

To meet the ever more complex training and qualifi cation requirements, we offer sound theoretical and practical guides with our services and products to ensure secure transfer of knowledge in practice.

Please feel free to get in touch with one of our customer consultants.

“Whether you are looking to expand your existing specialised training lab or are planning something new – we are happy to support you with the necessary advice and expertise. Tell us about your individual requirements. We can then advise you on all questions.”

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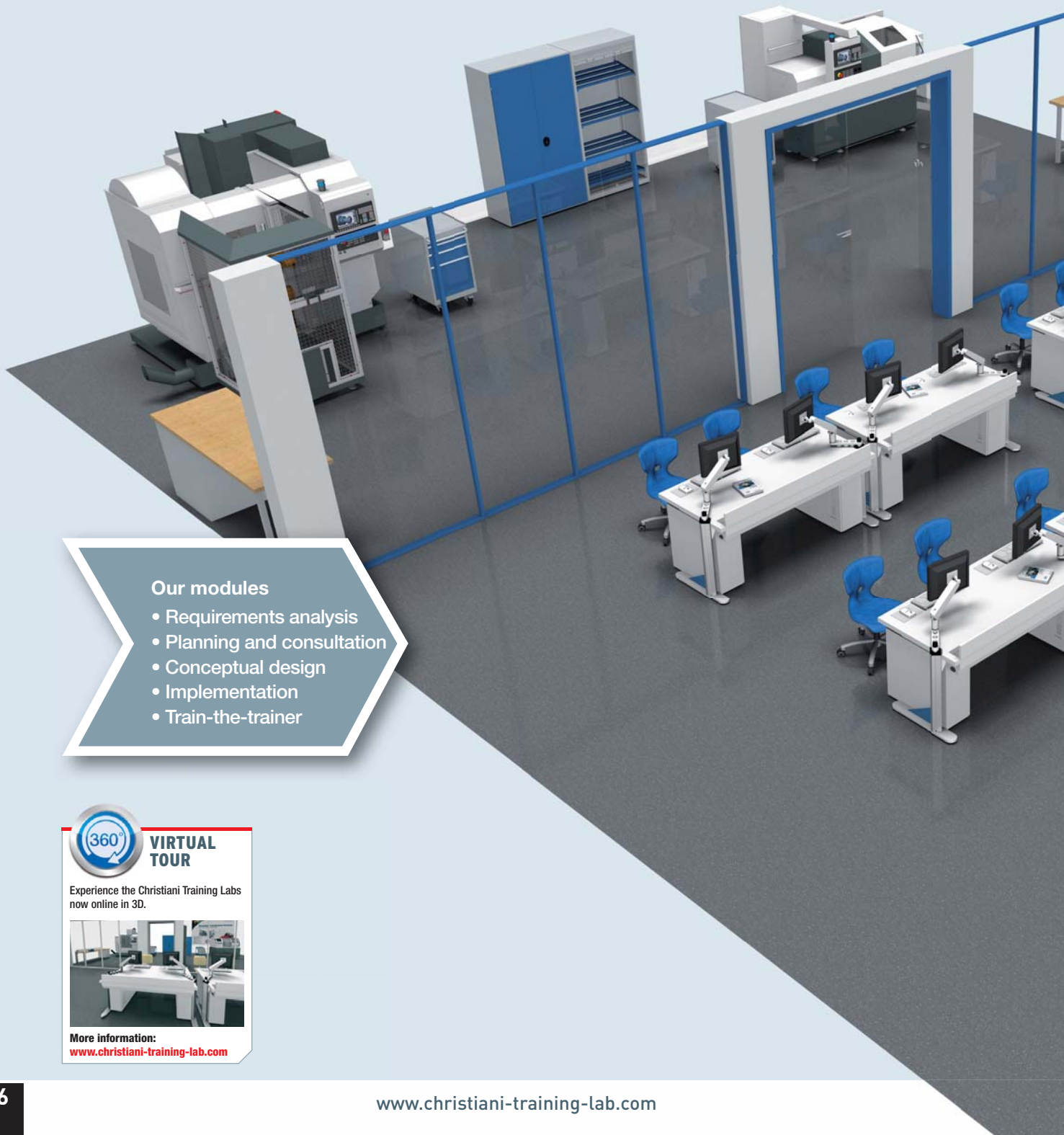
3D design, CNC programming and manufacturing

In this laboratory, basic knowledge of how to program CNC machines is conveyed. This obviously also includes operating the CNC machines installed in the lab. In addition to this, the computer workplaces in this laboratory can also be upgraded to include CAD software, all the way up to CAD/CAM systems.



Our modules

- Requirements analysis
- Planning and consultation
- Conceptual design
- Implementation
- Train-the-trainer

VIRTUAL TOUR

Experience the Christiani Training Labs now online in 3D.

More information:
www.christiani-training-lab.com

COMPACT INFO

Technical Training Lab for CAD-CAM-CNC

Example configuration for 16 workplaces:

- 1 CNC milling machine with SIEMENS control system
- 1 CNC turning machine with SIEMENS control system
- 16 computer workplaces with CNC simulation software, 2D and 3D CAD systems, CAM software
- 1 instructor desk
- CNC table attachment
- CNC hinged-door cabinet
- 2 workbenches
- 1 tool measuring system

Suitable for:

- Metalworking professions

Topics/learning objectives:

Manufacturing using numerically controlled machines

- Work plan, tool plan, set-up sheet
- Design and function of CNC machines
- Coordinate systems
- Reference points
- Geometric data
- Technology data
- Programme architecture
- Tool correction

The Christiani technical training lab CAD-CAM-CNC offers you the following:

- Theory and practice from a single source
- Motivation to learn and sustainable learning success
- Didactic diversity and practically oriented training media
- Strong partnerships with industry
- Professional consulting – from the planning stage, all the way up to implementation

Practically Oriented Training Media

Development of high-grade didactic products for vocational qualifications and further training is a tradition that stretches back more than 80 years at Christiani. Together with SIEMENS and Stürmer Maschinen GmbH, we have extended our range of training materials and machines to include CNC turning and CNC milling. From teachware, through real-world control system simulation software, all the way up to machine operation with original control systems, these employ an end-to-end concept that provides trainees with qualifications in the field of CNC technology.

Technical training courses

Specialised books

Task book

CNC Simulation Software

The new SINUMERIK user interface is now even more clearly structured and intuitive. SINUMERIK Operate combines the familiar HMIAdvanced, ShopMill and ShopTurn systems in a single, end-to-end, innovative operating and programming interface.

CNC Training Case

The training cases are used to learn how to operate and programme CNC machininig tools as well as taking them into operation and servicing them.

Powerful Specialised Lab Components

Functional CNC machines that offer you comprehensive performance characteristics at an affordable price. This is what sets the OPTIMUM CNC machines apart. The products impress through their excellent quality and precise machining, while also offering “OPTIMUM” price-performance

„Train-the-Trainer“

Siemens-certified trainers can train you on your own company premises - worldwide or at the HQ of Stürmer Maschinen GmbH in Hallstadt/Bamberg, Germany

Simply let us know your requirements: info@christiani-international.com

Please feel free to get in touch with one of our customer consultants.

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Furnishing, machines, working utilities – centralised performance by Christiani

We have created this example configuration to show you the wide range of options open to you when compiling your technical training lab. The fixtures, fitting, machines and equipment shown here offer you a brief overview of our product portfolio.

Our modules

- Requirements analysis
- Planning and consultation
- Conceptual design
- Implementation
- Train-the-trainer

VIRTUAL TOUR

Experience the Christiani Training Labs now online in 3D.

More information:
www.christiani-training-lab.com

COMPACT INFO

Technical Training Lab for Metal Engineering

Metalworking machines:

- Drills
- Drilling-milling machines
- CNC milling machines
- Lathes
- CNC lathes
- Metal band saws
- Metal circular saws
- Grinding machines
- Bending machines
- Sheet-metal cutters
- Comprehensive accessories
- Company facilities
- Furniture and fittings
- Tools, resources and test materials
- Workbenches
- Measuring and marking plates
- Surface plate

The Christiani technical training lab for metal engineering offers you the following:

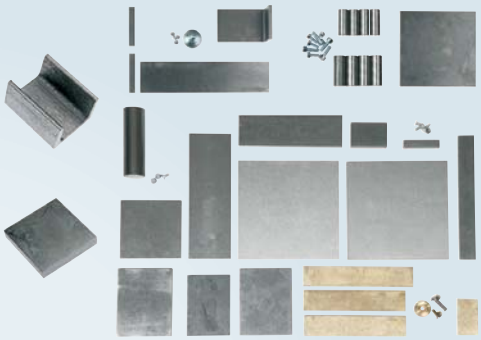
- Theory and practice from a single source
- Motivation to learn and sustainable learning success
- Didactic diversity and practically oriented training media
- Strong partnerships with industry
- Professional consulting – from the planning stage, all the way up to implementation

Technical Training Lab for Metal Engineering
Teaching Methods and Practice from a Single Source

Practically Oriented Training Media

Christiani technical training courses have been providing a solid basis for transferring skills and knowledge for years.
Developed by experienced trainers, the individual series stimulate personal skills and encourage independence. It is very important in this regard that trainers and trainees work hand in hand with precisely matched materials. Suitable material kits, toolkits and machine tools round off this offer.

Technical training courses



Material kit

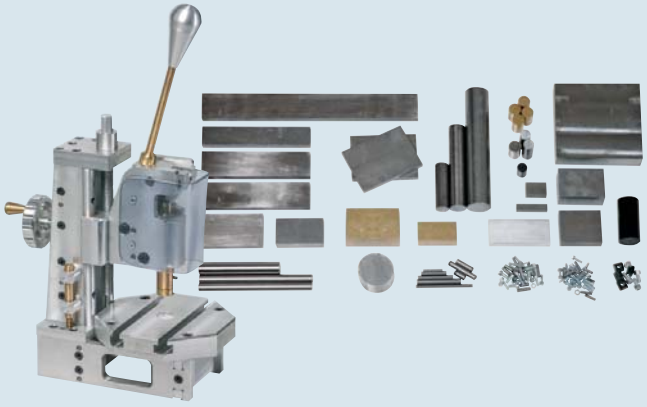
Tool box

Manufactured project work

Christiani Learning Portal

The flexible solution for use “on the go”, as well as at home, work or school. With the Christiani learning portal, you also have online access to interactive training programmes on metal and electrical engineering.

Project Work



With Christiani project works, trainees practice important working methods and manufacturing processes. All project work consist of a material kit and didactic documentation.

Powerful Specialised Lab Components

Premium screw cutting and bar lathe

„Train-the-Trainer“

We train your training staff to the latest standards and show you the most effective ways to use our training systems and materials.

Christiani plans and implements training projects of all sizes throughout the world. Our customers receive everything from a single source: Analysis and planning, the didactic concepts, as well as fully set up workshops, including training labs.

Please feel free to get in touch with one of our customer consultants.

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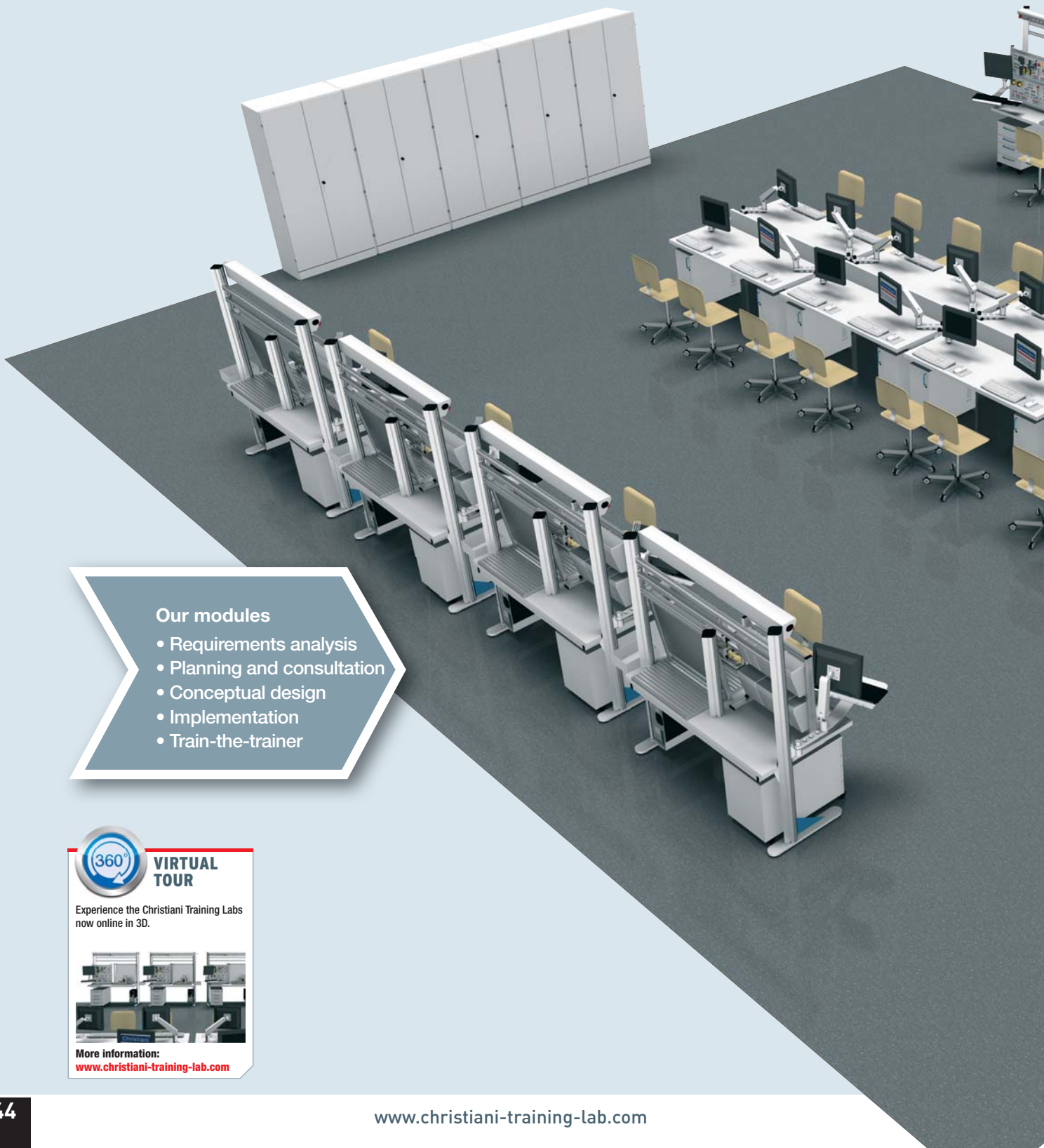
Deepen your know-how in the field of pneumatics and electropneumatics

To cater to the ever stricter requirements of modern training institutes, Christiani offers a diverse product portfolio for training in the fields of pneumatics and electropneumatics. Tailored to your specific requirements, we are happy to draw up an individual offer for you with the corresponding workplace systems, device kits and the accompanying didactic materials.



Our modules

- Requirements analysis
- Planning and consultation
- Conceptual design
- Implementation
- Train-the-trainer

VIRTUAL TOUR

Experience the Christiani Training Labs now online in 3D.

More information:
www.christiani-training-lab.com

COMPACT INFO

Technical Training Lab for Pneumatics

Example configuration for 16 workplaces:

- 8 multifunctional single-sided MAPS workplace systems
- 8 pneumatic device kits
- 8 electropneumatic device kits
- 8 press functional assemblies
- 8 logo training boards
- 1 instructor workplace
- 8 multimedia desks
- 16 copies of the “Automation Studio” simulation software
- Cabinet system

Suitable for:

- Students/trainees, workers, technicians in the field of mechanics and mechatronics.

Topics/learning objectives:

Integrating components of the PLC and control technology

- Compressed air generation and compressed air distribution
- Compressed air treatment
- Cylinder and directional control valves

Installing and operating control systems

- Supply air and exhaust air flow control
- AND members/OR members
- Sequence control with individual valves
- Sequence control with chain of steps

Ensuring the operating ability of automated systems

- Measurements of voltage and current
- Solenoid vales
- Basic circuits with contacts
- Relay, lock
- Time relay
- Pneumatic-electric converter

The Christiani technical training lab for pneumatics offers you the following:

- Theory and practice from a single source
- Motivation to learn and sustainable learning success
- Didactic diversity and practically oriented training media
- Strong partnerships with industry
- Professional consulting - from the planning stage, all the way up to implementation

Technical Training Lab for Pneumatics
Teaching Methods and Practice from a Single Source

Practically Oriented Training Media

At Christiani, specialised technical training lab equipment and didactic training materials are precisely matched to one another. With this uniform holistic concept, you can offer state-of-the-art training, as well as conveying practically oriented specialist knowledge and the necessary personal skills. In developing our innovative products, we work closely with strong partners from the industrial sector.

Technical training courses

Specialised books

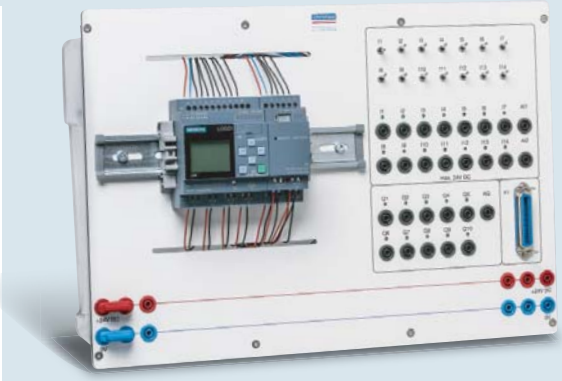
Component kit

We offer a wide range of training materials and learning methods for vocational training and trade schools.
We would be happy to advise you on putting together the ideal package for your specific requirements.

Simulation Software

Automation Studio E6
The software solution par excellence, ideally suited for teaching in the specialist fields of pneumatics, hydraulics and automation.

Training Boards



The Christiani training boards are the ideal tools for a quick and easy introduction to using and programming miniature controllers.

Powerful Specialised Lab Components

The Christiani technical training lab is equipped with modern training equipment and training systems. All components and device kits comply with industry standards and have been specifically matched to the requirements of schools and educational establishments.

„Train-the-Trainer“

We train your training staff to the latest standards and show you the most effective ways to use our training systems and materials.

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Your ideal entry into the world of hydraulics

The technical expertise of Rexroth and the solution expertise in the field of industrial applications flow seamlessly into modular training systems, while precisely fulfilling the qualification requirements of industry. Beginners and advanced students gain practically oriented and technical specialist knowledge in the field of hydraulic components in a step-by-step approach. The didactic materials are based on industrial tasks.

Our modules

- Requirements analysis
- Planning and consultation
- Conceptual design
- Implementation
- Train-the-trainer

VIRTUAL TOUR

Experience the Christiani Training Labs now online in 3D.

More information:
www.christiani-training-lab.com

COMPACT INFO

Technical Training Lab for Hydraulics

Example configuration for 16 workplaces:

- 4 training systems for hydraulic components, 8 double-sided device kits
- Switching hydraulics, electrohydraulics, modulation valve technology, mobile hydraulics
- 4 component holders
- 8 desks for theory work
- Storage and cabinet system

Suitable for:

- Basics for all metalworking professions
- Milling machine operators
- Industrial engineers
- Mechatronics engineers
- For all technical professions which require understanding of the fundamentals of hydraulic systems

Topics/learning objectives:

- Identification of the components
- Commissioning
- How is pressure generated
- Directional valves, travel direction of the cylinder
- Load pressure
- Setting speeds, inlet throttle
- Adjusting the pressure difference using system pressure
- Adjusting the pressure difference using load pressure
- Pressure transmission, outlet throttle
- Pressure reduction

The Christiani technical training lab for hydraulics offers you the following:

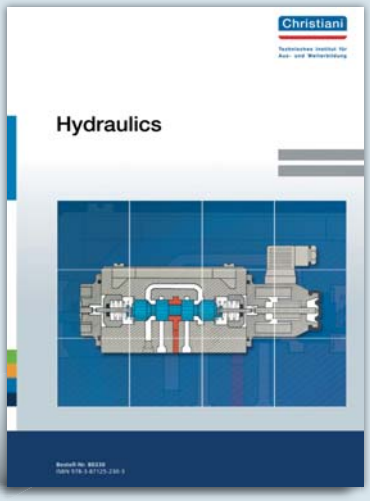
- Theory and practice from a single source
- Motivation to learn and sustainable learning success
- Didactic diversity and practically oriented training media
- Strong partnerships with industry
- Professional consulting – from the planning stage, all the way up to implementation

Technical Training Lab for Hydraulics

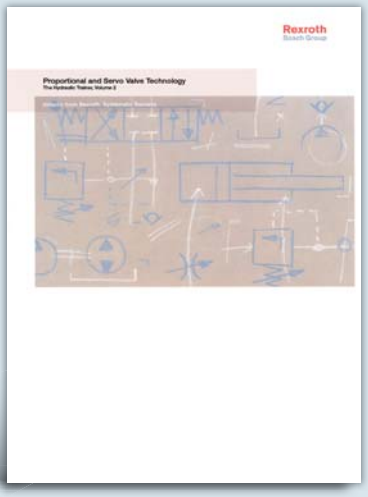
Teaching Methods and Practice from a Single Source

Practically Oriented Training Media

The “Hydraulics” training system has been developed to cater to the ever stricter qualification and further training requirements in the field of fluid engineering. The training system offers a solid basis for providing practical training on virtually all technologies relating to hydraulics. Matching teachware, simulation software and comprehensive accessories round off the offer and guarantee maximum learning success.



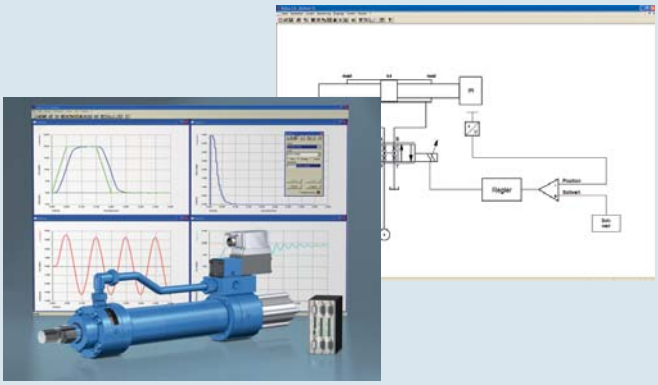
Technical training courses



Specialised books

Component kit

Simulation Software

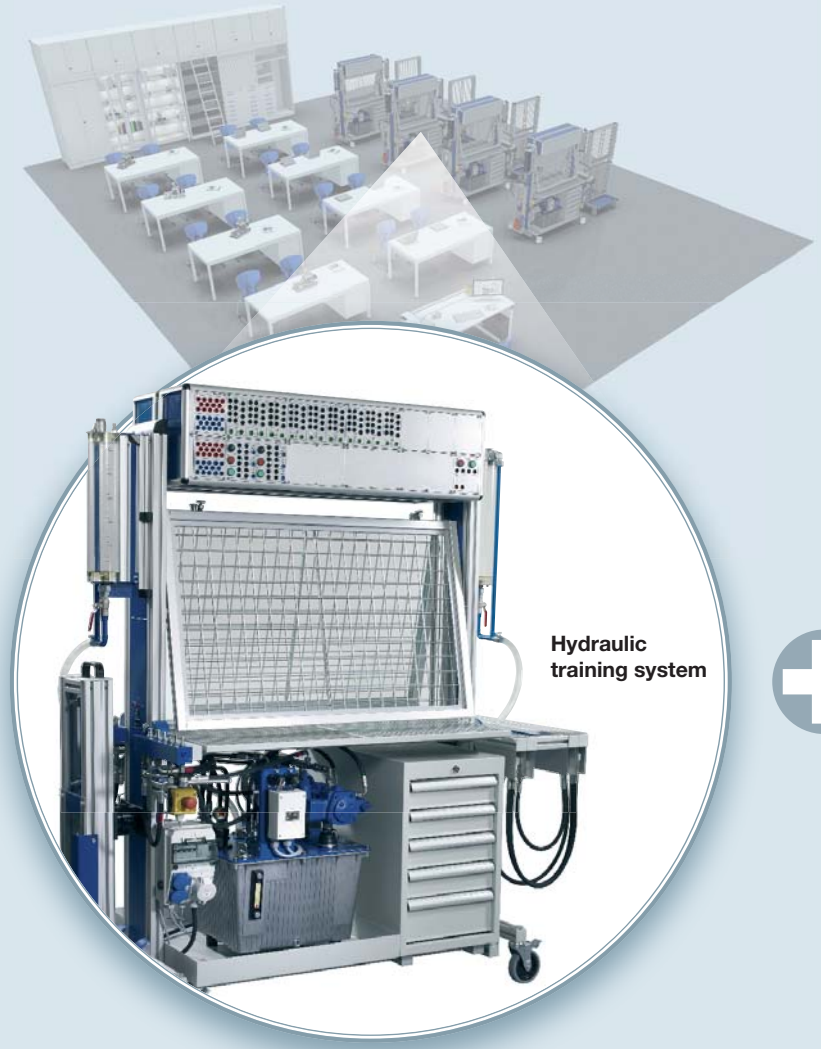


HYVOS 7.0
The software allows valve-operated cylinder drives to be simulated in open or closed circuits.

Project Manuals

The trainer and trainee manuals from Rexroth are characterised by their high degree of practical relevance and are precisely matched to the training systems and component kits.

Powerful Specialised Lab Components



Training system for practical qualifications and further training. Use of standard components from Rexroth's range of industrial valves (nominal size 6).

„Train-the-Trainer“

We train your training staff to the latest standards and show you the most effective ways to use our training systems and materials.

Please feel free to get in touch with one of our customer consultants.

“Whether you are looking to expand your existing specialised training lab or are planning something new – we are happy to support you with the necessary advice and expertise. Tell us about your individual requirements. We can then advise you on all questions.”

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Interactive Learning Programmes

Recommendation

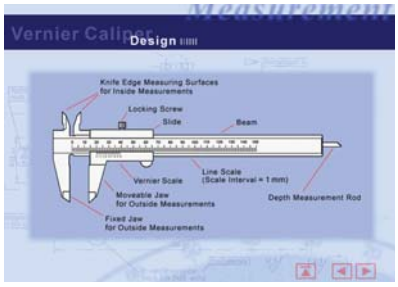
The independent and flexible way to learn

Separating / Forming

The interactive learning program „Separating and Forming“ describes manual and automated procedures for cutting, bending and straightening.

Joining 1

The interactive learning program „Joining 1“ encompasses positive and friction joining, as well as the procedures for bonding and soldering / brazing.



More information **on page 60**

Learn basic principles of metal working independently at your PC

The individual modules of the interactive learning programmes from Christiani have been designed as self-contained, subject-based units, each containing their own learning objectives review. Trainees control their learning more independently and individually than before, supported by motivational learning media. The mixture of texts to be read, images, animated graphics and narrated text brings this type of learning to life. The additional training module offers an individual learning objectives review for each trainee.

Specification:

The aim is to impart the required specialist theory to students based on a complete concept which offers them greater independence and freedom.

Content:

In terms of content, the learning programmes deal with the required specialist theory for practical training in the field of testing and production technology.

Learning objectives:

General core qualifications in metalworking professions

- Operational and technical communication
- Planning and organising work, evaluating results
- Manufacturing components and simple functional units

Demo versions and videos for all modules are available at **www.christiani-international.com** or **www.learn4metal.com**

The interactive metal learning programmes are available in three variants:

1 The standard solution for use on a single computer or over a network connection

The optimum solution for learning islands, fixed training rooms or classrooms or if there is no Internet connection

CBT – Computer Based Training

- Learning content can be installed as a single workstation application or in the computer network
- Not bound to a workstation, thanks to network integration
- No Internet access required
- Can be used for an unlimited period of time

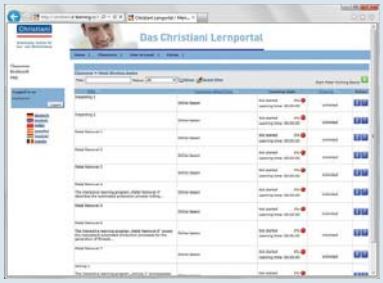
2 The web-based online solution for your learning management system

Learn whenever and wherever you want – whether in the company or at school (prerequisite: Internet access)

WBT – Web Based Training

- The learning content is integrated in your learning management system (LMS)
- Can be used for an unlimited period of time
- Starting from a minimum quantity of 20 licences, the licensing level is freely selectable
- Learning is possible regardless of time or location

3 The online solution on the Christiani learning portal



Online learning portal www.learn4metal.com

- The learning content is edited online (time restriction)
- Always the latest software version
- Cost-effective, as you only pay for the usage period
- Direct access to all offers
- Learning is possible regardless of time or location

Introduction

1. Objective

The objective is to provide the learners with the basic knowledge required in metalworking occupations by means of an integrated concept that gives the learners more independence and the instructor greater flexibility.

2. Concept

The individual modules are designed as self-contained, topic-specific units, each including its own learning objective check. The respective practical instruction can be started directly after the work on the individual topic areas.

3. Suitable for

The interactive learning programmes are suitable both for trainees at vocational college and for specialist workers and other personnel in the factories.

4. Content

The content of the learning programmes relates to the basic knowledge required for practical training in the area of testing and manufacturing technology. The topic areas are, specifically: Testing, cutting, joining, separation and forming, as well as work planning.

5. Duration

Duration of the modules including the learning objective check is between 3 and 5.5 hours, depending on the program. For didactic reasons, the individual programmes should not be dealt with in one go, but in blocks of max. 90 minutes – this ensures that the knowledge acquired is retained better.

6. Learning Process

The learners control their own learning process – supported by motivating media – in a more independent and individual manner than previously. By means of the integrated learning objective check, they can test their knowledge and take specific measures to fill in any gaps.

7. More Flexibility for Individual Guidance

The use of the interactive learning programmes benefits both the learners and the instructors – with this form of knowledge transfer the learners achieve a greater degree of independence, the instructors are increasingly relieved of routine tasks and can therefore dedicate themselves more to individual support of the learners.

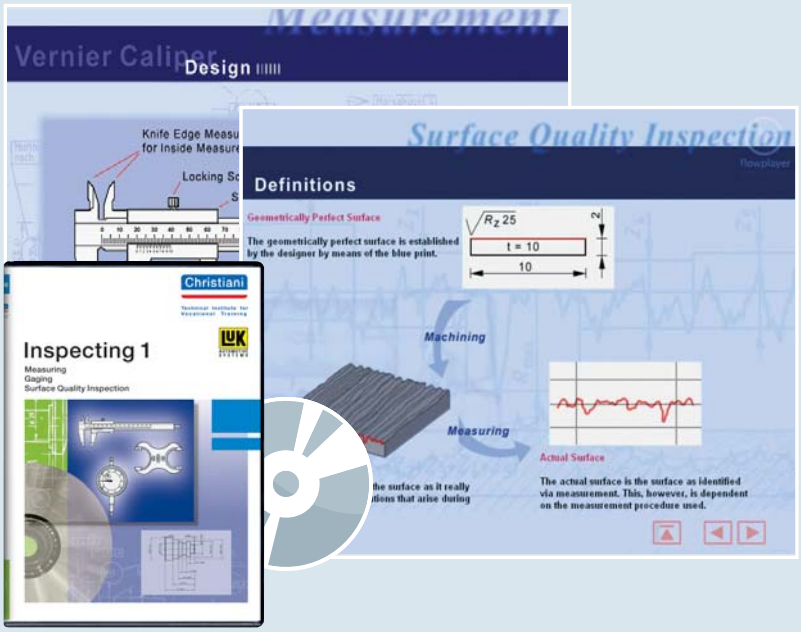
Overview of Topics

- **Inspecting 1**
  Topics: inspection practices, devices and basic measurement terminology
- **Inspecting 2**
  Topics: tolerances and fits necessary for work in production
- **Metal Removal 1**
  Topics: manual metal removal production processes.
- **Metal Removal 2**
  Topics: automated metal removal production procedures fort he generation and processing of drilled holes
- **Metal Removal 3**
  Topics: automated production process turning
- **Metal Removal 4**
  Topics: automated production process milling
- **Metal Removal 5**
  Topics: automated production process grinding
- **Metal Removal 6**
  Topics: manual and automated production processes for the generation of threads
- **Metal Removal 7**
  Topics: basic terminology of metal removal using machine tools, covering cutting tools, cutting tools materials and metal removal process
- **Joining 1**
  Topics: positive and friction joining, procedures for bonding and soldering / brazing
- **Joining 2**
  Topics: welding process
- **Process Planning**
  Topics: blue print reading, technical communication, developing manufacturing plans
- **Separating / Forming**
  Topics: manual and automated procedures for cutting, bending and straightening
- **Testing Module**
  Topics: subject-specific / multi-subject examinations

System requirements:
- *PC with Windows XP, 7 (32/64 Bit), 8 (32/64 Bit), 10 (32/64 Bit)*
- *PC with Windows Server 2003, 2008, 2012*
- *Min. Pentium 133*
- *160 MB available hard drive memory (for complete installation)*
- *16 bit color depth at 800 x 600*
- *Sound card and 4 x CD-ROM*

Inspecting 1 – Measuring, Gauging, Surface, Quality Inspection

The interactive learning programme „Inspecting 1“– for dimensional inspecting techniques according to DIN 2257– offers a comprehensive treatment of inspection practices, devices and basic measurement terminology.



Measuring
- Length Measuring Tools
- Angle Measuring Tools
- Basic Terms of Length Inspection Technology
- Course Objectives

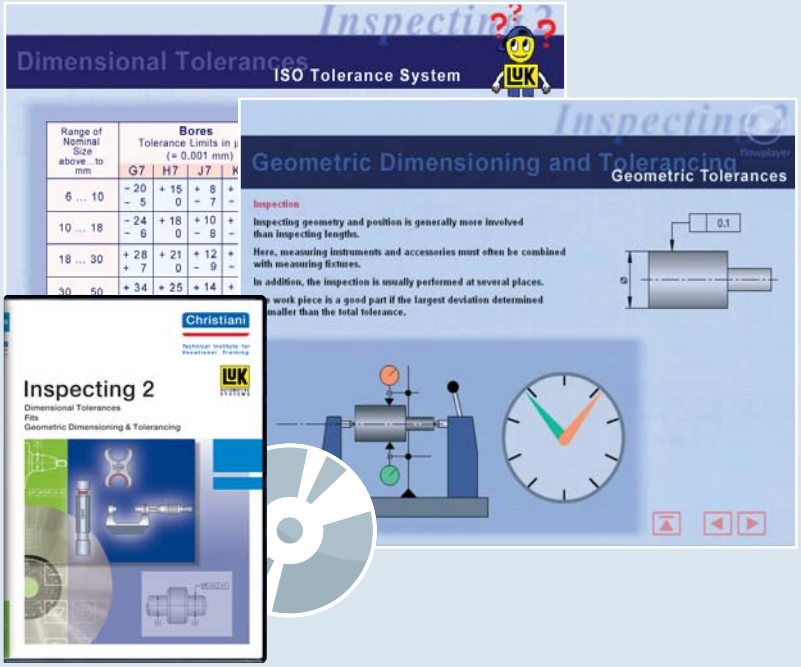
Gaging
- Flatness Inspection
- Profile Gages
- Size Gages
- Go/No-Go Gages
- Course Objectives

Surface Quality Inspection
- Definitions
- Geometric Deviations
- Surface Parameters
- Surface Quality Inspection Procedures
- Course Objectives

Demo-video at
www.christiani-international.com/10572

Inspecting 2 – Tolerances and Fits

The interactive learning programme „Inspecting 2“ describes the tolerances and fits necessary for work in production.



Dimensional Tolerances
- Basic Terms
- ISO Tolerance System
- Inspection Dimensional Tolerances

Fits
- Types of Fits
- Systems of Fits
- Selecting Fits
- Inspecting Fit Dimensions

Geometric Dimensioning & Tolerancing
- Geometric Tolerances:
- Blue Print Specifications, Types, Inspecting Geometric Tolerances
- Positional Tolerances:
- Blue Print Specifications, Types, Inspecting Positional Tolerances 1
- Coordinate Measuring Machine (CMM)

Demo-video at
www.christiani-international.com/10573

	CBT-Single License			WBT-License (web-based online solution)				
	English	Spanish	Chinese	English	Spanish	Chinese	Rumanian	Hungarian
Article	**Order-No.**			**Order-No.**				
Inspecting 1	10572	10600	available, please request	available – ask us for our special license packages				
Inspecting 2	10573	10612						

Metal Removal 1 – Cutting Wedge, Scribing, Layout Punching, Sawing, Filing

The interactive learning programme „Metal Removal 1“ describes manual metal removal production processes.

Cutting Wedge
- Metal Removal Process
- Cutting Edges, Surfaces and Angles
- Cold Chisel

Layout Work
- Scribing: Scribing Tools
- Layout Punching: Layout Punch,
- Execution

Sawing
- Saw
- Process
- Types of Saw Cuts

Filing
- File
- Process
- Processing examples

Demo-video at
www.christiani-international.com/10575

Metal Removal 2 – Drilling, Counterboring & Countersinking, Reaming

The interactive learning programme „Metal Removal 2“ describes automated metal removal production procedures for the generationand processing of drilled holes

Drilling
- Definition
- Drilling Tools
- Drilling Machines
- Drilling Process

Counterboring & Countersinking
- Definition
- Counterbore & Countersink
- Counterboring & Countersinking Process

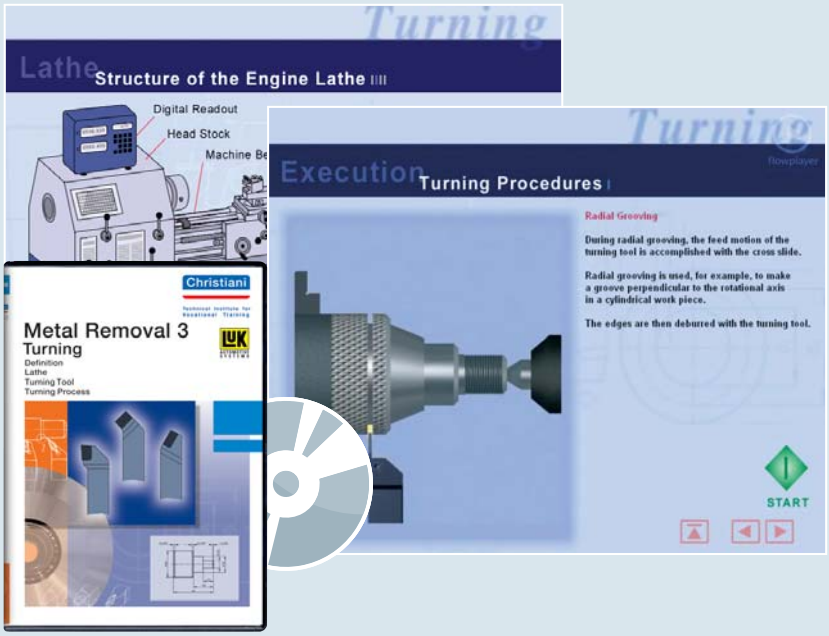
Reaming
- Definition
- Reamer
- Reaming
- Process

Demo-video at
www.christiani-international.com/10576

	CBT-Single License			WBT-License (web-based online solution)				
	English	Spanish	Chinese	English	Spanish	Chinese	Rumanian	Hungarian
Article	**Order-No.**			**Order-No.**				
Metall Removal 1	10575	10614	available,	available – ask us for our special license packages				
Metall Removal 2	10576	10620	please request					

Metal Removal 3 – Turning

The interactive learning programme „Metal Removal 3“ describes the automated production process turning.



Lathe
- Structure
- Parameters
- Types

Turning Tool
- Structure
- Cutting Edge Geometry
- Chip Types
- Types of Turning Tools

Turning Process
- Determining the Cutting Parameters
- Clamping the Tool
- Clamping the Workpiece
- Working Technique
- Turning Procedures
- Process Planning

Demo-video at
www.christiani-international.com/10577

Metal Removal 4 – Milling

The interactive learning programme „Metal Removal 4“ describes the automated production process milling.

Milling Machines
- Structure
- Parameters
- Types

Milling Cutter
- Cutting Edge Geometry
- Wear
- Milling Cutter Types

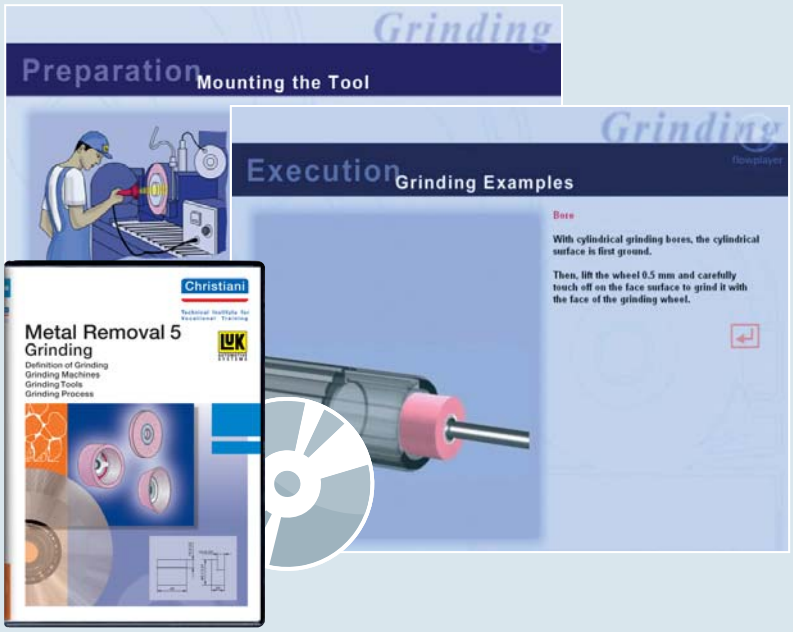
Milling Process
- Determining the Cutting Parameters
- Holding the Tools
- Holding the Work Pieces

Demo-video at
www.christiani-international.com/10578

	CBT-Single License			WBT-License (web-based online solution)				
	English	Spanish	Chinese	English	Spanish	Chinese	Rumanian	Hungarian
Article	**Order-No.**			**Order-No.**				
Metal Removal 3	10577	10624	available, please request	available – ask us for our special license packages				
Metal Removal 4	10578	10625						

Metal Removal 5 – Grinding

The interactive learning programme „Metal Removal 5“ describes the automated production process grinding.



Grinding Machines
- Structure of the Horizontal Surface Grinder
- Structure of the Universal Cylindrical Grinder
- Types of Grinding Machines

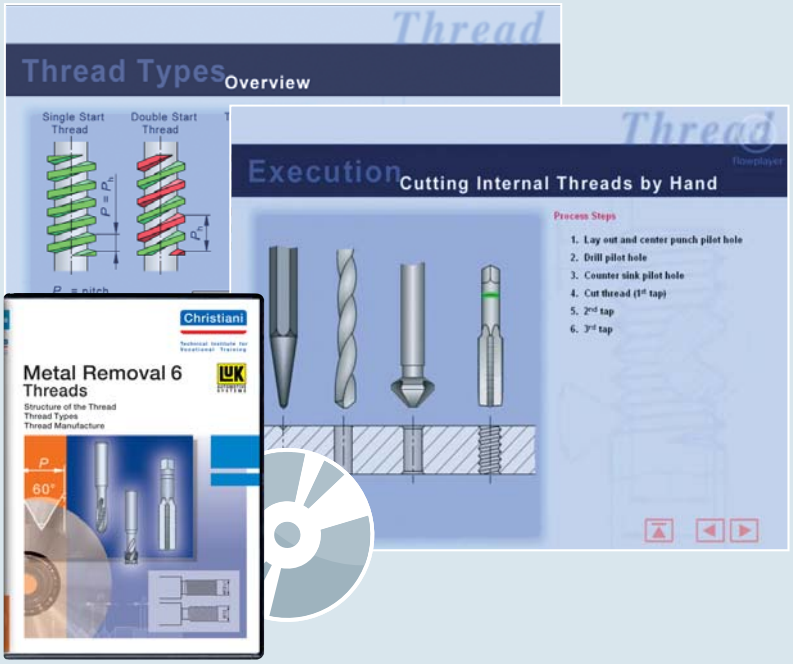
Grinding Tools
- Structure and Properties
- Shapes
- Designation of Grinding Wheels

Grinding Process
- Determining the Cutting Parameters
- Clamping and Balancing Grinding Wheels
- Dressing Grinding Wheels.

Demo-video at
www.christiani-international.com/10579

Metal Removal 6 – Threads

The interactive learning programme „Metal Removal 6“ covers the manual and automated production processes for the generation of threads.



Structure of the Thread
- Application and Generation of Threads
- Thread Designations

Thread Types
- Threads for Fastening and Adjusting
- Metric ISO Standard and Fine Threads
- Right and Left Hand Threads
- Single and Multiple StartThreads

Thread Manufacture
- Dimensions for Internal and External Threads
- Cutting and tapping threads by hand
- Cutting threads with the lathe and milling machine
- Thread Inspection

Demo-video at
www.christiani-international.com/10580

	CBT-Single License			WBT-License (web-based online solution)				
	English	Spanish	Chinese	English	Spanish	Chinese	Rumanian	Hungarian
Article	**Order-No.**			**Order-No.**				
Metall Removal 5	10579	10626	available,	available – ask us for our special license packages				
Metall Removal 6	10580	10627	please request					

Metal Removal 7 – Technology

The interactive learning programme „Metal Removal 7“ describes the basic terminology of metal removal using machine tools and covers cutting tools, cutting tool materials and the metal removal process.

Basic Terms
- Procedures
- Motions

Cutting Tools
- Cutting Edge Geometry

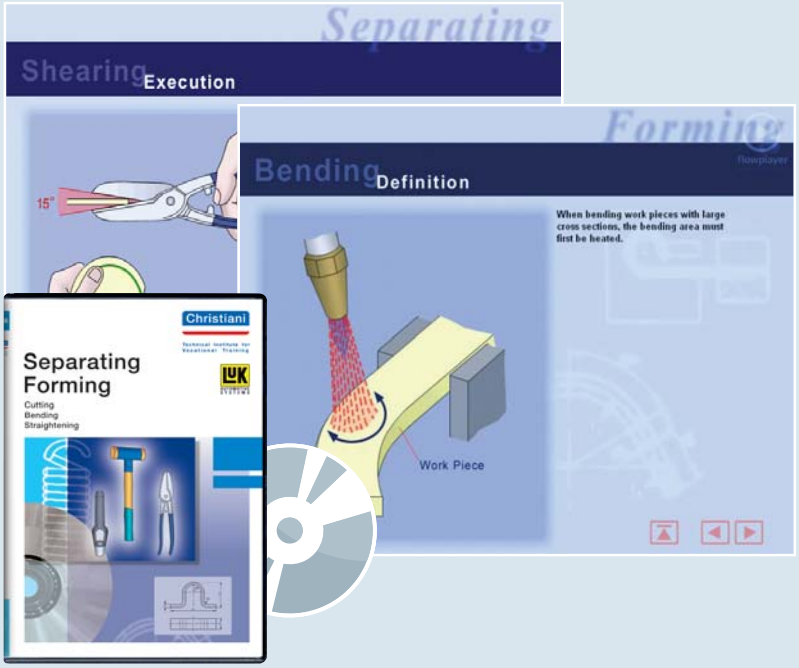
Cutting Tool Material
- Requirements
- Overviews
- Indexable Inserts

Process
- Preparing Work Pieces
- Preparing Cutting Tools
- Cutting Fluid
- Working Technique
- Results
- Metal Removal Procedures

Demo-video at
www.christiani-international.com/10581

Separating / Forming

The interactive learning programme „Separating and Forming“ describes manual and automated procedures for cutting, bending and straightening.



Separating
- Blade Cutting
- Cutting with Opposing Blades
- Shearing
- Thermal Cutting
- Occupational Safety

Forming
- Bending
- Straightening
- Other Procedures
- Occupational Safety

Demo-video at
www.christiani-international.com/10574

	CBT-Single License			WBT-License (web-based online solution)				
	English	Spanish	Chinese	English	Spanish	Chinese	Rumanian	Hungarian
Article	**Order-No.**			**Order-No.**				
Metal Removal 7	10581	10628	available, please request	available – ask us for our special license packages				
Separating / Forming	10574	10613						

Joining 1 – Positive / Friction Joining, Bonded & Soldered / Brazed Joints

The interactive learning programme „Joining 1“ encompasses positive and friction joining, as well as the procedures for bonding and soldering / brazing.

Demo-video at
www.christiani-international.com/10582

Threaded Fastener Joints
- Threaded Fasteners and Nuts
- Designations
- Thread Locks
- Tools
- Process

Pin and Bolt Joints
- Pin Types and Process
- Bolt Joints

Rivet Joints
- Rivet Types
- Tools
- Process

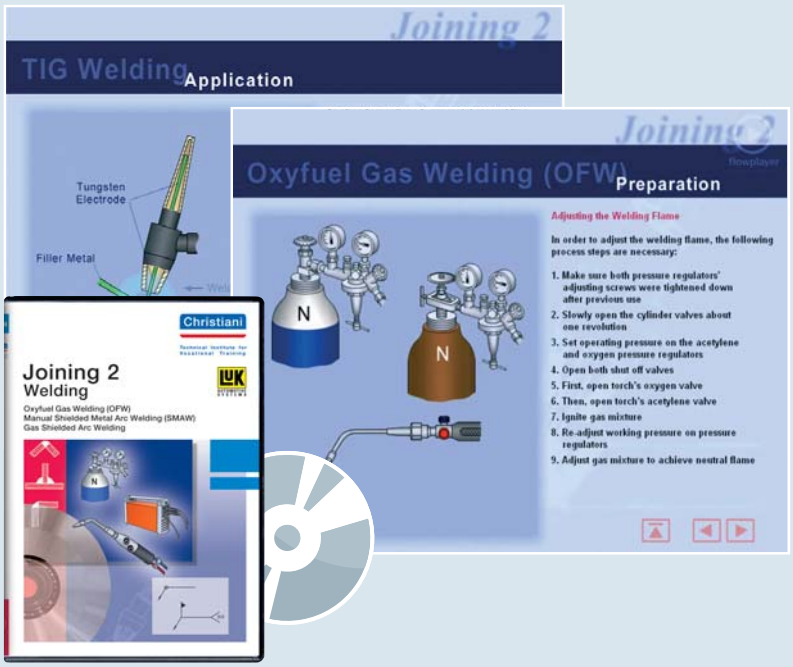
Shaft and Hub Joints
- Key, Gib and Profile Joints

Bonded Joints
- Adhesives and Process

Soldered/Brazed Joints
- Tools
- Solder/Brazing Filler Metal and Fluxes
- Process

Joining 2 – Welding

The interactive learning programme „Joining 2“ describes the welding process.



Oxyfuel Gas Welding (OFW)
- Welding Gases
- Welding Equipment
- Welding Supplies
- Process

Manual Shielded Metal Arc Welding (SMAW)
- Arc Welding Power Sources
- Work Place
- Welding Supplies
- Electrode
- Process
- Welding Defects

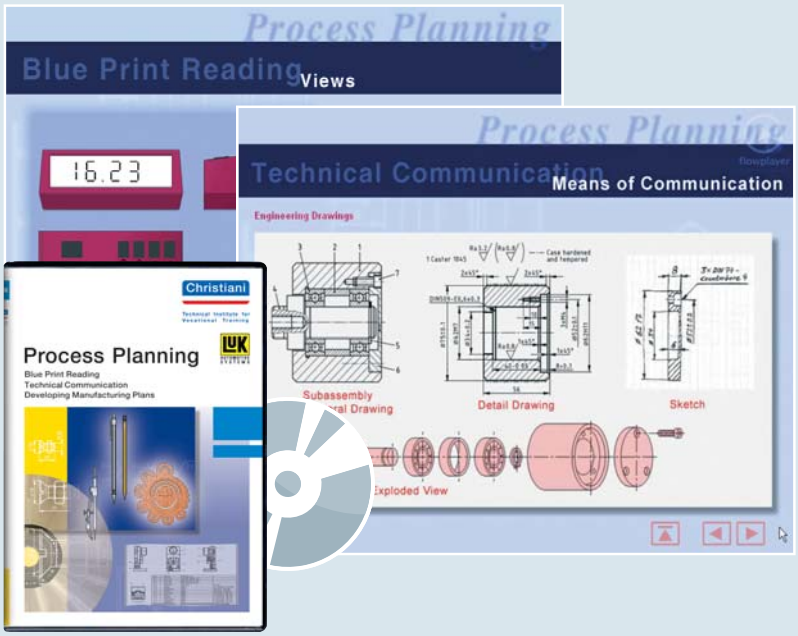
Gas Shielded Arc Welding
- Shielding Gases
- Gas Metal Arc Welding (GMAW)
- Gas Tungsten Arc Welding (GTAW)
- Welding Defects

Demo-video at
www.christiani-international.com/10583

	CBT-Single License			WBT-License (web-based online solution)				
	English	Spanish	Chinese	English	Spanish	Chinese	Rumanian	Hungarian
Article	**Order-No.**			**Order-No.**				
Joining 1	10582	10629	available,	available – ask us for our special license packages				
Joining 2	10583	10630	please request					

Process Planning

The interactive learning programme „Process Planning“ contains the subjects blue print reading, technical communication and developing manufacturing plans.



Blue Print Reading
- Views
- Dimensioning
- Tolerance Designation
- Surface Characteristic Designation
- Cross Section Representation
- Thread Representation
- Simplified Representations

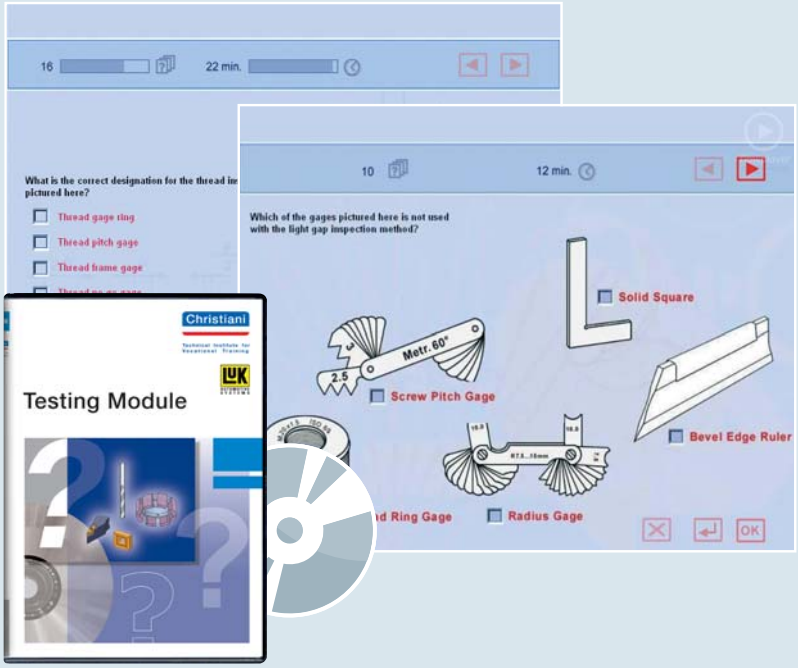
Technical Communication
- Standardization
- Means of Communication
- Drawing Equipment

Developing Manufacturing Plans
- Preparation
- Process Plans
- Assembly Plans
- Documentation

Demo-video at
www.christiani-international.com/10584

Testing Module

The „Testing Module“ is comprised of the Course Objective questions from all modules of the Metal Working Series and allows for the generation of subject-specific and multi-subject examinations.



Trainer
- Subject pre-selection
- Question selection:
  - All subjects
  - Particular number of randomly selected questions
  - Particular number per exercise type
  - Manual selection
- Saving prepared tests
- Calling up and printing out test results

Trainee
- Taking tests prepared by the trainer
- Taking self-examinations
- Subject pre-selection
- Question selection:
  - All subjects
  - Particular number of randomly selected questions
  - Particular number per exercise type

Demo-video at
www.christiani-international.com/10585

	CBT-Single License			WBT-License (web-based online solution)				
	English	Spanish	Chinese	English	Spanish	Chinese	Rumanian	Hungarian
Article	**Order-No.**			**Order-No.**				
Process Planning	10584	10635	available, please request	available – ask us for our special license packages				
Testing Module	10585	10636						

ISO Trainer Metal

Correct testing (making measurements and using gauges) of workpieces is one of the most important basic skills in vocational training. By participating in our ISO Trainer Metal, your apprentices and/or students practice making measurements and using gauges independently on prefabricated workpieces. This places emphasis on proper handling of the testing device, and recognizing and evaluating the accuracies required by technical drawings. The ISO Trainer Metal can be used to improve knowledge and skills in the inspection area. The learners should already have basic knowledge in taking measurements and using gauges, as well as in reading technical drawings.

Sample workpieces
The ISO Trainer Metal supplies 6 workpieces and the corresponding drawings. It includes 3 turned and 3 milled parts. The workpieces are sand blasted aluminium. All dimensions relevant in practice are covered, e.g.: outside dimensions, inside dimensions, depths, hole spacing, radii, etc. The ISO Trainer Metal can be expanded to include a maximum of 6 of your own workpieces.

Application with PC programme
The ISO Trainer Metal contains a PC programme, which guides the learner through the completion of test problems, displays the dimensions to be tested, offers help if required, delivers immediate feedback, and evaluates the solutions. All the results from the session are stored in the programme. Thus evaluations specific to test points and test devices can be created.

Workpiece drawings
There is a complete drawing available for each workpiece. Dimensions – have either specified tolerance specifications or are non-toleranced dimensions. Actual dimensions do not always lie within the given tolerance in each case; rather they may also be rejects.

Scope of delivery:

- Sturdy plastic case with foam rubber lining
- 3 turned and 3 milled workpieces
- Corresponding drawings
- PC programme with detailed documentation
- Printed short instructions

System requirements
• PC with Windows XP, 7, 8
• At least Pentium 128 • 128 MB RAM • Graphic card resolution 1024 x 768 • CD-ROM drive

Article	Order-No.
Iso Trainer Metal	**76958**

More Information: www.christiani-international.com/76958

Starting your career

The “Tips for Training” series from the CCI (German Chamber of Industry and Commerce) supports companies abroad in implementing their vocational training in accordance with German job profiles and standards. Topics, such as the time frame method, learning fields, training organisation and the structure of the CCI examinations, are explained.

The following volumes are available, each in English and Spanish:

- Starting your career as a mechatronics engineer
- Starting your career in metal
- Industrial electronics professions

More information: www.christiani-international.com

Technical Training Courses

Recommendation

Manual material processing – basic and advanced training

The training course „Manual Material Processing“ covers the manual cutting manufacturing processes according to the technical training scheme for metalworking professions. The course covers the following skills in detail: filing, sawing, drilling, countersinking, reaming, chiselling, thread production and punching. The training materials also focus on testing, scribing and marking. Subsequent sections are dedicated to materials science, occupational health and safety and environmental protection.

More information **on page 70**

Best practices – the recipe for success
Benefit from a successful training concept

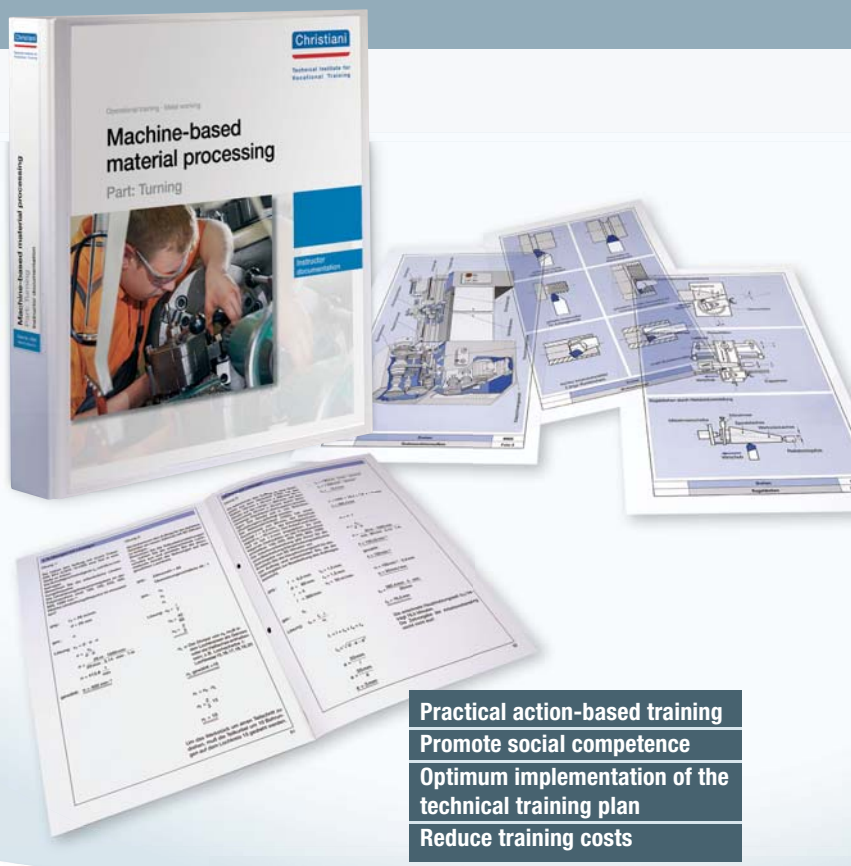
Christiani technical training courses have been providing a solid basis for transferring skills and knowledge for years.
Developed by experienced trainers, the individual series stimulate personal skills and encourage independent working. It is very important in this regard that trainers and trainees work hand in hand with precisely matched materials, for example with:

- Technical information
- Guiding texts
- Work plan documents
- Inspection and Evaluation Sheets

Christiani thereby provides the trainer with a high-quality training package, which full delivers the contents of the basic training in accordance with the technical training scheme. The training packages offer optimum implementation of the technical training scheme – thereby also reducing training costs. The concept of the technical training courses follows the approach of „knowledge through action“. In numerous smaller projects – suitable both for group-based and individual work – the trainees are guided through the stages of the guiding text method.

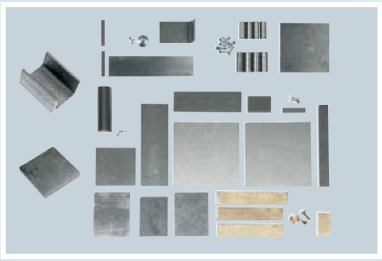
The training course consisting of

- **Trainer manual**
- **Documentation for the trainee**
- **The textbook**
- **The appropriate material resources**



Complete material set

The example of the course „Manual material processing-basic and advanced training“



Consisting of semi-finished products and standard parts for the exercises

Practical action-based training
Promote social competence
Optimum implementation of the technical training plan
Reduce training costs

Course package for the trainer

The example of the course „Manual material processing-basic and advanced training“

Trainer manual
The trainee documentation is already clearly structured, and this systematic approach is also continued in the accompanying materials.

The textbook
The bound textbook contains practical and theoretical knowledge and notes on regulation and standards relating to occupationalhealth and safety and environmental protection.

CD-ROM
The CD-ROM for the trainer contains all slides and proposed solutions in a linked file in printquality.

Documentation for the trainee
In the documents, the trainees will find the task descriptions with detailed colour illustrations and all the necessary documentation for work planning and execution, through to selfassessment and evaluation.

The Components for the Trainer

Documentation for the trainee

Nowadays, the training materials that are used on a day-to-day basis are of the utmost importance. Complicated research and searching for technical information are a thing of the past with the optimally prepared training folders for metal technology. The clear layout and structure enable the trainee to view and start
using the information immediately. This means that every training course – whether for the trainer or trainee – provides the optimum preparation for the future career.

Trainer manual

The trainee documentation is already clearly structured, and this systematic approach is also continued in the accompanying materials. The trainer guide contains detailed suggestions for performing the vocational training. Learning objectives, training content, didactic and methodical notes, use of media and time allowances are displayed in table form. Corresponding exercises with recommendations on methodology and the use of resources complete the guide.

CD-ROM

The CD-ROM for the trainer contains all slides and proposed solutions in a linked file in print quality. It also provides digitally processed worksheets for group exercises, work planning etc. The CD-ROM also contains interactive animations that contribute towards a better understanding or consolidation of complex dynamic processes related to the topic (included in every training course).

The textbook

Even in the digital age, electronic information sources are not always the best medium for conveying all information. This is where the trusted medium of the textbook steps in. This is used to communicate general content such as standards, regulations and legal texts. It also provides information about working with technical and reference tables. The textbook accompanies the trainees throughout their whole training period.

The Components for the Trainee

Documentation for the trainee

In the documents, the trainees will find the task descriptions with detailed colour illustrations and all the necessary documentation for work planning and execution, through to self-assessment and evaluation. The trainees are therefore guided throughout the entire process.

The textbook

The bound textbook contains practical and theoretical knowledge and notes on regulation and standards relating to occupational health and safety and environmental protection. As the training period progresses, the trainee will learn how to make use of textbooks, tables and technical information. The textbooks act as a reference work throughout the whole training period.

Christiani concept for company-based vocational training in metal

An in-depth knowledge of the basics of metal technology is essential in order to be able to master more complex tasks later on and be capable of flexible deployment within the company. Christiani, with its company-based training courses, offers a concept with which you can plan the vocational training in a thorough and modular fashion in terms of subject-matter and time. The contents are prepared in such a way that they can be worked through in the specified time frame, combining theoretical knowledge with practical work in the form of projects.

Recommended Process Basic Education in Metal

Manual material processing
time benchmark 14 weeks

Turning
time benchmark 6 weeks

Milling
time benchmark 6 weeks

Basics welding technology
time benchmark 9 weeks

Basics CNC technology
time benchmark 8 weeks
(in preparation)

Basics pneumatic and hydraulic
time benchmark 8 weeks
(in preparation)

Basics maintenance
time benchmark 2 weeks

Concept of action-based training

The Training Courses are Based on the Model of Complete Action

Working with our documents trainer and trainee automatically follow the Model, by passing these steps:

In given textbooks and drawings the trainees can find all relevant information, which they need to fulfill the tasks. Additionally Formula book and our interactive software would be useful tools and information sources. A Media list is included.

Planning work sheets and guiding questions help the trainee to substantiate the way of solving the task or project. Bill of materials, list of supplies and Workflow diagrams are means to document the planning. Drafts of them are in Christiani course documents.

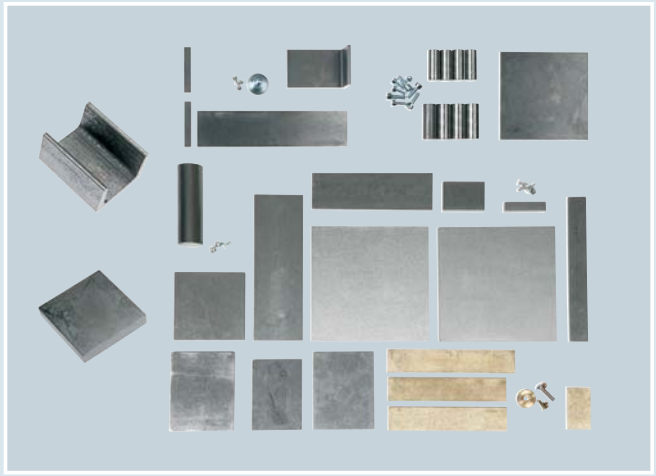
The technical discussion between Trainer and Trainee is based on the answers of guiding questions, work plan and completed bill of material. After closing any information gaps and correcting mistakes a decision can be taken.

Trainee should carry out the task as independently as possible, using prepared drawings, tools and materials.

Inspection and evaluation sheets with relevant tolerances are given for each task.

Trainer and trainees inspection and evaluation sheets are compared and assessed. Guiding questions help to asses if the trainee has achieved desired learning objective.

Manual Material Processing – Basic and Advanced Training



Suitable for:

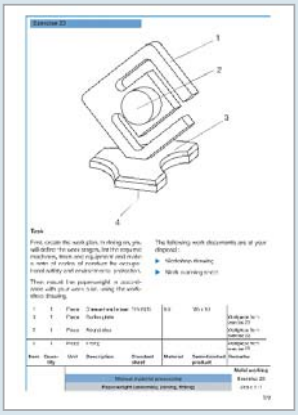
For vocational schools, technical colleges and universities as well as technical training centers in the fields of mechanics.

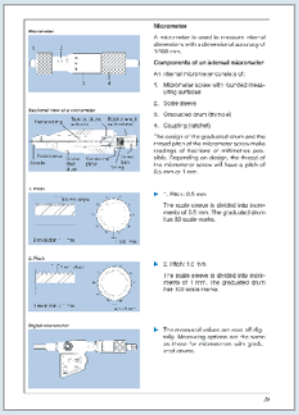
Learning objectives:
Manual and light machining skills

- Filing
- Sawing
- Chiselling
- Scribing, punching, marking
- Drilling, countersinking, reaming
- Thread production
- Checking: measuring and gauging

Duration:

approx. 14 weeks





May we recommend:

- Tool kit
  (Order-No. 95137)

Complete material set

1. edition 2014, aprox. 520 pages in a folder, with CD-ROM

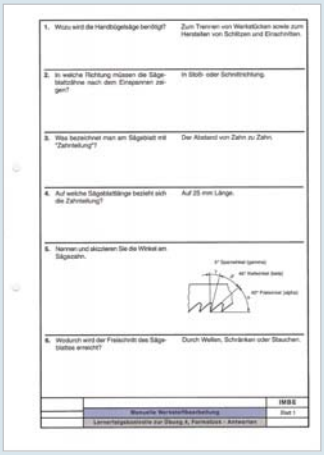
The training course „Manual Material Processing“ covers the manual cutting manufacturing processes according to the technical training scheme for metalworking professions. The course covers the following skills in detail: filing, sawing, drilling, countersinking, reaming, chiselling, thread production and punching. The training materials also focus on testing, scribing and marking. Subsequent sections are dedicated to materials science, occupational health and safety and environmental protection.
In 26 practical exercises, the trainee can apply their knowledge on various project tasks, in each case with work information, parts lists and work planning forms, as well as check and evaluation sheets. The exercises are structured according to the guiding text method and follow the „complete process“ model. They therefore promote in particular the use of communication skills and social competence. The exercises can be performed inividually or as group work.

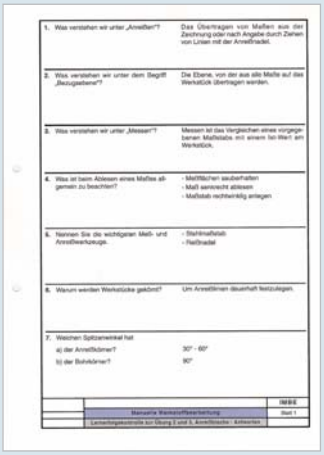
Extract below
www.christiani-international.com/97351

Article	English	Spanish	French
	Order-No.		
The training course for the trainer The complete training course in a folder.	97351	97381	97364
The training course for the trainees Worksheets for the training course.	97743*	97744*	97745*
The textbook	97421	97536	97537
Complete material set		68000	

* Package consists of five manuals for five trainees.

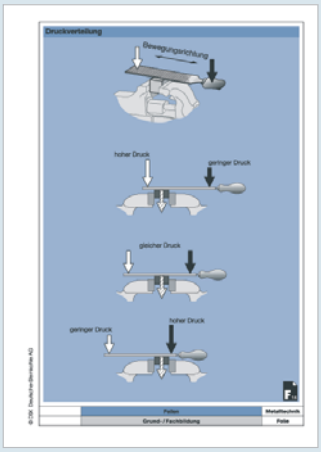
Manual Material Processing – Basic and Advanced Training





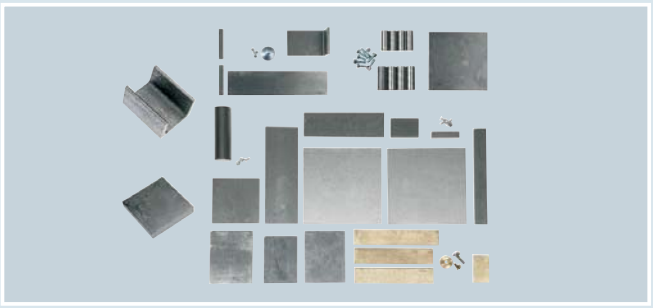
Sample solutions

Nearly all tasks and exercises can be followed based on sample solutions with detailed explanations. Knowledge check!



107 coloured slides on CD

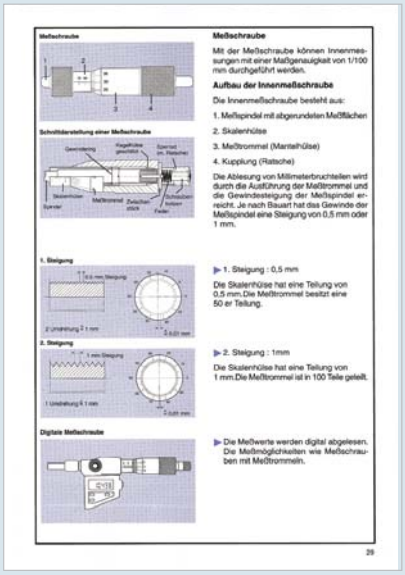
The slides complement the training and develop the comprehension of extensive interrelationships.



Complete material set

U-section practice set, Scribing sheet practice set, Fitting practice set, Gauge practice set, Tea warmer/joining material set, Centre square material set, Slide bolt material set, Marking gauge material set, Bevel gauge material set, Round steel practice set, Base plate practice set, Radius plate practice set

Order-No.
68000



Textbook

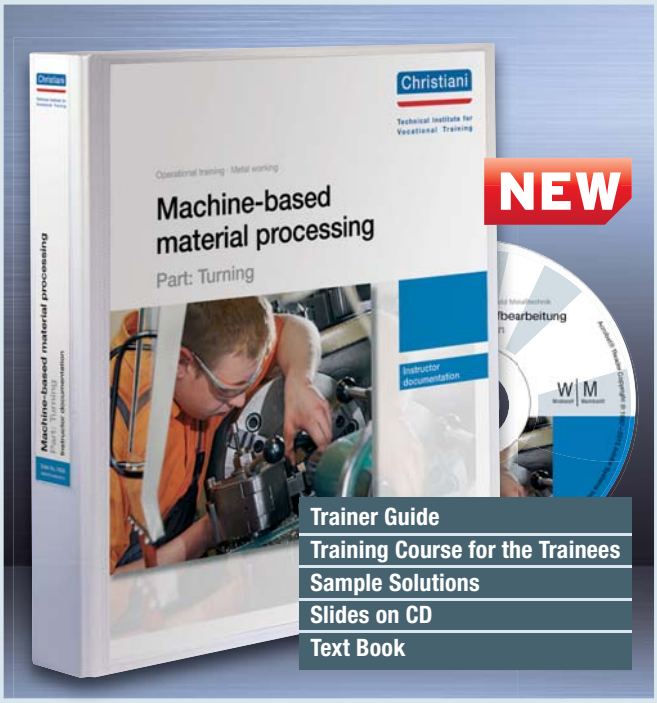
Specialist theoretical knowledge for the "Manual Material Processing" course, comprising seven individual textbooks with colour illustrations and graphics.
Not all information for vocational training can be handled optimally in this age of electronic information sources. So, an age-old medium comes into play: The textbook. Used to impart comprehensive content, such as standards, regulations and legal texts, textbooks can also provide information on how to use specialist books and reference tables. The textbook accompanies trainees throughout their entire training period. Textbooks can also be purchased individually. (At least one set of textbooks is required for approximately 3–5 trainees.)

Order-No.
97421

To complement this training course we recommend our **interactive learning programmes** for teaching the fundamentals of metalworking. Available as **Computer Based Training (CBT), Web Based Training (WBT)** and on our **Learning Portal.**

Further information starting on page 54

Machine-based Material Processing – Turning



Suitable for:

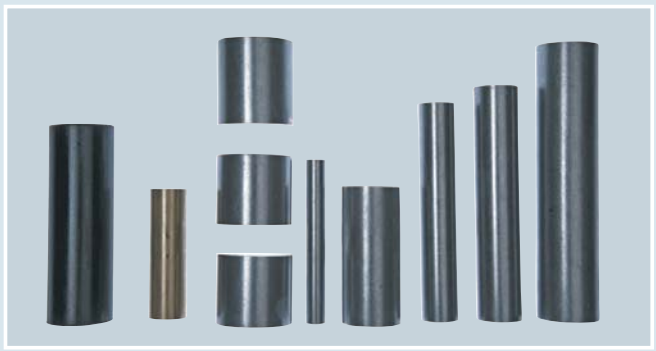
For vocational schools, technical colleges and universities as well as technical training centers in the field of mechanics.

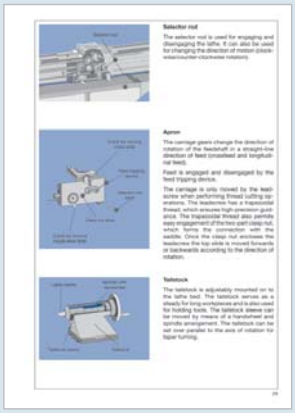
Learning objectives:

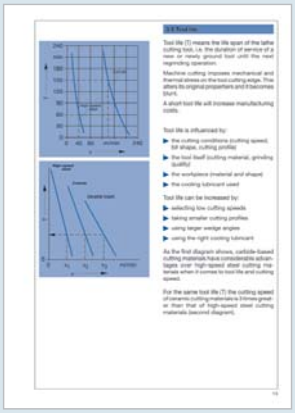
- Classify turning processes
- Layout and operation of the lead screw/feed shaft machine lathe
- Prepare the lathe for operation
- Develop skills (transverse facing, longitudinal straight turning, centring, drilling, parting-off, deburring)
- and many more

Duration:

approx. 4 weeks







Slides on CD

To complement the didactic materials, the use of coloured slides in technical training offers clear advantages: Detailed problems and visualisation of complex interrelations are immediately visible and clarified. This facilitates smooth realisation in everyday application.

Sample solutions

Nearly all tasks and exercises can be followed based on sample solutions with detailed explanations. Knowledge check!

Complete material set

2. edition 2014, approx. 190 pages in a folder, with CD-ROM

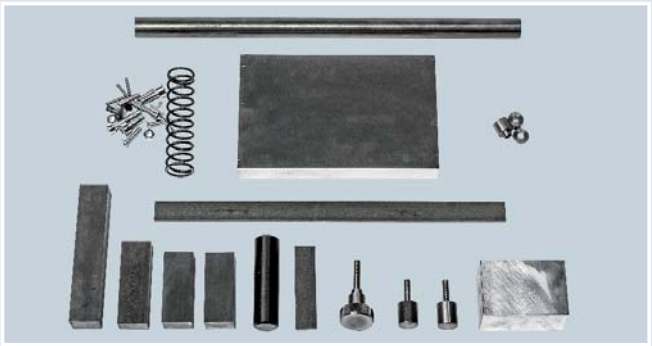
The training workbook „Machine-based Material Processing - Part: Turning“ deals with the metal removing process of turning in accordance with industrial training regulations for metal working occupations. It provides a detailed description of the main skills applied in turning, such as centring, drilling, thread cutting, taper turning, knurling, and deburring. It also presents the various types of lathes and their functions and provides instruction in professional machine operation. Detailed information is given on the checking and setting of the production parameters, and the necessary tools as well as the fitting and adjustment of the tools and workpieces is described. A total of 12 practical exercises dealing with a variety of project tasks and each accompanied by work information, parts lists and work planning sheets as well as inspection and evaluation sheets, are contained in the workbook. The exercises themselves are structured according to the „Leittext“ method and are based on the end-to-end process model. This approach fosters both working and social competence. The exercises are equally suitable for individual and group work.
Trainer file: This contains the complete training section in one file and comprises the trainer guidelines, the trainee work sheets and the textbook. A CD-ROM is also included, containing digital transparencies in printable quality.

Extract below
www.christiani-international.com/74324

Article	English	Spanish	French
	Order-No.		
The training course for the trainer The complete training course in a folder.	74324	97383	97366
The training course for the trainees Worksheets for the training course.	97746*	97747*	97748*
The textbook	74326	97530	97518
Complete material set		68014	

* Package consists of five manuals for five trainees.

Machine-Based Material Processing – Milling



Suitable for:

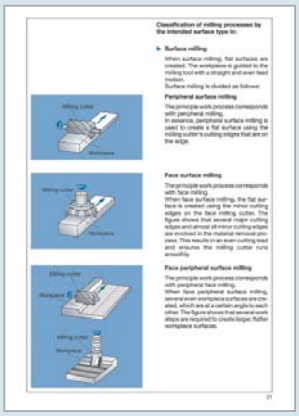
For vocational schools, technical colleges and universities as well as technical training centers in the field of mechanics.

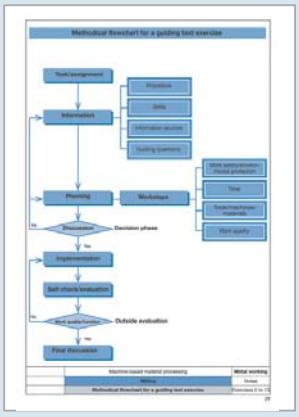
Learning objectives:

- Explain the design and function of a milling machine
- Distinguish between milling tools
- Distinguish between different types of milling machines
- Select and fit appropriate toolholders
- Use and reinforce work techniques

Duration:

approx. 6 weeks





Slides on CD

To complement the didactic materials, the use of coloured slides in technical training offers clear advantages: Detailed problems and visualisation of complex interrelations are immediately visible and clarified. This facilitates smooth realisation in everyday application.

Sample solutions

Nearly all tasks and exercises can be followed based on sample solutions with detailed explanations. Knowledge check!

Complete material set

2. edition 2014, aprox. 69 pages in a folder, with CD-ROM

The training course „Machine-based Material Processing – Milling“ part covers the mechanical cutting process of milling according to the technical training scheme for metalworking professions. This covers the different milling processes such as face surface milling and longitudinal profile milling in detail. It also focuses on milling machines and their functions, as well as correct operation and adjustment of the machine functions.

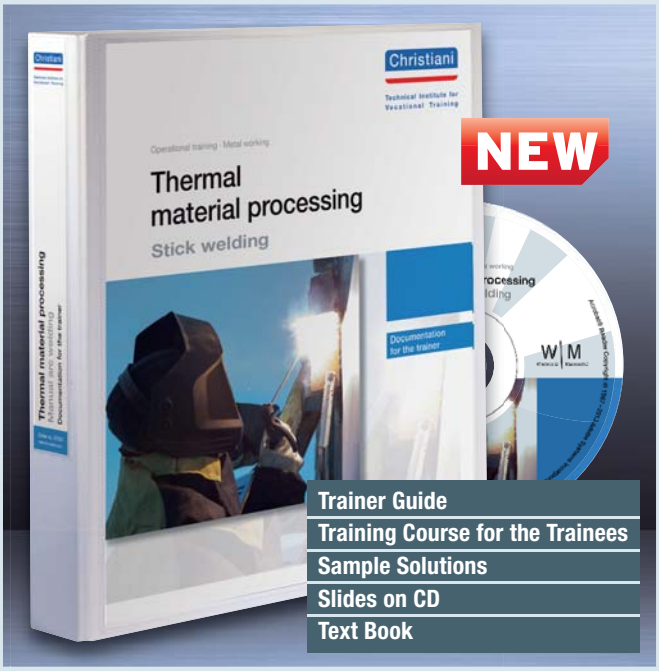
In 12 pracical exercises, each with work information, parts lists and work planning forms, as well as check and evaluation sheets, the trainers will work through the „drill stand“ project. The exercises are structured according to the guiding text method and follow the „complete process“ model. They therefore promote in particular the use of communication skills and social competence. The exercises can be performed inividually or as group work.

Extract below
www.christiani-international.com/72996

	English	Spanish	French
Article	**Order-No.**		
The training course for the trainer The complete training course in a folder.	**72996**	**97385**	**97368**
The training course for the trainees Worksheets for the training course.	**97749***	**97750***	**97751***
The textbook	**72998**	**97531**	**97519**
Complete material set		**68015**	

* Package consists of five manuals for five trainees.

Thermal Material Processing – Stick Welding



Suitable for:

For vocational schools, technical colleges and universities as well as technical training centers in the field of mechanics.

Learning objectives:

- Plan procedures
- Check and evaluate work results
- Weld-I-seams (PA)
- Weld-V-seams in three places (PF)
- Weld double seams (PB)
- Weld double-fillet welds in two places (PF)
- Establish a corner connection

Duration:

approx. 3 weeks

1. edition 2014, aprox. 160 pages in a folder, with CD-ROM

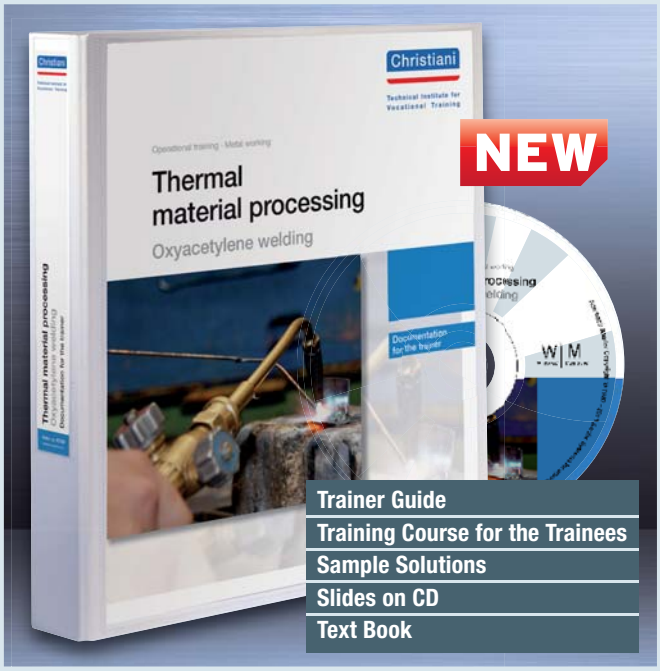
The course uses practical exercises to convey the skills and knowledge required in real-world work situations. In completing the exercises, participants will learn basic skills and both recognise and consolidate fundamental working techniques.
The content of the „Gas fusion welding“ course is based on the guidelines for the training scheme devised for training metalworking professions.

Extract below
www.christiani-international.com/97356

Article	English	Spanish	French
	Order-No.		
Documents for trainers The complete training course in a folder.	97356	97390	97373
Documents for trainees Worksheets for the training course.	97752 *	97753 *	97754 *
The textbook	97508	97532	97520

* Package consists of five manuals for five trainees.

Thermal Material Processing – Gas fusion Welding



Suitable for:

For vocational schools, technical colleges and universities as well as technical training centers in the field of mechanics.

Learning objectives:

- Plan procedures
- Weld-I-seams
- Check and evaluate work results
- Present planning results
- Weld fillet welds
- Weld double-fillet welds

Duration:

approx. 3 weeks

Article	English	Spanish	French
	Order-No.		
Documents for trainers The complete training course in a folder.	97358	97392	97375
Documents for trainees Worksheets for the training course.	97755 *	97756 *	97757 *
The textbook	97509	97533	97521

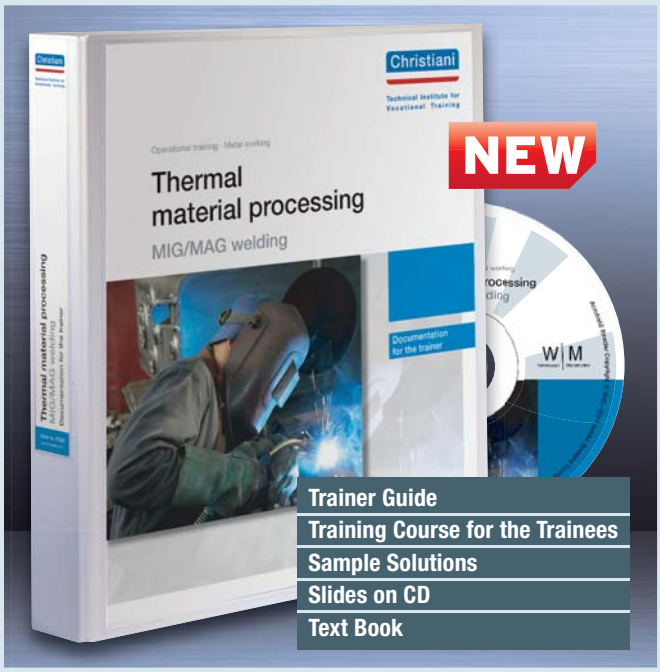
* Package consists of five manuals for five trainees.

1. edition 2014, aprox. 175 pages in a folder, with CD-ROM

The course uses practical exercises to convey the skills and knowledge required in real-world work situations. In completing the exercises, participants will learn basic skills and both recognise and consolidate fundamental working techniques.

The content of the „Gas fusion welding“ course is based on the guidelines for the training scheme devised for training metalworking professions.

Thermal Material Processing – MIG/MAG Welding



Suitable for:
For vocational schools, technical colleges and universities as well as technical training centers in the field of mechanics.
Learning objectives:
• Able to set the required parameters (current strength, voltage, wire speed, gas volume) • Select the gas nozzle diameter and the thickness of the wire electrode • Alight workpieces and ignite wire electrodes • Carry out surface welding • Tack weld workpieces
Duration:
approx. 3 weeks

1. edition 2014, aprox. 140 pages in a folder, with CD-ROM

The course uses practical exercises to convey the skills and knowledge required in real-world work situations. In completing the exercises, participants will learn basic skills and both recognise and consolidate fundamental working techniques.

The complete course presented in lever arch files consists of the trainer manual, the trainees' course, the sample solutions, colour sheets on CD and the textbook.

Extract below
www.christiani-international.com/97360

Article	English	Spanish	French
	Order-No.		
Documents for trainers The complete training course in a folder.	97360	97394	97377
Documents for trainees Worksheets for the training course.	97758 *	97759 *	97760 *
The textbook	97510	97534	97522

* Package consists of five manuals for five trainees.

Welding Training Table

The training tables are an optimal workplace for the welding training in vocational schools, the industry or similar organisations. Due to its stable steel construction, the table is best suitable for the daily use.
The surface of the table is divided into two sections. A sheet steel support with fireclay bricks for flat welding and a bar iron rust for the penetration welding. The optional work piece clamp completes the training table, which is available in three different sizes.

table dimensions:
w = 600 mm, d = 600 mm, h = 800 mm

Article	Order-No.
Welding training table	94271

MIG/MAG Welding Devices

The PRO-MIG 230-4 AM and 230-2 AM are in particular appropriate to be used in the thin plate processing from sensational 15 A welding current on. The special Synergie programs for MIG/MAG welding and MIG soldering of galvanized and aluminized bodywork steel sheets are making it furthermore a perfect device for motor vehicle workshops.

Article	Order-No.
PRO-MIG synergie 230-2 AM	92806

Maintenance – Basic Principles

Suitable for:

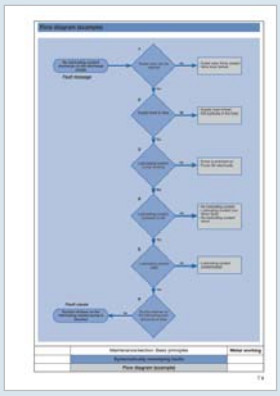
For vocational schools, technical colleges and universities as well as technical training centers in the field of mechanics.

Learning objectives:

- The trainees should systematically determine fault causes within systems, develop a check list for determining faults and practise their use using role play.
- The trainees should determine their personal learning requirements in the area of machine elements and make suggestions about the next steps.
- The trainees should determine their personal learning requirements in the area of lubricants and make suggestions about the next steps.

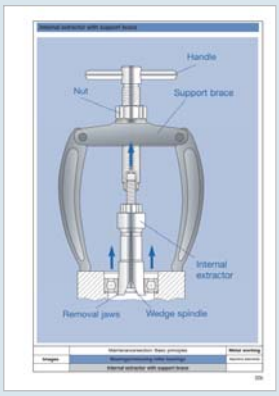
Duration:

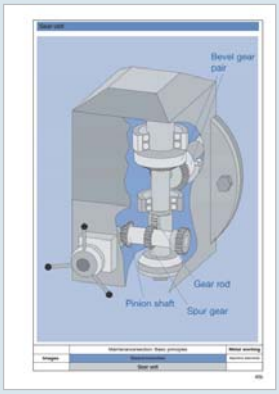
approx. 2 weeks



Trainer guide

Clearly structured documents to support the work of the trainer.





The training course for the trainees

The newly acquired knowledge is still theoretically, be underpinned by practical exercises on.

Slides on CD

To complement the didactic materials, the use of coloured slides in technical training offers clear advantages: Detailed problems and visualisation of complex interrelations are immediately visible and clarifi ed. This facilitates smooth realisation in everyday application.

1. edition 2014, aprox. 150 pages in a folder, with CD-ROM

The “Maintenance” course focuses on general maintenance principles, as well as the guidelines from training schemes for many metal working professions, for which it is necessary to transfer the basic qualification into concrete, true-to-life tasks. The content is developed based on DIN 31051 and structured within the areas of maintenance work, inspection and servicing.

The systematic procedure used when troubleshooting and rectifying faults is also a key element of the course. Using a flow diagram, work-based situations are presented and analysed using examples. The trainees develop a manual for determining a precise fault pattern, they test and optimise this manual by taking into consideration typical, work-based faults.

Article	English	Spanish	French
	Order-No.		
Documents for trainers The complete training course in binders.	97362	97396	97379
Documents for trainees Worksheets for the training course.	97761 *	97762 *	97763 *

* Package consists of five manuals for five trainees.

Project Works

Recommendation

Convey basic knowledge in metalworking

Professions in a hands-on manner

This project work provides a basis for your trainee recruiting process. Find out the level of knowledge in metalworking of your trainees in a popular and exciting way.

Within only one week, this project work is teaching basic knowledge in sawing, filing, marking, scribing, tapping as well as processing of sheet metal.

More information **on page 82**

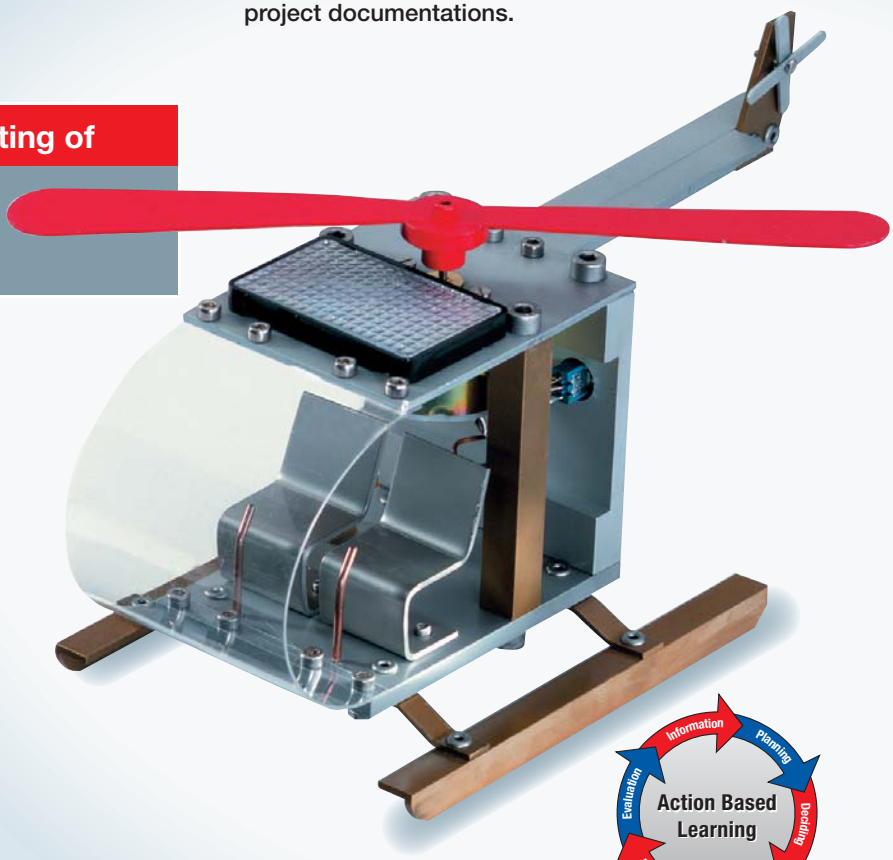
Hands-on learning, motivation, learning success: Christiani project works in the field of mechanics

For years, Christiani project work has provided a solid basis for good, qualified training in many companies. Your trainees use practical project work to learn the various working techniques and manufacturing processes involved in metal technology. This provides them with confidence in the handling of technical drawings, materials, tools and machines.

But there is more to project work than just practical advantages: Interesting topics also keep trainees motivated and enable them to experience success directly through the completion of "their" project work – even in a team. Christiani project works combine first-class quality both in the material sets and in the didactical project documentations.

Christiani project works consisting of

- the material kit
- the project documentation or
- the project folder



Christiani material kit

The material kit includes
- semi-finished components
- standard components
- purchased components
- if necessary: tools which are required for manufacturing each project work

Introduction:

Trainees are introduced to the action-oriented working method.

Drawing kit:

Comprising the relevant drawings for individual components of the assembly, a general drawing including a bill of materials and an assembly drawing

Guiding questions:

The trainee engages with the skills and knowledge content to be applied.

Work plan documents:

The trainee can enter the work steps and all other important data systematically into the work plan forms.

Documentation templates:

The information needed to complete the project work can be documented using the spreadsheets supplied.

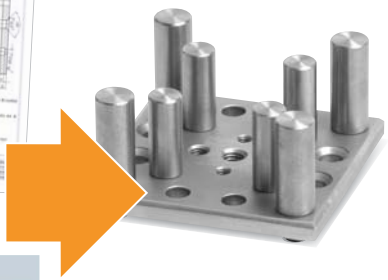
Evaluation sheet:

For the trainee to evaluate their own work or for the trainer to evaluate the trainee's project work.

Our didactical concepts

1. Project works with standard project documents

Project documents



Manufactured project work

Material kit

These project documents are particularly cost-effective and generally include:

Drawing kit:

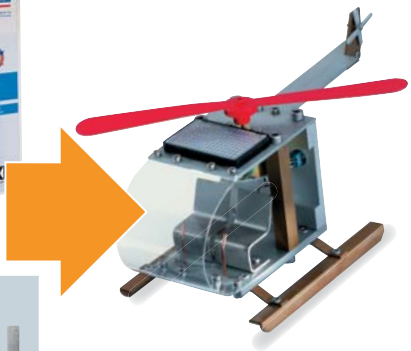
Each drawing kit comprises a general drawing as well as several sub-drawings with the associated individual components of the assembly. The drawing kit includes all the dimensions and data required for manufacturing and assembly, including a bill of materials and a tool list.

Evaluation sheet:

After a self-evaluation carried out by the trainee, the trainer evaluates the project work and the results of the inspection performed by the trainee and enters this evaluation into the inspection and evaluation sheet.

2. Project works with comprehensive project folder according to action based learning

Project folder



Manufactured project work

Material kit

This project work is provided with a detailed project folder (one for the trainer and one for the trainee). The tasks are based on the model of "complete action".

Each project folder includes:

- Task description for action-oriented project tasks
- Assembly drawings
- Manufacturing drawings
- Bills of material
- Information regarding qualification modules and media
- Guiding questions (with solutions*)
- Work plan documents (with suggested solutions*)
- Documentation templates
- Evaluation sheet for self-evaluation and evaluation by the trainer
- Guidelines and forms for the discussion

*in the trainer's documentation

Basic skills in metalworking professions

Project works dealing with basic skills enable you to convey basic knowledge in metalworking professions in a hands-on manner. These short, easily understood project works are especially suitable for beginners in activity-orientated training. They have been developed by experienced trainers according to the model of complete action and tested on a large number of trainees. Each project consists of detailed project documents with the work assignment, guiding questions, workshop drawings, work plan sheet, inspection and evaluation sheets and the complete material kit.

Tea Warmer

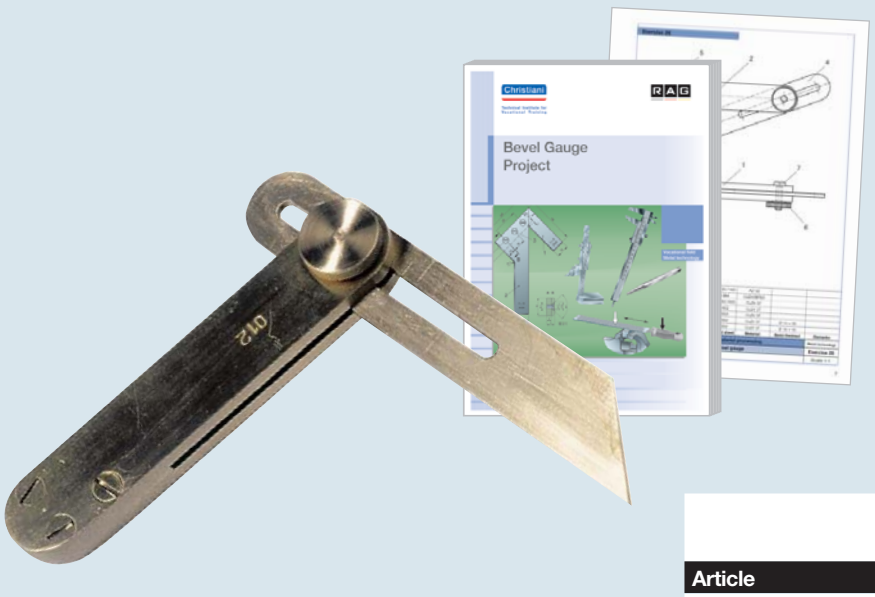
Suitable for:
Beginners, trainees and students in the field of mechanics

Learning objectives:
Drilling, Countersinking, Deburring, Thread cutting, Reaming, Combine

Duration:
approx. 24,5 hours

Article	English	Spanish	French
	Order-No.		
Complete tutorial Project manuals + material set	68501	97795	97797

Bevel Gauge



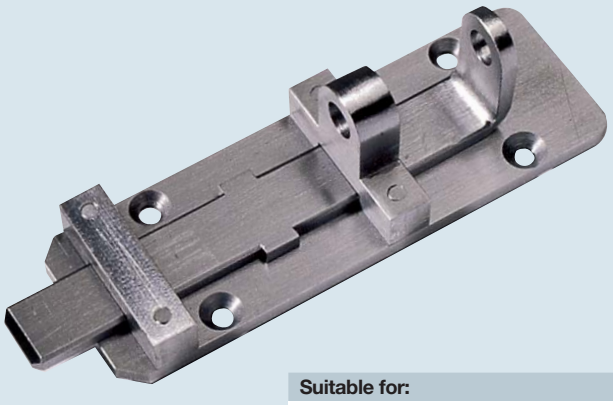
Suitable for:
Beginners, trainees and students in the field of mechanics

Learning objectives:
Drilling, Countersinking, Deburring, Thread cutting, Reaming, Filling, Sawing

Duration:
approx. 16 hours

Article	English	Spanish	French
	Order-No.		
Complete tutorial Project manuals + material set	68502	97800	97802

Sliding Bolt



Suitable for:
Beginners, trainees and students in the field of mechanics
Learning objectives:
Sawing, Filing, Countersinking, Drilling, Thread cutting, Reaming
Duration:
approx. 16 hours

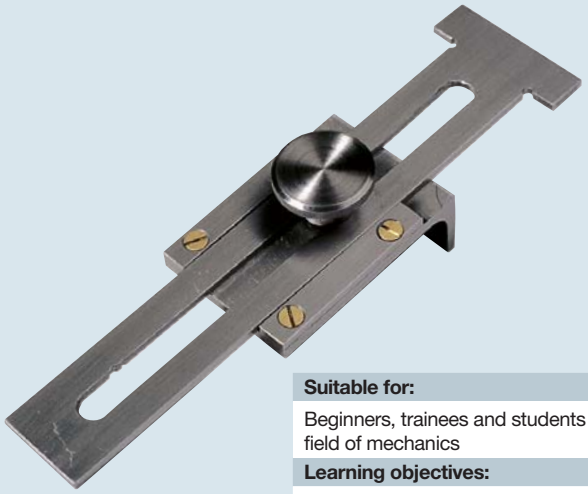
Article	English	Spanish	French
	Order-No.		
Complete tutorial Project manuals + material set	97812	97813	97814

Angle Plate

Suitable for:
Beginners, trainees and students in the field of mechanics
Learning objectives:
Drilling, Countersinking, Deburring, Thread cutting, Reaming, Scribing
Duration:
approx. 9 hours

Article	English	Spanish	French
	Order-No.		
Complete tutorial Project manuals + material set	97818	97819	97820

Scratch Gauge



Suitable for:
Beginners, trainees and students in the field of mechanics
Learning objectives:
Drilling, Sinking, Deburring, Thread cutting, Reaming
Duration:
approx. 8,5 hours

Article	English	Spanish	French
	Order-No.		
Complete tutorial Project manuals + material set	97804	97806	97808

Drill Cassette

Suitable for:
Beginners, trainees and students in the field of mechanics
Learning objectives:
Turning, sheet metal cutting, drilling, filing, thread cutting, center-punching, reaming, sawing, countersinking
Duration:
approx. 5 hours

Article	English
	Order-No.
Complete tutorial Project manuals + material set	88801

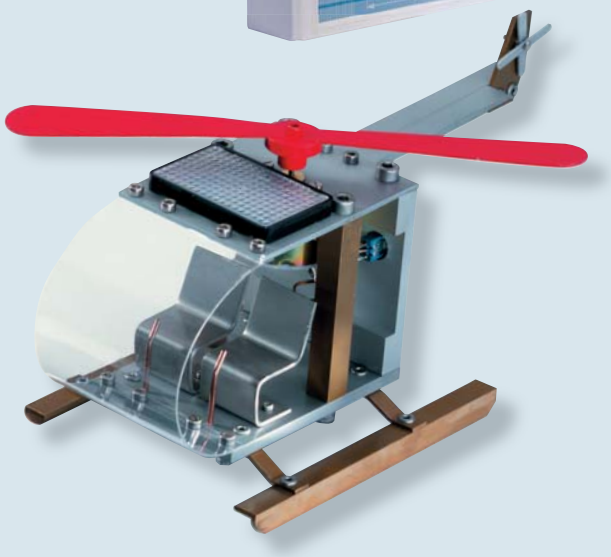
Helicopter

This project work is well employed also for the job finding trainee programs and is very popular with the trainees. For, if the work is enjoying, success is inevitable.

Within only one week, this project work is teaching basic knowledge in sawing, filing, marking, scribing, tapping as well as processing of sheet metal.

Also the following machining procedures on machine tools are demanded:
- **centerpunching**
- **drilling**
- **reaming**
- **countersinking**
- **lathe**
- **milling**

The components are assembled by screws, rivets, glue and solder. After installation of the electronic components, the function of the rotor can be tested in the sunlight or under a halogen lamp.



Requirement
easy

Suitable for:

Basic skills in all metalworking professions, trainees

Learning objectives:

Common core qualification in metalworking professions
- Operational and technical communication
- Planning and organising work, evaluating work results
- Manufacturing and assembling components and subassemblies

Manual and machine skills:
Sawing, filing, scribing, centre punching, thread cutting, sheet metal processing, centring, drilling, reaming, countersinking, lathing, milling

Duration:

approx. 4 weeks

Contents of material kit

- All semi-finished products (made of CuZn39, AlMg3) and standard parts needed to manufacture the helicopter.
- Solar cells and solar motor for driving the rotor.

Contents of project documents

Concept of the „Model of Complete Action“*
- Documentation of the tasks
- Assembly drawings
- Manufacturing drawings
- Bills of materials
- Notes on qualification modules and media
- Guiding questions (with solutions*)
- Work plan documents (with proposed solutions*)
- Documentation templates
- Assessment sheet for self-evaluation and evaluation by third parties
- Guide and forms for technical discussions

* in the documents for the trainer

Article	Order-No.
Project documentation for the trainer	64089
Project manual folder for the trainee	64088
Complete material kit	64001
Project manual folder for the trainee + complete material kit	99895

Formula 1 – Racing Car

Our project work "Formula 1 – Racing Car" is likely the hit among the projects for the basic training of industrial mechanics. Following closely the respective curricula, extensive knowledge and skills are trained from the first year on. In the sunlight or under a halogen lamp, the two wheels on the rear axle are beginning to turn. The wheels are driven by two electric motors, power is supplied by solar cells on the rear spoiler of the car.

Requirement
difficult

Suitable for:

For vocational schools, technical colleges and universities as well as technical training centers in the fields of mechanics.

Learning objectives:

Common core qualification in metalworking professions

- Operational and technical communication
- Planning and organising work, evaluating work results
- Manufacturing and assembling components and subassembl

Duration:

approx. 12 weeks

Contents of material kit

- All semi-finished products and standard parts needed to build the racing car.
- Solar cells and solar motor for driving the racing car.

Contents of project documents

Concept of the „Model of Complete Action"*

- Task description for activity-oriented project tasks
- Assembly drawings
- Manufacturing drawings
- Bills of materials
- Notes on qualification modules and media
- Guiding questions (with solutions*)
- Work plan documents (with proposed solutions*)
- Documentation templates
- Assessment sheet for self-evaluation and evaluation by third parties
- Guide and forms for technical discussions

* in the documents for the trainer

Article	Order-No.
Project documentation for the trainer	64087
Project manual folder for the trainee	64086
Complete material kit	64000
Project manual folder for the trainee + complete material kit	99897

Trike V2

This project work is not just for bikers who always wanted to build a trike. It also offers all trainees in metalworking professions in industry and trade the possibility to apply the basic skills acquired in their vocational training. Step-by-step, a model of a trike is built which is accurate in every detail. The project documents, which are structured according to the model of complete action, support the trainees in the activity-based completion of this project work. The special kick with this model is the lighting set, which is available as an option. With this lighting set, the trike can be rounded off with dipped headlights, rear lights and turn signals.

Requirement
difficult

Suitable for:

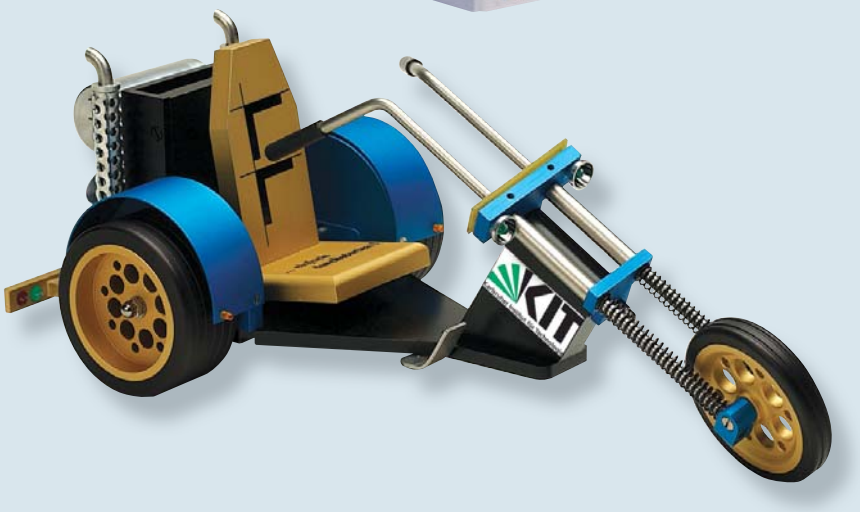
For vocational schools, technical colleges and universities as well as technical training centers in the fields of mechanics.

Learning objectives:

Common core qualification in metalworking professions
- Operational and technical communication
- Planning and organising work, evaluating work results
- Manufacturing and assembling components and subassemblies

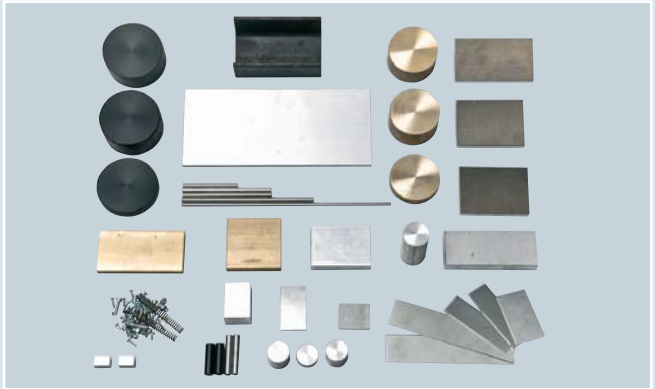
Duration:

approx. 12 weeks



Contents of material kit

- Mechanical components – semi-finished products for bumpers and PCB cover, standard parts
- Electrical components – printed circuit boards, switches, flat flexible cable and electronic components for turn signal actuation (IC, LEDs, reflectors, etc.)



Contents of project documents

Concept of the „Model of Complete Action“*
- Task description for activity-oriented project tasks
- Assembly drawings
- Manufacturing drawings
- Bills of materials
- Notes on qualification modules and media
- Guiding questions
- Work plan documents
- Documentation templates
- Assessment sheet for self-evaluation and evaluation by third parties
- Guide and forms for technical discussions

* in the documents for the trainer

Article	Order-No.
Project documentation for the trainer	67841
Project manual folder for the trainee	67842
Complete material kit	64092
Project manual folder for the trainee + complete material kit	99898
Supplementary „lightning“ – complete tutorial for the trainee	99899

Training Lab Equipment and Tools

Recommendation

Basic pneumatic kit according to BIBB with SMC components

This electropneumatics equipment set is suitable for pneumatics exercises in training labs or workshops with students, trainees, trainees on retraining courses, technicians, etc.

More information **on page 88**

Multifunctional training desk system „MAPS“

Practical training with industrial components

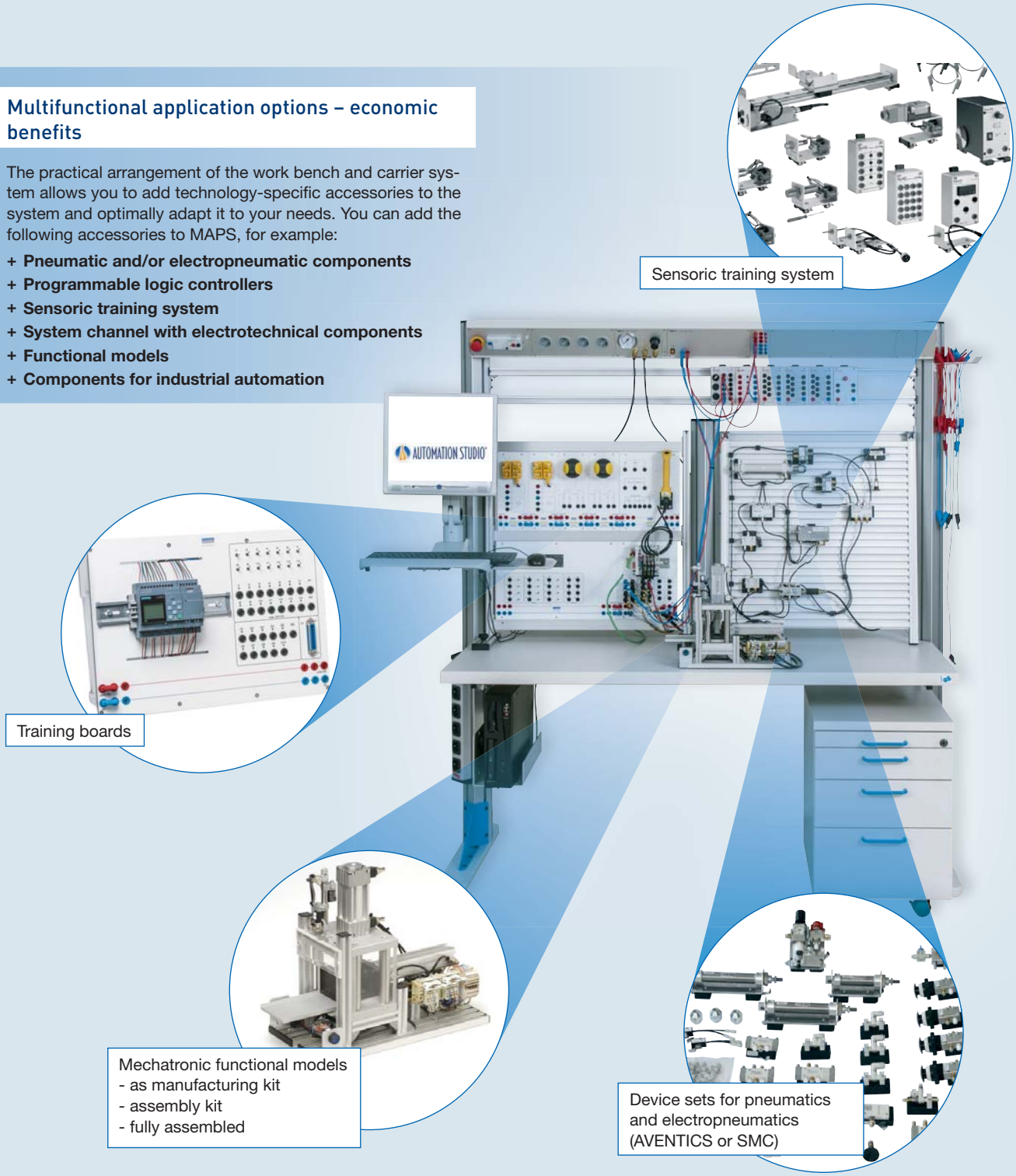
A well-thought-out system for many application options. This MAPS training desk system, newly developed by Christiani, provides you with a sound basis for the practical teaching of nearly all technologies in commercial/technical vocational training.

Through using an extensive range of accessories, you can adapt MAPS precisely to your requirements and take the best advantage of the multifunctional options.

Multifunctional application options – economic benefits

The practical arrangement of the work bench and carrier system allows you to add technology-specific accessories to the system and optimally adapt it to your needs. You can add the following accessories to MAPS, for example:

+ **Pneumatic and/or electropneumatic components**
+ **Programmable logic controllers**
+ **Sensoric training system**
+ **System channel with electrotechnical components**
+ **Functional models**
+ **Components for industrial automation**



Specifications::

① Stable construction using aluminium system profile with 4 cable holders, incl. foot stabilisers (safety-tested). Dimensions: 1600x850x780 mm (WxDxH); rear feet 1900 mm high.

② Multilayered bench top with HPL laminate, non-conductive. Dimensions: 1600x8530x40 mm (WxDxT)

③ Grooved plate for fastening snap-in components (SI), inclination-adjustable

④ Mounting frame for power boxes with tandem snap-in technology (TSI)

⑤ Experimental frame for accommodating A4 teaching panels, depth-adjustable

⑥ System channel (emergency stop control, all-current sensitive RCD switch, fixed voltage source 24V/5A, 4-gang multiple socket, 7-gang distributor box for safety laboratory plug, pneumatics supply)

⑦ Cable holder for accommodating approx. 40 shrouded plugs

⑧ Storage tray for hydraulic unit

⑨ Monitor bracket incl. extension arm, keyboard support and mouse tray

⑩ PC bracket

⑪ Roller container for storing the pneumatic and electropneumatic components

Low entry price combined with a high level of expandability depending on application.
Single-sided and double-sided versions
Stable construction using aluminium system profile
Grooved plate for flexible and precise configuration of the components

MAPS Basic – single-sided

Order-No. 94300

MAPS Mechatronic – single-sided

Order-No. 94301

MAPS Professional – single-sided

Order-No. 94302

MAPS Basic – Double-sided

Order-No. 94303

MAPS Mechatronic – Double-sided

Order-No. 94304

MAPS Professional – Double-sided

Order-No. 94305

Practical exercises with suitable teachware

For the field of pneumatics and electropneumatics, the BIBB recommends a “basic pneumatics assembly set” and an “extension electropneumatics assembly set”. Our BIBB Pneumatics (order no. 95500) and BIBB Electropneumatics (order no. 95501) equipment sets were created based on this. The equipment sets are suitable for demanding advanced training and further education.

Exercise circuits and components are described in connection with the “Pneumatics control technology” teaching materials. Exercise sheets with solutions are used for deepening your knowledge of the training content.

Pneumatic Kit according to BiBB

The pneumatic device set for BiBB exercises is suitable for implementing the learning targets and learning contents in the technical industrial training and further development in the sense of BiBB on the pneumatic bases on the basis of real industrial products.

Single- and double-acting cylinders, 3/2, 4/2, 5/2 and 5/3 directional valves, throttle valves, check valves, throttle check valves, exhaust air throttling, quick-exhaust valves, pneumatic amplifier, reflection nozzle, pneumatic logic valves, delay valves.

Electrical Extension Kit

This electropneumatics equipment set is suitable for pneumatics exercises in training rooms or workshops with students, trainees, trainees on retraining courses, technicians, etc.

Based on the pneumatics equipment set for BIBB exercises (Order No. 67904 and 95500).
It contains a wide range of options, including the construction of your own electropneumatic circuits.

	AVENTICS	SMC
Article	**Order-No.**	**Order-No.**
Pneumatic Kit according to BiBB	67904	95500
Electrical Extension Kit Pneumatics according to BiBB	59088	95501
Cable set BiBB electropneumatics	68364	

	Pneumatics		Electropneumatics	
	English	Spanish	English	Spanish
Article	**Order-No.**		**Order-No.**	
Trainer manuals	99858	99859	99861	99862
Trainee manuals	99864	99865	99867	99868

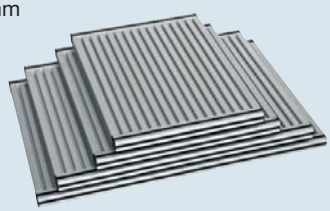
May we recommend:

- Pneumatic; hydraulic; electric - sticker symbol case **(Order-No. 61508)**

- Pneumatic tool kit **(Order-No. 59202)**

- Working table with grooved plate, Ecodesk **(Order-No. 87532)**

- groove plate 1100 x 700 mm **(Order-No. 88445)**



Basics of pneumatics

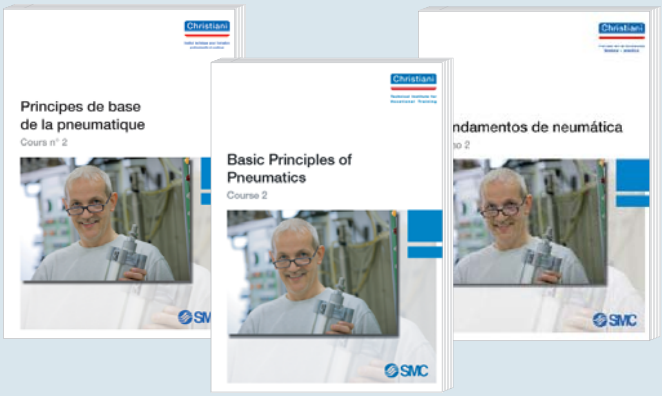
Industrial Automation combines a variety of systems and components. Motion and force are generally prepared by mechanical, electrical, hydraulic and pneumatic elements ensured. It offers the Pneumatics through simple application that offers good value for money, high security and low environmental impact. It is now in almost all Industries represented.

Basics of Pneumatics – Part 1

Contents:
- Introduction
- Compressed air theory
- Compressors and compressed air distribution
- Air treatment
- Drives
- Valves
- Symbols

This book deals with the fundamentals of pneumatics. The training materials are up-to-date with the latest technologies and describe the most important pneumatic elements in a way that is easy to understand. An overview of pneumatic symbols and circuit diagrams is also provided. It is also possible to work through the basics of all of the training materials independently without a trainer. We have intentionally dispensed with unnecessary calculations, primarily to highlight the key concepts in the field of pneumatics. The „part 2“ book goes into greater detail regarding the criteria for selecting pneumatic components.

Basics of Pneumatics – Part 2



Contents:
- Introduction
- Cylinders
- Rotary actuators
- Grippers
- Shock absorbers
- Valves
- Designing pneumatic systems
- Symbols
- Basic circuits
- Depicting control tasks

Because they use the compressible medium of air, pneumatic systems are difficult to design and in many cases the control elements end up oversized as it takes significant amounts of time and effort to perform the calculations for the physical processes associated with the medium. For that reason, pneumatic applications often turn to empirical values instead. This course looks at the fundamental aspects and bases of calculation involved in dimensioning key pneumatic components correctly. It outlines the guidelines and empirical values that have proven to work as reliable tools in practical scenarios and explains the basic principles behind creating pneumatic circuit diagrams.

Basics of Pneumatics – Part 3

Contents:
- Advanced pneumatics
- Proportional pneumatics
- Vacuum technology
- Link between pneumatics and electronics

The aim of this coursebook is to convey to the reader how the different topics are linked but without discussing the mathematical relationships in detail. This publication is targeted at a wide readership (e.g. skilled workers, technicians, engineers, etc.). Once they have completed the coursebook, they will have the knowledge required to design a simple vacuum and pneumatics system. What's more, this course will look at the basic concepts of closed-loop and open-loop control technology but without considering the complicated mathematical calculations.

Basics of Pneumatics	English	Spanish	French
Article	**Order-No.**		
Part 1	97353	97387	97370
Part 2	97354	97388	97371
Part 3	97355	97389	97372

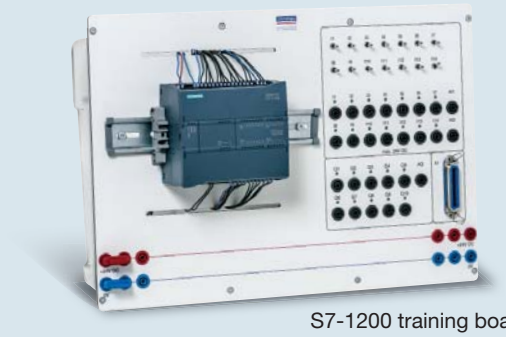
Flexible training boards for most common controllers

LOGO! 8 training board

LOGO! 8 training board

LOGO! training board with LOGO! module version 8 and DM8 12/24R add-on. 12 digital inputs, 8 digital outputs. To be attached to the experiment frame or for use as a desk-top device.
Operating voltage: 24 V DC; dimensions: 420 x 200 x 240 mm
Including LOGO! SoftComfort programming software.

Article	Order-No.
LOGO! 8 training board	59817
More information: www.christiani-international.com/59817	



S7-1200 training board

S7-1200 training board

Training board with SIMATIC S7-1214C DC/DC/DC. 14 digital inputs, 10 digital outputs. To be attached to the experiment frame or for use as a desk-top device.
Operating voltage: 24 V DC; dimensions: 420 x 200 x 240 mm

Article	Order-No.
S7-1200 training board	59493
More information: www.christiani-international.com/59493	

nanoLine training board

Phoenix Contact nanoLine training board

Training board with Phoenix Contact nanoLine. 12 digital inputs, 8 digital outputs. To be attached to the experiment frame or for use as a desk-top device.
Operating voltage: 24 V DC; dimensions: 420 x 200 x 240 mm

The nanoLine Navigator programming software can be downloaded free of charge from the Internet.

Article	Order-No.
Phoenix Contact nanoLine training board	59530
More information: www.christiani-international.com/59530	

nanoLine individual modules are available at www.christiani-international.com or on request

Also available with other control systems, on request

ILC training board

Phoenix Contact ILC training board

Training board with Phoenix Contact ILC. 14 digital inputs, 10 digital outputs, 2 analogue inputs, 1 analogue output. To be attached to the experiment frame or for use as a desk-top device.
Operating voltage: 24 V DC; dimensions: 420 x 200 x 240 mm

The PC Worx Express programming software can be downloaded free of charge from the Internet.

Article	Order-No.
Phoenix Contact ILC training board	59529
More information: www.christiani-international.com/59529	

Accessories

Connecting cable

"mMS functional unit" training board connecting cable
10-wire, 4 mm safety lab socket on one side,
10-pin socket strip on other side.

Depending on the functional unit to be connected,
1 - 4 connecting cables are required.

Order-No.
53609

modular Mechatronics System (mMS) – get started with automation technology

The fully functional units from the mMS range provide your trainees with an introduction to the world of automation. Integrate this assembly in your multifunctional training desk system and control it using one of the programmable logic controllers on page 200. We provide all units either as manufacturing kits or assembly kits or in a fully assembled. Our didactic training concept includes comprehensive project documentation for each units for trainers and trainees.

Article	Order-No. English	Order-No. Spanish
Pneumatic Press Project Workbook for lecturer	64785	64720
Pneumatic Press Project workbook for students	64786	64721

Logo! 8 module Pneumatic Press
Fully assembled

Order-No. **69590**

Pneumatic Press
Fully assembled

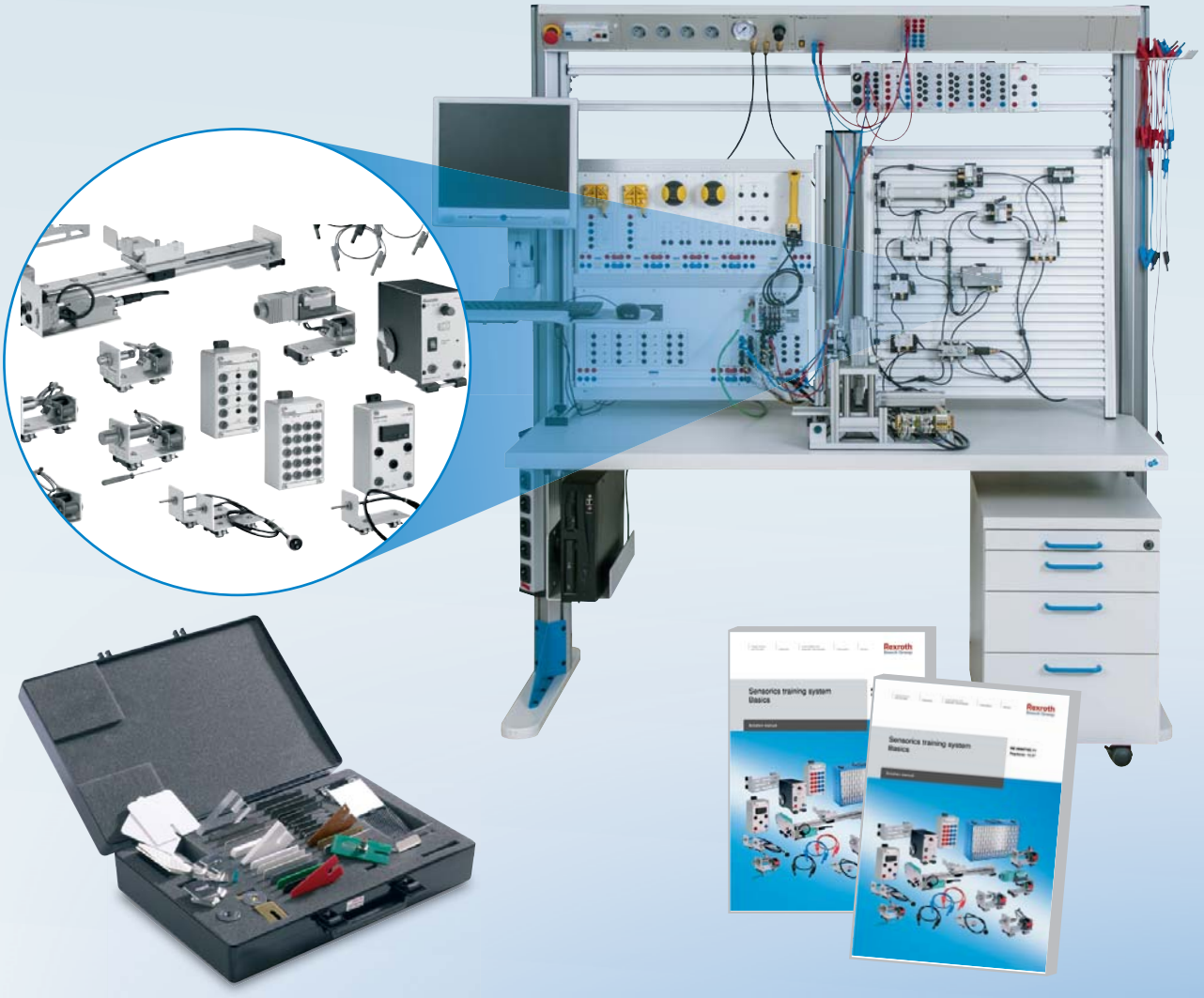
Order-No. **64337**

Sorting Station
Fully assembled

Order-No. **65679**

Sensor technology

The training systems are based on standard components from the different product areas. A training system consists of the hardware and the exercise and project manuals for trainers and trainees. By means of the training systems, inexperienced and experienced users gradually acquire practice-oriented and technical expert knowledge. The trainees will come across the standard components used in the training system later, in their professional career, in machines and systems.



Sensor technology basic kit

This training system allows you to impart functional principles and possible applications of inductive, capacitive, optoelectronic, magnetic field and ultrasonic sensors.

TS sensor technology extension

The extension kit is suitable for imparting more detailed and advanced knowledge of the sensor technology on the basis of real industrial products. Inductive analog sensor detects Fe metals and other metals, ultrasonic sensor detects non-metal materials, reflection sensor detects plastics white, black, clear.

Material sample case

Plastic case filled with different material samples and accessories for the performance of practices.

Practise manual

The extensive exercise manual Sensor technology basics with 56 exercises is divided into the areas introductory practices, basic practices and additional practices.

Article	Order-No.
Sensor technology basic kit	93557
TS sensor technology extension	93634
Material sample case	93068
Practise manual	89588
Solution manual	89590

Your ideal entry into the world of hydraulics

NEW

WS200 Workstation

The WS200 training system – modular, compact, upgradable

The WS200 workstation features a convincing combination of modular and compact design and practical equipment. Users benefit from the low price combined with a wide range of expansion options depending on the application.

Modular

WS200 is simply versatile! This modular system is designed for individual qualification of skilled personnel in the fields of hydraulics.

Upgradable

This system can easily be upgraded to meet your specific needs. With the advantage of simple connectivity, all modules can be interconnected with a minimum of effort. The new WS200 is also compatible with existing Rexroth training systems.

Compact

Thanks to its compact 800 x 800 x 1750 mm (L x W x H) dimensions adapted to fit standard door sizes as well as its mobility on rollers, the system can be used flexibly wherever it is needed.

Robust

The sturdy and durable construction is built to industry standards (it is CE approved) and designed for heavy industrial components.

Practical equipment features

The WS200 training system comes equipped with industry-tested products and standard components which learners will subsequently find in machines and systems in the course of their professional career.

Article	Order-No.
WS290, single-sided	95700
WS290, double-sided	95701

Extensions to the WS200 Workstation

Workstation

The WS201 workstation is required for project exercises in on/off hydraulics according to BIBB in which a load unit and measuring glass are required. One load unit and a measuring glass are fixed to the base frame of the WS201.

Article	Order-No.
WS201, single-sided	95890
WS201, double-sided	95891

Mounting kit for connecting WS 200 workstations

The mounting kit can be easily installed on the WS200 /WS201 workstations. The stainless steel latch clamp safely connects the workstations together.

Article	Order-No.
Mounting kit	95704

Hose holder

The hose holder can be optionally attached to the WS200 workstation. The hose holder can be used to accommodate up to 9 hydraulic hoses. The hoses are hung between the two racks.

Article	Order-No.
Hose holder	95703

WS200/WS290 On/Off Hydraulics – Getting Started

This device set is used to impart the basics of hydraulics based on project work. Only industrial components of size 6 are used that have been specially prepared for use in the training exercises. The device set matches the On/off Hydraulics - Getting Started training manual that deals with BIBB exercises A-E3. The exercises with the listed components can be performed on both the WS200 and WS290 workstations.

Article	Order-No.
Device set for WS200/WS290 On/off hydraulics - getting started	95706
Expanded device set for WS200/WS290 from “On/off hydraulics - getting started” to “On/off hydraulics - manual operation”	99840

WS200/WS290 On/Off Hydraulics – Manual Control (according to BIBB, A-H), Complete

The device set matches the On/off hydraulics - manual operation training manual (according to BIBB) that deals with BIBB exercises A-H. The exercises with the listed components can be performed on both the WS200 and WS290 workstations.

You have the option to troubleshoot an equipment set (manually actuated).

The extension kit assures you an economic way reaching the next educational level.

Article	Order-No.
Device set for WS200/WS290 On/off hydraulics - manual control (according to BIBB, A-H), complete	99802
Expansion device set for WS200/WS290 from “On/off hydraulics - manual operation” to “On/off hydraulics - electrical operation” (according to BIBB, A-H)	99808
Device set for WS200/WS290 On/off hydraulics - troubleshooting, manual operation	68987

WS200/WS290 On/Off Hydraulics – Electrical Operation (BIBB, A-H), Complete

The device set is aligned with the training manual “On/off Hydraulics - Getting Started”, which deals with BIBB exercises A-H and Z1-Z3. The exercises with the listed components can be performed on both the WS200 and WS290 workstations.

An electrical equipment set is required in addition to the switching hydraulics (electronically actuated) equipment set. This is available with or without an E/A module.

You have the option to troubleshoot an equipment set (manually actuated).

Article	Order-No.
Device set for WS200/WS290 On/off hydraulics - electrical operation (BIBB, A-H), complete	99805
Electrical device set for WS200, On-off hydraulics - electrical operation (BIBB A-H), excluding I/O module	99820
Electrical device set for WS290, On-off hydraulics - electrical operation (BIBB A-H), excluding I/O module 19"	99806
Device set for WS200/WS290 On/off hydraulics - troubleshooting, electrical operation	68989
Expanded device set for WS200/WS290 for On/off hydraulics - electrical control (BIBB, Z1-Z3)	99822

WS290 Workstation

A comprehensive package for your project ideas.

The WS290 workstation offers unlimited options for creating practical and demanding tasks in the fields of on/off hydraulics, proportional servo valve technology and mobile hydraulics.

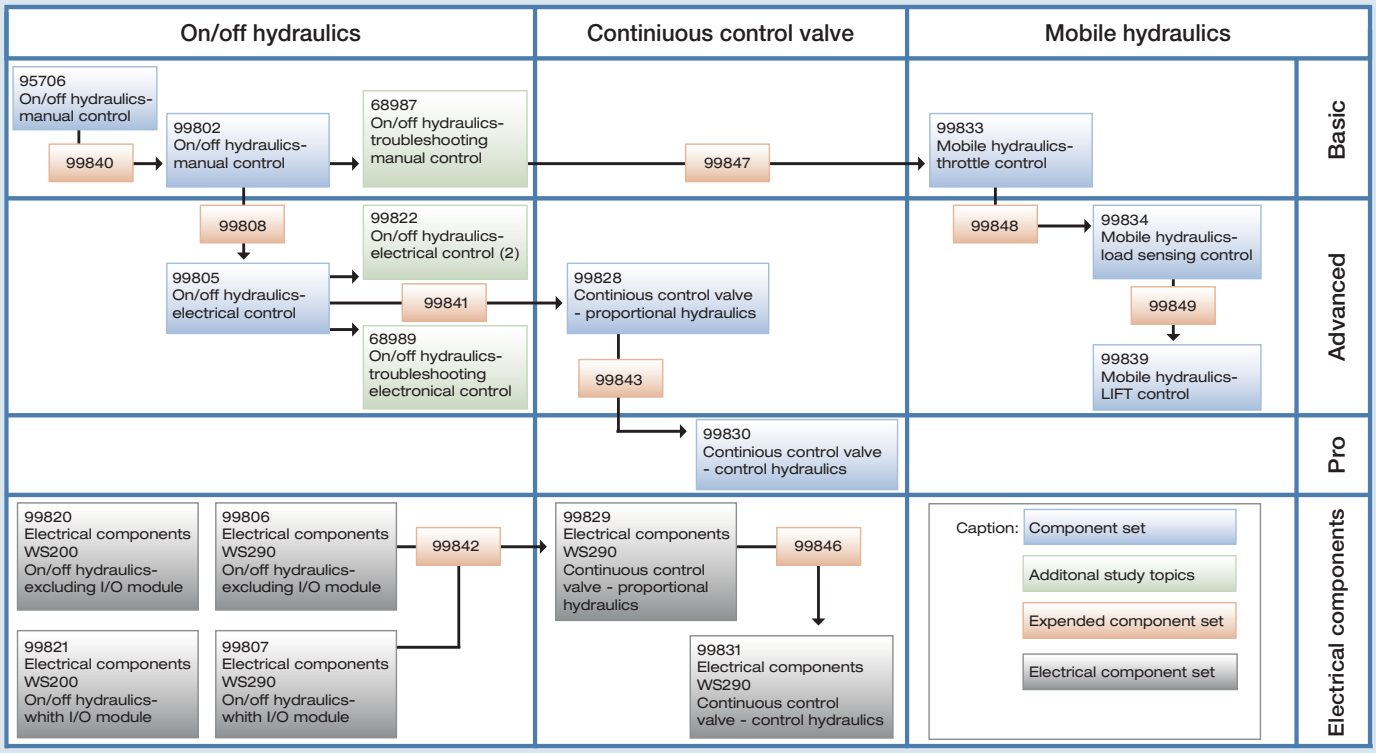
The WS290 workstation is used for teaching industrial and mobile hydraulics, and can also be used for pneumatics and automation technology if it is equipped with a slotted plate. It provides a basis for clearly representing the operating behaviour of modern hydraulic circuits and provides students with ideal preparation for using them in companies. The preferred models of the WS290 workstation, which can be expanded if necessary, offer designs for use in training which are suited to specific topics. The use of a load-sensing unit makes the WS290 ideally suited for training in mobile hydraulics. This provides a practical illustration of the particular features of the field of mobile applications. The device sets, which are provided with the project handbooks for each individual learning topic, provide students with ideal preparation for their eventual professional tasks and requirements.

Article	Order-No.
WS290, single-sided 230V/50Hz with rack	**95977**
WS290, single-sided 230V/50Hz without rack	**95978**
WS290, double-sided 230V/50Hz with rack	**95981**
WS290, double-sided 230V/50Hz without rack	**95982**

! Additional preferred models (400 V/50 Hz or 230 V/60 Hz) available on request. Please feel free to contact us.

Device Sets

A device set is a combination of components for carrying out practical exercises. A wide range of device sets are available for the WS200 and WS290 workstations. To enable users to cheaply supplement learning topics, we offer suitable expanded device sets (see overview). Starting with one device set, an expanded device set enables you to reach the next learning topic.



WS290 Proportional Servo Valve Technology – Proportional Hydraulics, Complete

The device set is aligned with the proportional servo valve technology - proportional hydraulics manual. The exercises with the listed components can be performed at the WS290 workstation.

Electrical components are required in addition to the equipment set.

Article	Order-No.
Device set for WS290 Proportional servo valve technology - proportional hydraulics, complete	99828
Electrical device set for WS290 proportional servo valve technology - proportional hydraulics	99829

WS290 Proportional Servo Valve Technology – Control Hydraulics, Complete

The device set is matched to the MANUAL “Proportional servo valve technology - control hydraulics”. The exercises with the listed components can be performed at the WS290 workstation.

Electrical components are required in addition to the equipment set.

Article	Order-No.
Component set for WS290 Proportional servo valve technology - control hydraulics, complete	99830
Electrical component set for WS290 Proportional servo valve technology - control hydraulics	99831

WS290 Mobile Hydraulics, Throttle Control, Complete

This device set is used to impart practical applications of mobile control technology. Only components which meet industry standards and which are specially prepared for use in the training exercises are used.
The set is aligned matched to the “Mobile Hydraulics - Throttle Control” manual. The exercises with the listed components can be performed at the WS290 workstation.

Article	Order-No.
Device set for WS290 Mobile hydraulics - throttle control, complete	99833

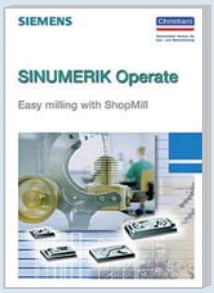
! Select the standard type of your workstation and device sets to meet your needs. We will happily assist you in making the right choice. Just get in touch with us!

SIEMENS Training Materials

SINUMERIK Operate
Easy milling with ShopMill

First edition 2012, 216 pages

Although ShopMill is easy to learn, these ShopMill Training Documents allow you to enter this world even faster. Before, however, it comes to the actual work with ShopMill, important basics will be discussed in the first sections. The theory is followed by practical exercises with ShopMill.



Order-No.
11967

SINUMERIK Operate
Turning made easy with ShopTurn

First edition 2012, 218 pages,

Although ShopTurn is easy to learn, these ShopTurn Training Documents allow you to enter this world even faster. Before, however, it comes to actually working with ShopTurn, the first sections cover a few important basics. The theory is followed by practical exercises with ShopTurn.

Order-No.
11968

Milling made easy with ShopMill

111 pages

Training documentation for the introduction to the program ShopMill. You learn the handling and programming of these efficient controllers, step by step, by means of extensively illustrated examples.
Contents: Advantages of ShopMill, Basics for beginners
Examples: Longitudinal guide, injection mould, lever, flange, retainer plate

Order-No.
10885

Turning made easy with Shop Turn

108 pages

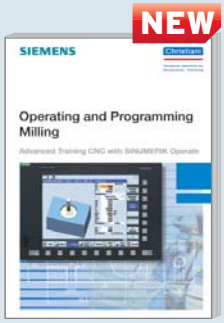
Training documentation for the introduction to the program ShopTurn.
Contents: Advantages of ShopTurn, Basics for beginners
Examples: Stepped shaft, drive shaft, deflection shaft, hollow shaft

Order-No.
10884

Operating and Programming Milling
Advanced CNC training with SINUMERIK Operate

1st edition 2015, 458 pages, DIN A4, four-colour

This detailed documentation on the topic of milling is intended for teachers and trainers. It has been developed by Siemens for experts in practical training. The topic of using Sinumerik Operate for training is rounded off with a guide for trainers and teachers, which includes tips and tricks.



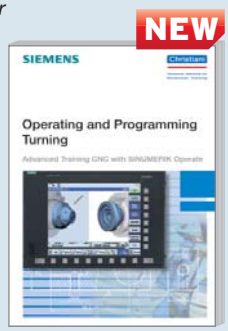
An extract is available at
www.christiani-international.com/12870

Article	Order-No.
English	12870
Chinese	12956
Spanish	12957

Operating and Programming Turning
Advanced CNC training with SINUMERIK Operate

1st edition 2015, 475 pages, DIN A4, four-colour

This detailed documentation on the topic of turning is intended for teachers and trainers. It has been developed by Siemens for experts in practical training. The topic of using Sinumerik Operate for training is rounded off with a guide for trainers and teachers, which includes tips and tricks.



An extract is available at
www.christiani-international.com/12871

Article	Order-No.
English	12871
Chinese	12958
Spanish	12959

CNC technology: turning, milling as per PAL

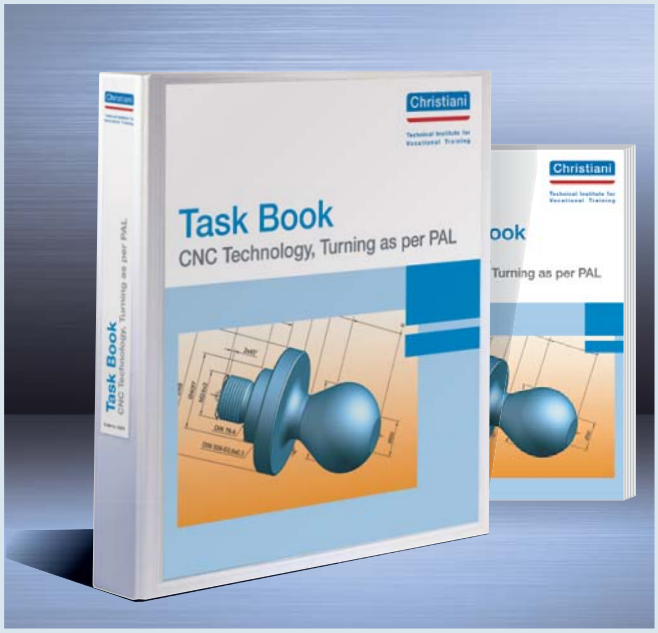
This series of exercises, which comprises 15 tasks, has been developed to cater to the new training requirements and examination preparations with regard to the PAL programming system, as well as to grant trainees a step-by-step entry into the world of CNC programming.

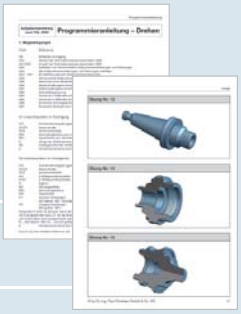
The series of exercises is designed in such a way that exercises 1–5 help explain and clarify the new requirements and command structures to trainees. The exercises can be used to help trainees get up and running with programming in a group environment or working alone.

Exercises 6–15 are designed as a set in which both the scope of tasks and the level of knowledge required are systematically increased.

The entire series of exercises can be evaluated and marked by the user using the evaluation matrix (exercises 1–15).

CNC Technology Turning





Task Book

1. edition 2014, 128 pages in a folder

Solution Book

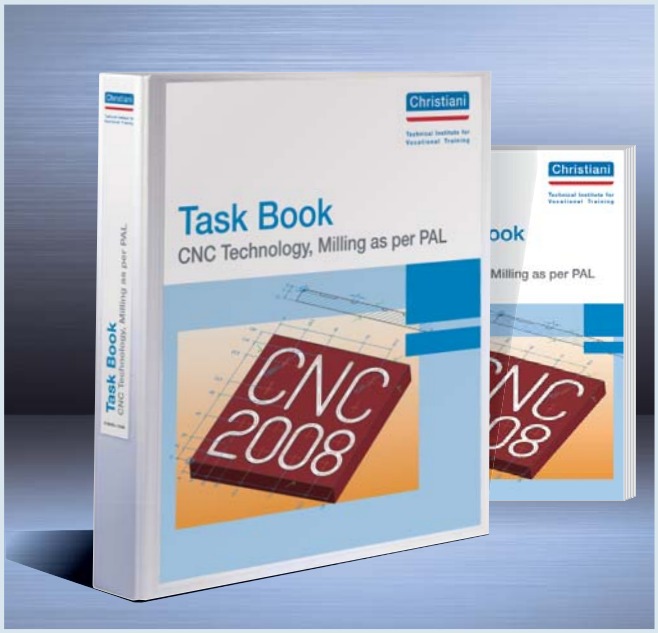
1. edition 2014, 108 pages

Solutions for 15 programming tasks of „Task Book - CNC Technology, Turning as per PAL

Article	Order-No.
Task Book	95673
Solution Book	95674
More Information: www.christiani-international.com/95673	

You can find the SYM*plus* PAL*plus* Turning simulation software, which is suitable for both collections of tasks, **on page 103**.

CNC Technology Milling



Task Book

1. edition 2014, 139 pages in a folder

Solution Book

1. edition 2014, 122 pages

Solutions for 15 programming tasks of „Task Book - CNC Technology, Milling as per PAL

Article	Order-No.
Task Book	95668
Solution Book	95669
More Information: www.christiani-international.com/95668	

Getting started with CNC technology using SINUMERIK

Basic Training in CNC Technology

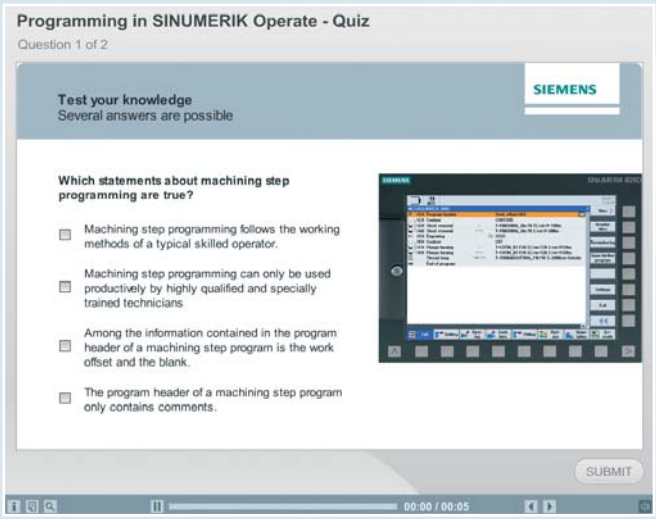
Web-based training in milling and turning with SINUMERIK Operate – Use our didactic options online now.

In cooperation with Siemens, we now offer programmes for learning the basic principles of CNC technology. The aim is to enable trainees to learn the required technical theory independently using modern media. This provides students with more fun and freedom when working.
The content of the learning programmes concerns the basic principles
of technical theory required for practical training in CNC technology. This Web-Based Training now provides an online learning programme for ShopMill and ShopTurn. The programme allows trainees to quickly get to grips with a CNC milling and turning user interface, designed to match those found in real workshops.
The learning objective of this programme is to gain necessary basic knowledge for dealing with "real" CNC machines further down the line.

You can reach the homepage for our interactive media via the Christiani Learning Portal, at **www.christiani-lernportal.de**.
After registering on the site, you can test our demo version for free:
With a few clicks, you can navigate through the contents and view animations, solve exercises and check your current level of knowledge. The demo version does not require installation.

The six modules of the CNC technology basic training:

A - Basic Principles of Machining
B - Basic Principles of Sinumerik Operate
C - Machining Tools
D - Basic Principles of NC Programming
E - Programming with Sinumerik Operate
F - Setting Up and Manufacturing



Users are tested using questions throughout each chapter.
After a minimum number of questions have been answered correctly, a Siemens certificate can be printed out.

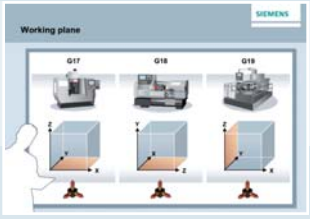
Time required to complete the course:
Approx. 3 hours in total – approx. 30 minutes per module
Suitable for:
Trainees in metalworking training occupations and mechatronics engineersStudents at vocational schools, etc.
Requirement:
The aim is to learn the required technical theory independently using modern media. This provides trainees with more fun and freedom when working.

Content:
The content of the learning programmes concerns the basic principles of technical theory that are required for practical training in CNC technology.
Learning objective:
Gaining necessary basic knowledge for dealing with "real" CNC machines further down the line.
Languages:
German, English, Simplified Chinese

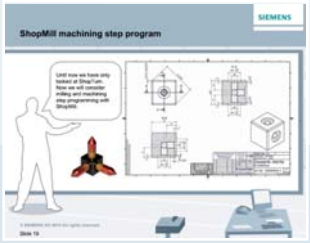
Example from the Basic Principles of Machining module

Example from the Basic Principles of SINUMERIK Operate module

Example from the Machining Tools module



Example from the Working Plane chapter



Example from the ShopMill Work Step Programme chapter

Example from the Setting Up and Manufacturing chapter

Your access to the Christiani Learning Portal

Online Learning Portal: www.learn4metal.com

- Learning content is completed online (time-limited)
- Always uses the latest software version
- Cheap to purchase – you only pay for the period of use
- Direct access to all content
- Learn anytime, anywhere
- Personalised access types
- Licence duration can be extended at any time

Requirements for the Christiani Learning Portal and the current learning content:

We are not aware of any restrictions relating to current browsers. Flash Player needs to be installed for certain learning programmes.

TOP OFFER

Company licences
(Training companies and institutions)

Access types	All six topics in this series	Order-No.
1	Complete package, 360-day company licence	95943
5	Complete package, 360-day company licence	95945
10	Complete package, 360-day company licence	95946
15	Complete package, 360-day company licence	95947

School licences
(Schools and cross-company training centres)

Access types	All six topics in this series	Order-No.
1	Complete package, 360-day school licence	95948
5	Complete package, 360-day school licence	95949
10	Complete package, 360-day school licence	95950
15	Complete package, 360-day school licence	95951

Couldn't find a suitable licence model?

Contact our customer consultants and we will work out a solution to suit your needs:
info@christiani-tvet.com

Programming in accordance with PAL coding

SYM*plus* PAL*plus* Milling V6.0

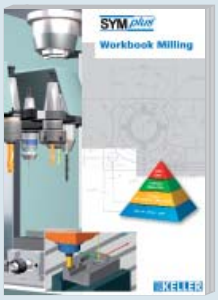
SYM*plus* PAL*plus* Milling is a learning and training programme for CNC programming in accordance with DIN and for preparation for the PAL examination. PAL currently provides a wide range of functions for programming contours and many modern cycles. The process of mastering this large range of new learning content is supported by many SYM*plus* PAL*plus* modules:

PAL Simulator

This enables learners to create complete PAL programmes with contour lines, cycles, programme part repetition, etc. Any NC block can be programmed in a "guided mode", which makes it easier to work with the large number of addresses – some of which are optional, others of which are for use as alternatives. Approx. 100 help diagrams and text explanations provide additional assistance.

Workbooks

The workbooks (which are included in the scope of delivery for the software) are systematically designed to integrate with the software, making them perfect teaching material for preparing for the PAL examination using SYM*plus* Milling.



SYM*plus* Milling workbook

124 pages

Order-No.
96162

Scope of delivery:
SYM*plus* PAL*plus* Milling is provided as a download. The licence can either be activated for a specific piece of hardware or secured by a USB dongle. (The dongle costs €40) The software always includes a postprocessor product (SIEMENS or similar) for automatically creating NC programmes for your control system(s).
Languages:
German, English, French, Italian, Spanish, Simplified Chinese

Article	Order-No.
Single-user licence	10891
*Company/school licence (incl. 3D Simulation)	10895
Virtual Workshop expansion module	10904
3D Simulation expansion module	10902
Tilted Milling expansion module Single-user licence	11954
Tilted Milling expansion module school licence	11956

PAL - German examination institute

The PAL develops in accordance with the industry and vocational schools exams for the trainees in Germany. Ensuring high quality standard in the technical vocational and educational training is one of the main tasks of the PAL.

PAL Multimedia

This SYM*plus* operating mode is designed to work closely alongside the workbooks and provides a multimedia introduction to DIN/PAL, with a clear structure consisting of general principles on the one hand and more in-depth PAL content on the other hand.

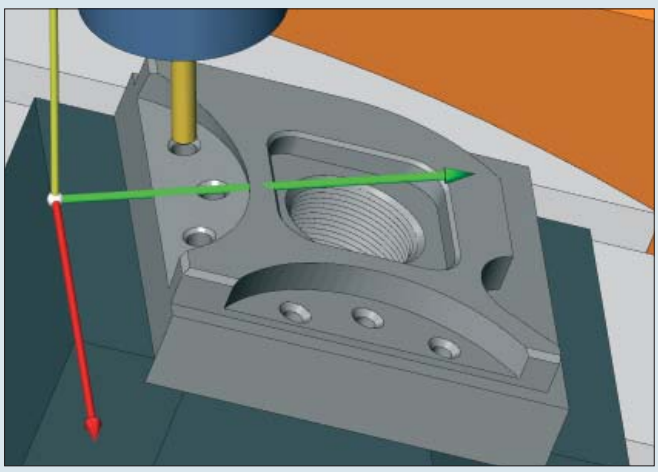
G1 G2 G3

The G1 G2 G3 operating mode enables learners to practise the basics of contour programming in accordance with DIN.

Virtual Workshop (optional)

This provides the opportunity to get to know a virtual 3D workshop along with measuring and test equipment, and become familiar with how a "real" CNC machine lathe operates and its assemblies. This software is available with either the 802C or the 840D (virtual) Sinumerik control system.

SYM*plus* Tilted Milling expansion module



* incl. 20 workstations for companies
incl. 80 workstations for schools

SYM*plus* PAL*plus* Turning V6.0

SYM*plus* PAL*plus* Turning is a learning and training programme for CNC programming in accordance with DIN and for preparation for the PAL examination. This allows, for example, the use of PAL for roughing any type of contour, provides groove and undercut cycles, and enables programming with R as an alternative to I and K, and the integration of bevels/curves. The process of mastering this large amount of new learning content is supported by a large number of SYM*plus* PAL*plus* modules.

PAL Simulator

This enables learners to create complete PAL programmes with contour lines, cycles, programme part repetition, etc. Any NC block can be programmed in a "guided mode", which makes it easier to work with the large number of addresses – some of which are optional, others of which are for use as alternatives. Approx. 100 help diagrams and text explanations provide additional assistance.

Workbooks

The workbooks (which are included in the scope of delivery for the software) are systematically designed to integrate with the software, making them perfect teaching material for preparing for the PAL examination using SYM*plus* PAL*plus* Turning.

SYM*plus* Turning workbook

104 pages

Order-No.
96161

Scope of delivery:

SYM*plus* PAL*plus* Turning is provided as a download. The licence can either be activated for a specific piece of hardware or secured by a USB dongle. (The dongle costs €40)
The software always includes a postprocessor product (SIEMENS or similar) for automatically creating NC programmes for your control system(s).

Languages:

German, English, French, Italian, Spanish, Simplified Chinese

Article	Order-No.
Single-user licence	10890
*Company/school licence (incl. 3D Simulation)	10894
Virtual Workshop expansion module	10905
3D Simulation expansion module	10903
Powered Tools expansion module single-user licence	11953
Powered Tools expansion module school licence	11955

PAL Multimedia

This SYM*plus* operating mode is designed to work closely alongside the workbooks and provides a multimedia introduction to DIN/PAL, with a clear structure consisting of general principles on the one hand and more in-depth PAL content on the other hand.

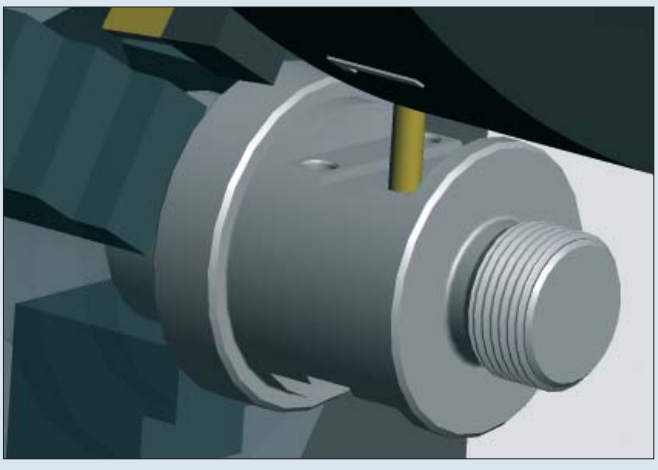
G1 G2 G3

The G1 G2 G3 operating mode enables learners to practise the basics of contour programming in accordance with DIN.

Virtual Workshop (optional)

This supplement to SYM*plus* PAL*plus* Turning enables you to move within a virtual 3D workshop, get to know measuring and test equipment, and become familiar with how a "real" CNC machine lathe operates and its assemblies. This software is available with either the 802C or the 840D (virtual) Sinumerik control system.

Powered Tools expansion module



* incl. 20 workstations for companies
incl. 80 workstations for schools

SinuTrain for Sinumerik Operate

As real as reality

SinuTrain enables convenient operation of SINUMERIK along with CNC programming on your PC. The software can be adjusted to perfectly suit the axis configurations of various machines. This ensures maximum compatibility between CNC programmes created offline and the machine on the shop floor.

**SINUMERIK Operate –
the user interface for efficient machine control.**

The new SINUMERIK operator interface has been structured even more clearly and intuitively. SINUMERIK Operate combines the known HMI-Advanced, ShopMill and ShopTurn on one consistent, innovative operator and programming interface.
SINUMERIK Operate is clearly structured, can be operated intuitively and provides numerous modern, powerful functions which allow to combine workstep and high-level language programming on one operator interface – thus ensuring fast, efficient and intuitive NC programming and production planning.

ShopTurn & ShopMill
workstep programming
ProgramGUIDE
graphic programming using animated elements
DIN/ISO & SINUMERIK high-level language
maximum freedom of programming

Simple steps for successful CNC machining
When setting up a workpiece, the measurement is vividly and transparently displayed by animated elements. Complex workpieces can be conveniently manufactured within a short time in one clamping. Different kinematics can be easily set up.
Simultaneous machining operation recording and simulation can be activated and displayed on request.
SINUMERIK Operate combines the whole range of operator and programming functions on one operator interface, thus ensuring efficient machine operation.

ShopMill user interface

ShopTurn user interface

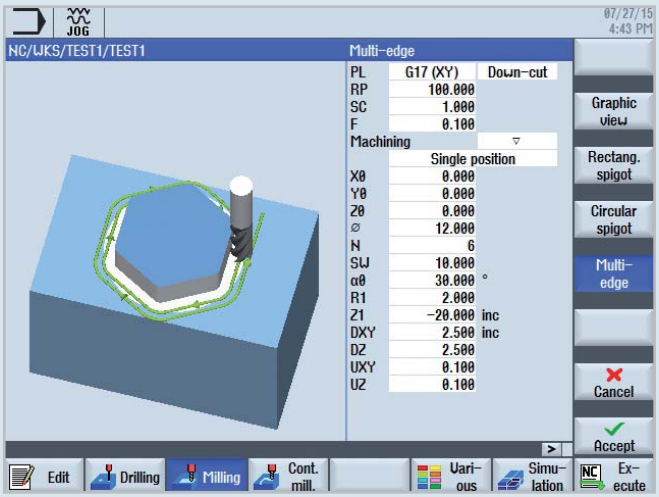
You can find technical data and application examples for the product at **www.christiani-international.com**

Programming, simulation and printing

- DIN/ISO programming with ProgramGUIDE
- ShopMill/ShopTurn work step programming
- Multi-channel programming with ProgramSYNC (only in the full version of SinuTrain)
- Complete graphical CNC simulation
- TCP/IP Ethernet networking with machines
- Print function for DIN/ISO and ShopMill/ShopTurn workstep programmes
- Integrated CAD reader for importing DXF files

Languages
German, English, French, Italian, Simplified Chinese, Spanish

Delivery form
The SinuTrain software for SINUMERIK Operate is integrated on a data storage device.
The scope of delivery includes a "SinuTrain for SINUMERIK Operate 828D/828D BASIC/840D sl 4.5 SP2" DVD, operating instructions in German and English, and a USB stick containing the licence key.



System requirements:

Hardware
- *Operating system Windows XP SP3 32 bits of professional, Home edition*
- *Operating system Windows 7 32/64 bits*
- *Processor: 1.5 GHz (single Core)*
- *RAM: 1 GB of free memories*
- *Hard disk: 2 GB of free memories*
- *DVD disk drive: for the installation about DVD data carrier*
- *Graphics map: minimum resolution 640 * 480 pixels*
- *USB interface*
- *Mouse, keyboard*
- *Training keyboard (optionally)*

Software
- *Adobe Acrobat reader®*

SINUMERIK Coordinate Cube

- High-quality tool for determining the axis direction of tool machines.
- The A, B and C axes can be rotated.
- Colour combination: Black, red, gold
- Material: Aluminium
- Dimensions: 70 x 70 x 70 mm

SinuTrain for SINUMERIK Operate – Licence Types

Article	Order-No.
SinuTrain complete package for Sinumerik Operate ShopMill/ShopTurn 4.5 single licence	59562
SinuTrain complete package for Sinumerik Operate ShopMill/ShopTurn 4.5 classroom licence for 18 workplaces	59563
SinuTrain upgrade for Sinumerik Operate ShopMill/ShopTurn Upgrade 4.5 single licence	59564
SinuTrain upgrade for Sinumerik Operate ShopMill/ShopTurn 4.5 classroom licence for 16 workplaces	59565
SinuTrain Trial version for Sinumerik Operate ShopMill/ShopTurn 4.5	59570
*SinuTrain for SINUMERIK Operate student version 4.5	59571
*SinuTrain for SINUMERIK Operate student package version 4.5	59572
*SinuTrain for SINUMERIK Operate trainer package version 4.5	59573

Download available at
www.christiani-international.com/59562

*** Please note that special licensing restrictions apply.** Please download the accompanying licensing agreement: www.christiani-international.com
Sign and stamp it and submit it together with your order. No sales to private individuals.

From simulation to practical application

Simulations can convey a lot of information – practical experience is irreplaceable. In addition to simulations, training cases and training stands provide the perfect supplement for deepening the theoretical knowledge that trainees have gained by putting it into practice. Training cases and their matching training stands enable users to learn how to operate, program, set up and service a CNC control system in a realistic environment and then practise their new-found skills. Some of the training cases have been designed as table-top units and can be operated separately without a training stand.

SINUMERIK 828D BASIC Training Case

Design

SINUMERIK 828D BASIC T/and BASIC M training cases are supplied with:

- SINUMERIK 828D BASIC T PPU 241.2 or SINUMERIK 828D BASIC M PPU 241.2 incl. system software and software options
- SINUMERIK MCP 483 PN machine control panel
- SINUMERIK PP 72/48D 2/2A PN periphery module
- SINAUT MD720-3 GSM/GPRS modem incl. aerial
- SCALANCE XB005 unmanaged industrial Ethernet switch

- Supply voltage: 230 V / 50 Hz
- Protection rating in accordance with DIN VDE 0470 Part 1/ EN 60529/IEC 60529
- Dimensions: 650 x 500 x 250 mm (W x H x D)
- Weight: approx. 30 kg

SINUMERIK 828D BASIC training cases are delivered in a PELI protective case with an integrated rigid foam inlay. The pull-out handle and the rollers set into the base make the case easy to transport.

Article	Order-No.
SINUMERIK 828D BASIC T training case	96106
SINUMERIK 828D BASIC M training case	96107

SINUMERIK 828D BASIC T and SINUMERIK 828D BASIC M training cases are designed to be placed on tabletops and can be operated separately without a SINAMICS S120 Combi training stand.

SINAMICS S120 Combi Drive Simulator

The SINAMICS S120 Combi drive training stand has been designed as a floor-standing unit with rollers and can only be operated in conjunction with SINUMERIK 828D BASIC T/BASIC M training cases.

Design

The SINAMICS S120 Combi drive training stand is supplied with:

- SINAMICS S120 Combi power module, 16 kW, 18 A/9 A/5 A/5 A
- SINAMICS S120 Booksize Compact motor module 9 A
- Line filter and line choke
- 1PH8 spindle motor with 2.8 kW
- Four 1FK7 feed motors with 0.85 Nm
- Supply voltage: 3 AC 380 ... 480 V
- Protection rating in accordance with DIN VDE 0470 Part 1/EN 60529 (IEC 60529)
- Dimensions: 615 x 1150 x 615 mm (W x H x D)
- Weight: approx. 120 kg

Article	Order-No.
SINAMICS S120 Combi drive simulator	96110

SINUMERIK 808D Training Case

NEW

SINUMERIK 808D (turning and milling) training cases are designed to be placed on tabletops and can be operated separately without a SINAMICS V60 training stand.

Article	Order-No.
Training Case SINUMERIK 808D T	96108
Training Case SINUMERIK 808D M	96109

SINAMICS V60 Training Stand

NEW

The SINAMICS V60 training stand has been designed as a floor-standing unit with rollers and can only be operated in conjunction with SINUMERIK 808D training cases.

Article	Order-No.
Training Stand SINAMICS V60	96112

SINUMERIK 840D sl Training Case

NEW

The training case is used together with the SINAMICS S120 drive simulator drive unit to practise setting up and servicing the SINUMERIK 840D sl in a realistic environment.

Article	Order-No.
SINUMERIK 840D sl training case	96104

SINAMICS S120 Drive Simulator

NEW

The SINAMICS S120 drive simulator is used to practise operating, programming, setting up and servicing work in a realistic environment.

Article	Order-No.
SINAMICS S120 drive simulator	96105

CNC Lathe OPTIturn L44

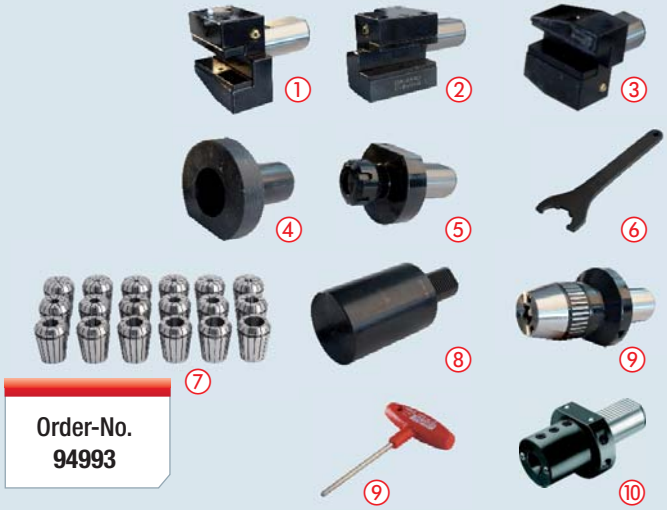
Order-No.
94121

More infomation and the technical details at
www.christiani-international.com/94121

CNC lathe with SIEMENS control 828 Basic T and the adventages: Speed, power, accuracy and durability

- ✔ Spindle and servo motor made by SIEMENS
- ✔ Complete cladding with safety equipment
- ✔ Coolant equipment
- ✔ Automatic central lubrication
- ✔ High spindle speed
- ✔ Slewable operating unit
- ✔ Electronic handwheels for X and Z axis
- ✔ RJ45 plug connection, USB connection and power connection (230V)
- ✔ Two-year SIEMENS guaranty included

Starter kit VDI 30



Order-No.
94993

① 3 pcs Square transversal seat
② 1 pcs Square transversal seat overhead
③ 1 pcs Longitudinal seat
④ 5 pcs Bohrstangenaufnahme Ø 10 / 12 / 16 / 20 / 25 mm
⑤ 3 pcs Cover plat
⑥ 1 pcs Collet chuck ER 25
⑦ 1 pcs Key for collet chuck ER 25
⑧ 1 pcs Collet chuck kit ER 25
⑨ pcs Tool holder
⑩ 1 pcs chuck

CNC Milling Machine OPTImill F150

Order-No.
94181

Heavy type
High productivity
High reliability
Electronic handwheel
Chip conveyor
and many more

Order-No.
94277

More infomation and the technical details at
www.christiani-international.com/94181

CNC-Workbench

- Dimension 1500 x 750 x 859 (L x D x H)
- Workbench foot
- Drawers cabinet
- Worktop beech multiplex 40 mm
- Usable dimensions of drawer inside: 450 x 600 mm
- Without tools and inserts

Article	Order-No.
CNC-Workbench	95614

CNC-Bench Stand

- The inserts are made of injection ABS plastic material, oil-resistant and distinguish oneself by accurately fitting cross beams inside.
- The Insert will be clipped into the support.
- Neps at the upper side of the inserts prevent the generation of vacuum and therefore the suction of tools
- All sizes of tools are combinable

CNC E1	CNC E2	CNC E3
• ISO / SK 30 • Cyl / VDI 30 • MK3 • MK4	• SK 40 • Cyl / VDI 40 • HSK A 50 / B 63 • HSK A 63 / B 80 • MK 5	• ISO / SK 50 • Cyl / VDI 50 • HSK A 32 / B 40 • HSK A 40 / B 50 • HSK A 80 / B 100 • HSK A 100 / B 125

*1st figure = number of supplied inputs for the sizes E1, E2 or E3
*2nd figure = number of highest possible inputs for the sizes E1, E2 or E3

CNC-Bench stand

- 425 x 375 x 300 mm (L x D x H)

CNC E1	CNC E2	CNC E3	Order-No.
10/14*	10/10*	6/6*	94852

CNC-Bench stand

- 425 x 375 x 525 mm (L x D x H)

CNC E1	CNC E2	CNC E3	Order-No.
20/28*	20/20*	12/12	95819

CNC-Cabinet

CNC-cabinet with swing doors

- 980 x 500 x 1838 mm (L x D x H)
- 3 x CNC-tool carrier level (WAR)
- 1 x shelf
- with inserts

CNC E1	CNC E2	CNC E3	Order-No.
66/144*	66/99*	45/72*	94851

CNC-Cabinet with roller shutter

- 1000 x 500 x 1950 mm (L x D x H)
- synthetic roller shutter
- 3 x CNC-tool carrier level (WAR)
- 1x shelf
- with inserts

CNC E1	CNC E2	CNC E3	Order-No.
66/144*	66/99*	45/72*	95827

Casting technology training cases

The training cases for bell casting and foundry enable students and trainees to actually carry out the oldest moulding processes, which are still fundamental today, in the classroom.

Bell Casting, Basic Training Set

NEW

Each student will enjoy the astonishing clean form in moulding sand as well as the easy handling with the low melting fluid metal. Due to modern and sandrepelling pattern in epoxy-resin the instruction sets are extremely close to practice. Instruction is highly facilitated by detailed information and working sheets.

The basic training set „bell casting“ contains 3 patterns:

- The Bell as a natural or a one-piece pattern
- The Anvil as a split, assymmetrical pattern, with big cake

Particularly suited to demonstrate the shrinkage cavitation.
The Anchor as a split, symmetrical pattern with its mean wall thickness, shows the limits of sand casting.

Special non-poisonous, lead- and zinc-free alloy, melting point 210° C, corresponding in its basic characteristics to the steel casting (intensive shrinking, non shock-absorbing, though). With the Bell Casting the modern moulding technique without riser (diminution of the circulation material) can be demonstrated.

More information: www.christiani-international.com/99873

Foundry, Buildung-up Training Set 1

NEW

Making-up of a casting with cavity of 2,2 kg of mass
(pipe reducer)

Terms such as core box, core point, core bar, riser, runner a.s.o. are intuitively worked out. Both pattern halves with the pattern plate are made of one piece only, the same as normally used for big series in practice - no separating agent necessary.
The charasteristics of the casting metal, the eutectic Wood´s metal alloy with a melting point of 70° C, almost correspond to those of cast grey iron (slight shrinkage, shock-absorbing, brittle).

Owing to the application of this low melting alloy it is possible to experience in one lesson the complete process of a work piece right from the ramming up of the pattern until the finished casting.

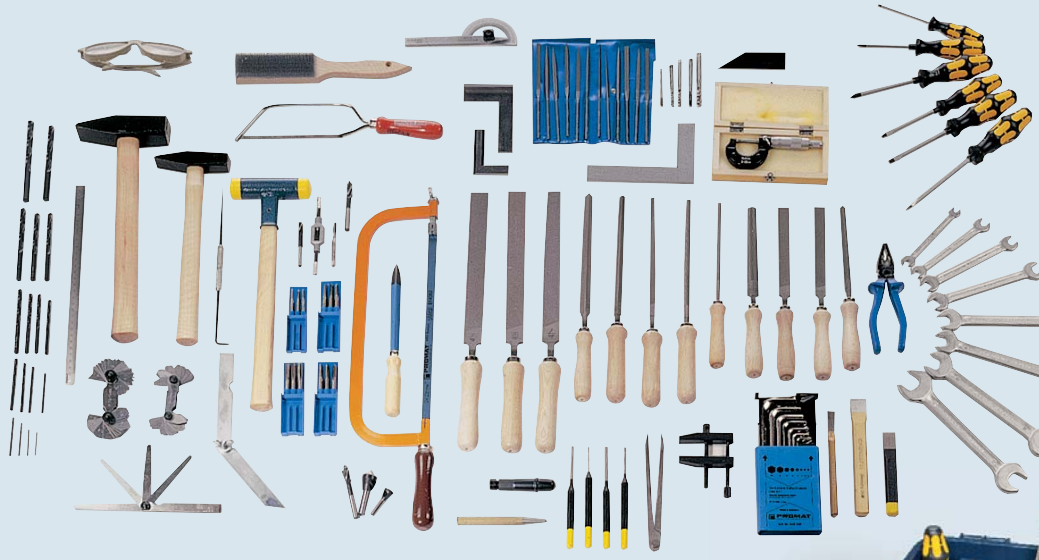
All elements, including work sheets for the preparation of a lesson, are neatly arranged in a solid case. The moulding sand is separately supplied in a container.

More information: www.christiani-international.com/99874

! All teaching equipment is supplied as a complete, ready-to-use set, including plenty of material.
We will be happy to provide you with further accessories and material on request.

Complete Tool Box for Metalworking Professions

This tool box contains the basic equipment of the tools and test equipment for metalworking professions.



COMPLETE SET

Order-No.
56207

Article	Order-No.
Tool box, measuring & testing equipment without calibration certificate	56207
More information: www.christiani-international.com/56207	
Tool box, measuring & testing equipment with calibration certificate	58971
NEW Tool box empty (without tools)	59652
More information: www.christiani-international.com/59652	

Complete Tool Box for Electronics and Mechatronics Professions

This tool box contains the basic equipment of the tools and test equipment for professions in the field of electronics and mechatronics.

COMPLETE SET

Order-No.
56376

More information: www.christiani-international.com/56376

zortrax M200

Ideas brought to life!

3D printer for professional use in schools

What is 3D printing and what is it for?

With a 3D printer, you can use additive manufacturing to create technical models, figures, components and assemblies. With the Zortrax M200, plastic filaments are melted and joined together, layer by layer, to form a model. This process is called fused deposition modelling (FDM). The data for component creation can be provided by any CAD program and transferred directly to the 3D printer.

ONLINE
VIDEO

Find out about our functions and potential areas of application in our detailed product video.

Order-No.
98895

NEW

3D printers in schools – What's the benefit?

Anyone who studies 3D printing can …

… train their powers of spatial imagination,
… understand additive manufacturing,
… understand manufacturing-oriented design,
… use CAD design programs for motivation,
… independently produce assemblies and understand their function,
… produce models for chemistry, biology, mathematics and technology,
… independently realise technical or creative ideas and designs,
… manufacture spare parts.

www.christiani-international.com/98895

Electronics

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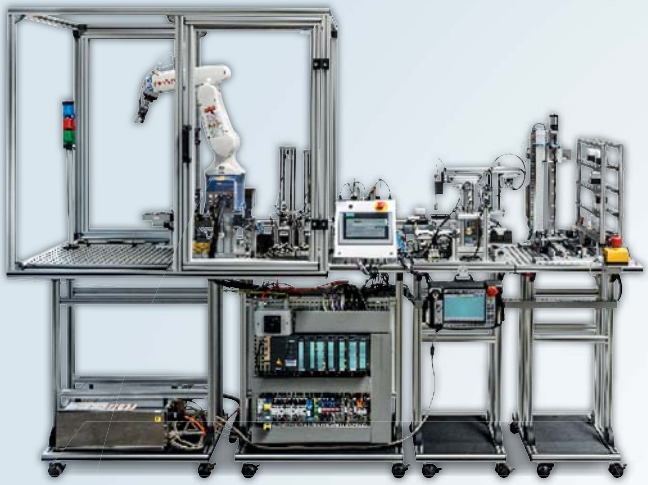
Training equipment and teaching methods

There are a variety of different professions and specializations in electrics and electronics job sector. Therefore our teaching equipment covers numerous fields like industrial wiring, PLC, drive technology and mechatronics. Using our training courses and project works teachers and trainees find a hands-on training method which prepares perfectly for working life.

Whether for vocational institutes, colleges and universities or for small and medium-sized companies and major corporations: We offer to our customers guidance, conception, planning and execution as well as train the trainer courses.

As a single-source provider for technical training, our portfolio covers both the hardware for the training labs and the teaching materials prepared for the lessons. This conclusive overall concept contributes to a lasting learning success!



Training Systems

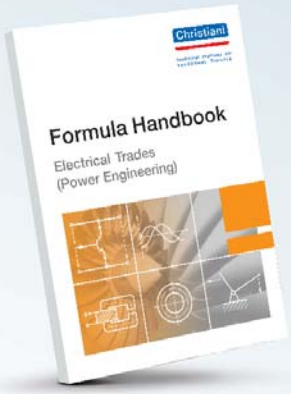
Training Boards

Laboratory Benches

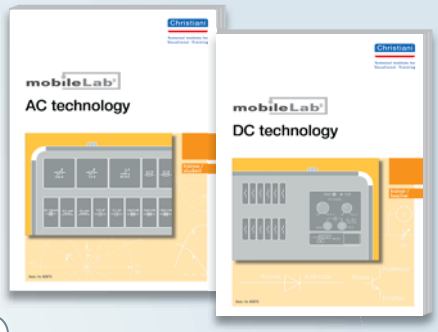
Christiani materials are available in many different languages. Visit:

christiani-tvet.com

You can directly access the online shops and the contacts for the respective regions.



Specialised Books



Teaching Manuals

Training Cases

Project Works

Basic training for electricians

Training in the field of electrical engineering opens up a large number of different career options. The fundamentals of electrical engineering rank among the key qualifications for all professions within this field. In this technical training lab, trainees learn the basic skills of electrical engineering and how to safely use the corresponding tools and equipment, finally focussing on exa-mination preparations.

Our modules

- Requirements analysis
- Planning and consultation
- Conceptual design
- Implementation
- Train-the-trainer

VIRTUAL TOUR

Experience the Christiani Training Labs now online in 3D.

More information:
www.christiani-training-lab.com

COMPACT INFO

Technical Training Lab for Electrical Engineering

Example configuration for 16 workplaces:

- Desks for theory work with 230 V power supply
- EDP workplaces
- Electrical engineering learning unit
- Electrical engineering laboratory benches
- Drive and safety engineering laboratory benches
- Workbenches

Suitable for:

- Electrical engineering professions

Topics/learning objectives:

- Analysing electrical systems and testing functions
- Planning and executing electrical installations
- Installing electrical operating equipment in compliance with safety aspects
- Analysing and adjusting control systems
- Configuring the hardware and software of assemblies

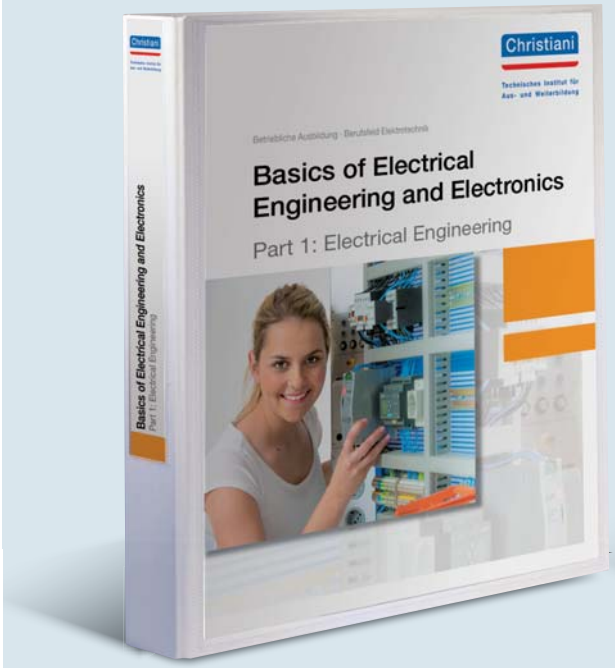
The Christiani technical training lab for electrical engineering offers you the following:

- Theory and practice from a single source
- Motivation to learn and sustainable learning success
- Didactic diversity and practically oriented training media
- Strong partnerships with industry
- Professional consulting – from the planning stage, all the way up to implementation

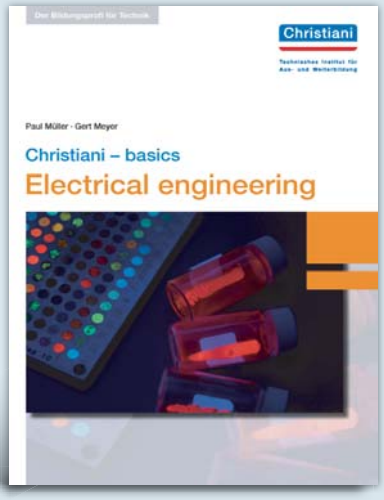
Technical Training Lab for Electrical Engineering
Teaching Methods and Practice from a Single Source

Practically Oriented Training Media

At Christiani, specialised technical training lab equipment and didactic training materials are precisely matched to one another. With this uniform holistic concept, you can offer state-of-the-art training, as well as conveying practically oriented specialist knowledge and the necessary personal skills. In developing our innovative products, we work closely with strong partners from the industrial sector.



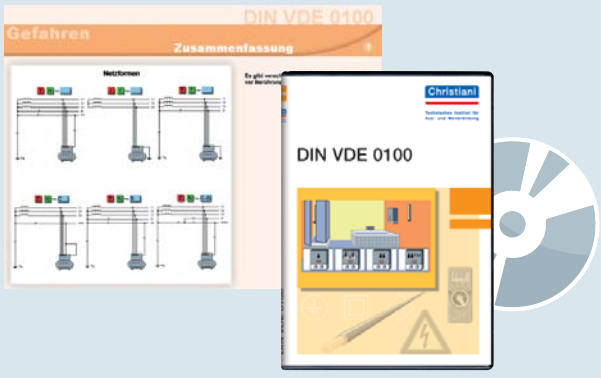
Technical training courses



Specialised books

Vocational training courses for electrical engineering form the didactic focus of the technical training lab.
We offer a wide range of training materials and learning methods for vocational training and trade schools.
We would be happy to advise you on putting together the ideal package for your specific requirements.

Interactive Learning Programmes



Interactive CBT training programmes *(computer-based training)* are ideal media for independent learning on a PC.
We offer more than 20 topics in the field of electrical engineering.

Project Works

As a trainer in technical or industrial electronics professions, by acquiring this material kit for a switching cabinet, you are investing in didactic materials which can accompany training over the long term

Powerful Specialised Lab Components

The new generation of laboratory benches

The Christiani technical training lab is equipped with modern teaching equipment and training systems. All teaching systems and devices comply with industry standards and have been specifically matched to the requirements of schools and educational establishments.

„Train-the-Trainer“

We train your training staff to the latest standards and show how you can most effectively use our training systems and materials.

Please feel free to get in touch with one of our customer consultants.

“Whether you are looking to expand your existing specialised training lab or are planning something new – we are happy to support you with the necessary advice and expertise. Tell us about your individual requirements. We can then advise you on all questions.”

ASIA-PACIFIC

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jamal@christiani.de
www.christiani-me.com

mobileLab® – The teaching system for schools and businesses

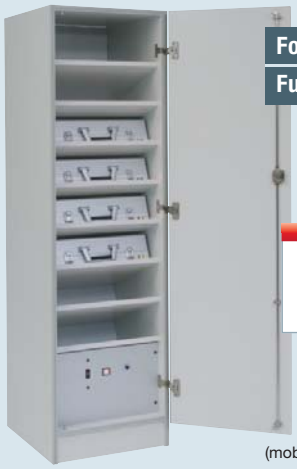
Using experimentation, the mobileLab teaching system enables you to impart the kind of basic knowledge on electrical engineering that is currently required in over 30 occupations that require training. In contrast to the demonstration systems which are often used, the mobileLab concept offers the distinct advantage that the learners are able to carry out and reflect upon the tasks themselves. The teaching system enables instructors to give experiment-based lessons in which the students have the opportunity to actively participate. Actively involving learners in the learning process significantly improves their long-term recall of what they have learnt. Various different basic experiments show the learner interrelationships and laws in electrical engineering. The use of pre-prepared exercise templates enables the learner to conduct and evaluate a relevant experiment in any teaching situation. The lesson therefore becomes more focussed and more efficient, and less time and material is wasted.

The features of the mobileLab system:

- Independent of the mains due to internal battery. If the battery is flat the cases can continue to be operated using the AC adapter provided.
- Integrated, adjustable voltage source. The AC case also includes a function generator.
- Operation with low voltages, as result completely safe even for beginners.
- The overload protection on the integrated assemblies and the dimensions of the plug-in elements ensure that nothing can be damaged, even if used incorrectly.
- A template is provided for each ot the predefined experiments; this template defines the circuit exactly.
- All necessary plug-in elements, jumpers and wires are included.
- The cases are charged in the special charging and storage cabinet and are kept ready for use. The connection is made by simply sliding into the cabinet.
- Individual cases can also be charged without the charging cabinet using the AC adapter provided.
- Dimensions: 410 x 110 x 335 mm (W x H x D)

A separate AC adapter for charging and operating the case is supplied.

Charging and Storage Cabinet



For 8 cases
Fully automatic charging

Order-No. 76826

Application example

(mobileLab case not included in the scope of delivery)

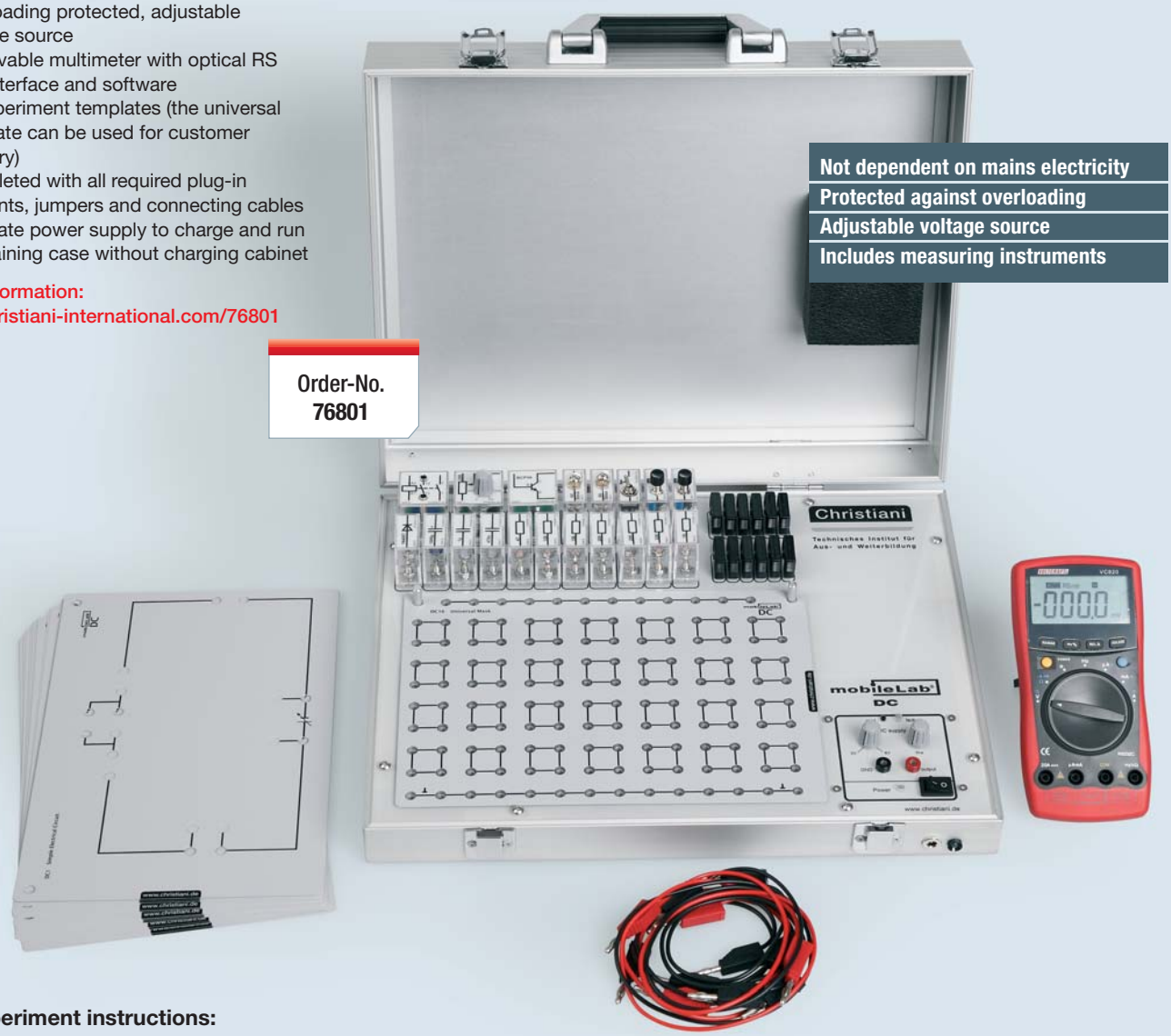
mobileLab® – DC Case for DC Technology

- Battery-operated training case for DC technology
- Overloading protected, adjustable voltage source
- Removable multimeter with optical RS 232 interface and software
- 16 experiment templates (the universal template can be used for customer circuitry)
- Completed with all required plug-in elements, jumpers and connecting cables
- Separate power supply to charge and run the training case without charging cabinet

More information:
www.christiani-international.com/76801

Order-No. 76801

Not dependent on mains electricity
Protected against overloading
Adjustable voltage source
Includes measuring instruments



DC experiment instructions:

- Simple electrical circuit
- Ohm´s law
- Series and parllel connection of resistors
- Expanded series and parallel connechtion of resistors
- Unloaded / loaded voltage divider
- Bridge circuit
- Relay with latching
- Diode in the DC circuit
- NPN transistor

DC experiment manual (trainer/teacher)

DC experiment manual (trainee/student)

Article	English	Spanish
	Order-No.	
DC technology - experiment manual for the trainer	80972	80912
DC technology- experiment manual for the trainee	80971	80911

mobileLab® – AC Case for AC Circuits and Electronics

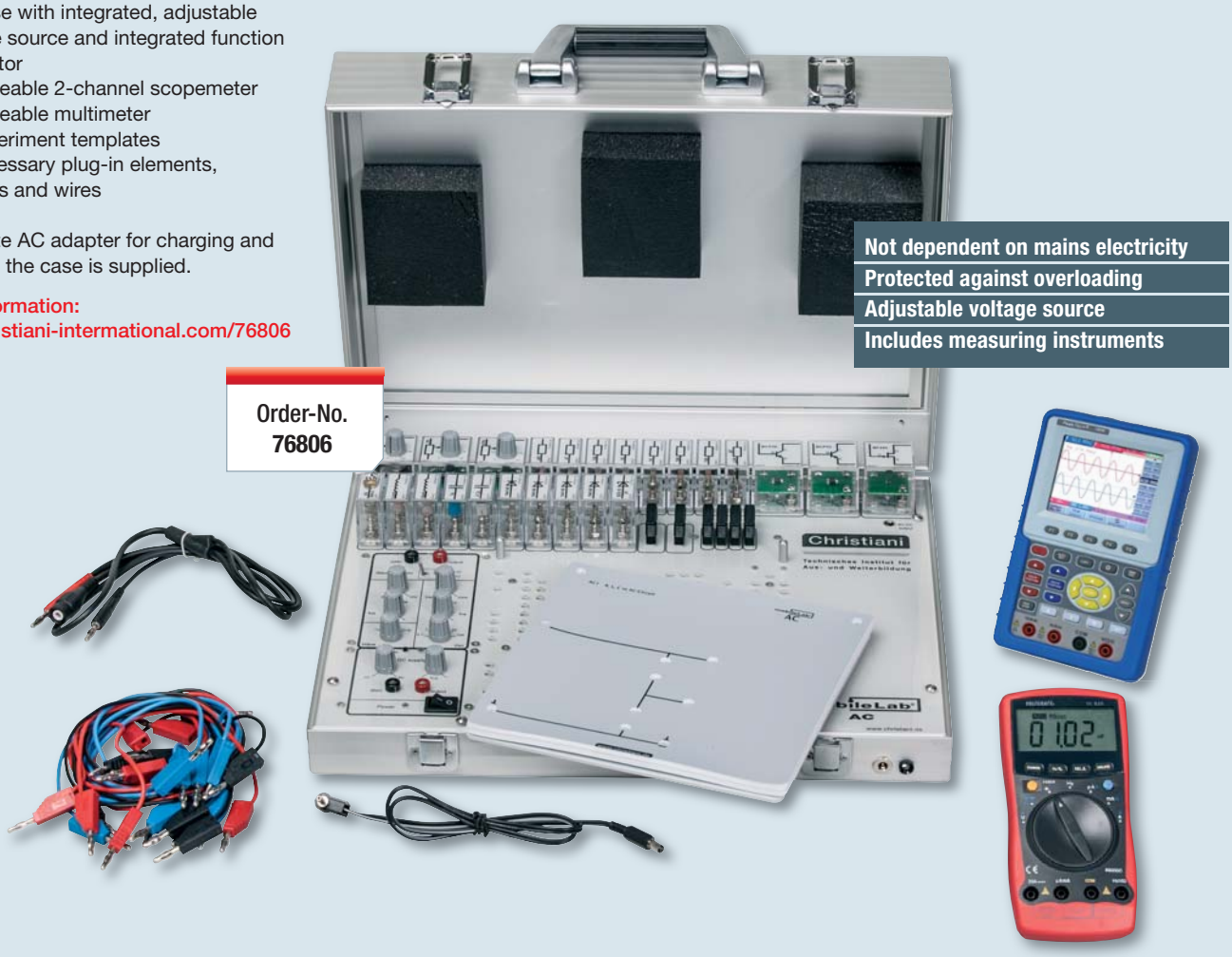
- AC case with integrated, adjustable voltage source and integrated function generator
- Removeable 2-channel scopemeter
- Removeable multimeter
- 22 experiment templates
- All necessary plug-in elements, jumpers and wires

A separate AC adapter for charging and operating the case is supplied.

More information:
www.christiani-international.com/76806

Not dependent on mains electricity
Protected against overloading
Adjustable voltage source
Includes measuring instruments

Order-No.
76806

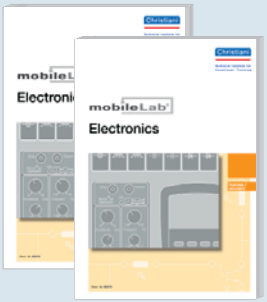


The AC experiment manuals cover the subjects:

- Resistance R, capacitance C and inductance L in the AC circuit
- RC and RL series circuit
- RC an RL parallel circuit
- RCL series circuit
- RCL parallel circuit
- High an low pass circuits

The electronics experiment manuals cover:

- Characteristics of electronic components
- Rectifier circuits
- Transistors
- Field effect transistors
- Stabilising circuits
- Push-pull stages
- Operational amplifiers



	English	Spanish
Article	**Order-No.**	
AC technology - experiment manual for the trainer	80974	80914
AC technology- experiment manual for the trainee	80973	80913
Electronics - experiment manual for the trainer	80976	80916
Electronics - experiment manual for the trainee	80975	80915

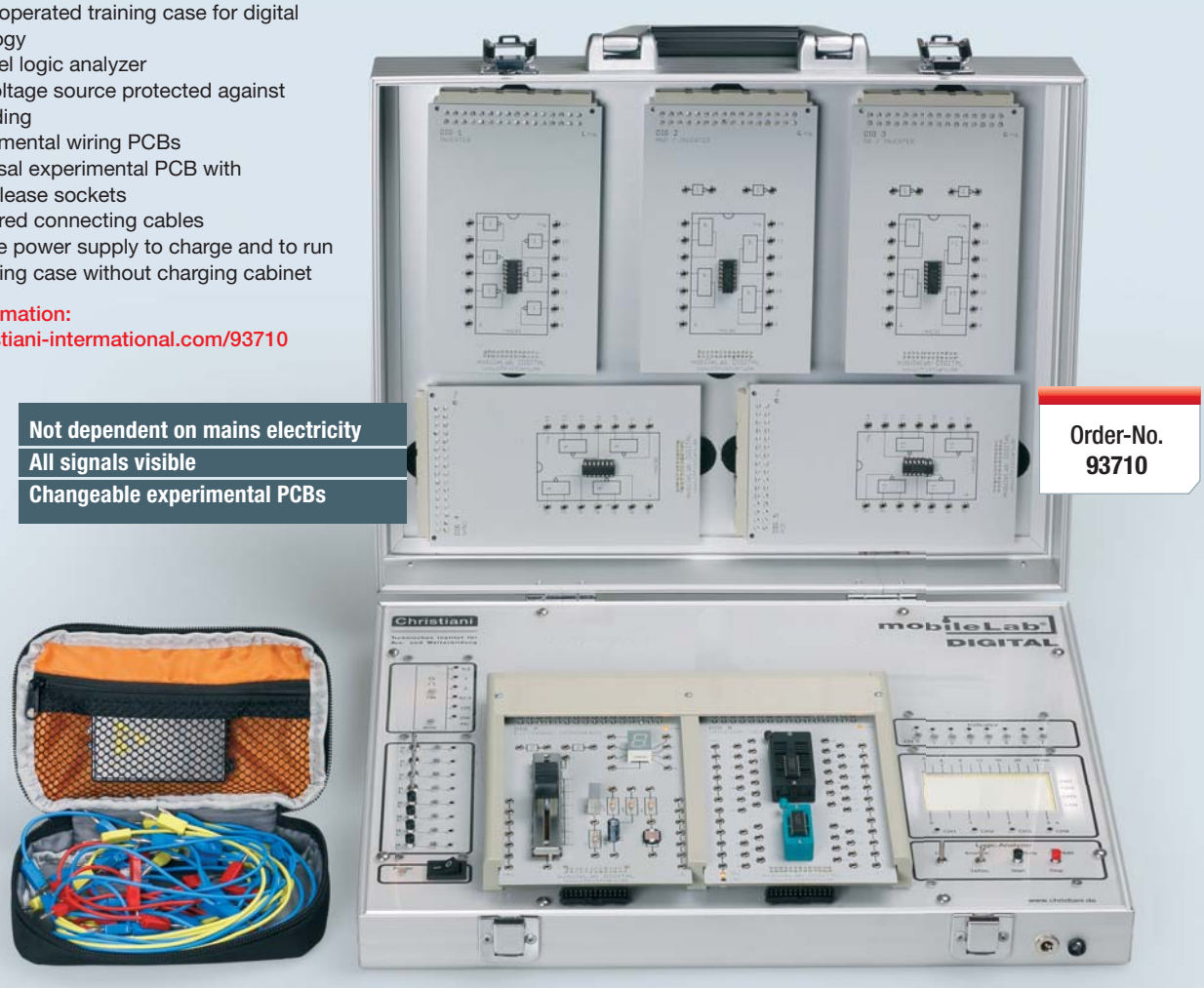
mobileLab® – DIGITAL Case for Digital Technology

- Battery-operated training case for digital technology
- 4 channel logic analyzer
- Fixed voltage source protected against overloading
- 6 experimental wiring PCBs
- 1 universal experimental PCB with quick-release sockets
- All required connecting cables
- Seperate power supply to charge and to run the training case without charging cabinet

More information:
www.christiani-international.com/93710

Not dependent on mains electricity
All signals visible
Changeable experimental PCBs

Order-No. 93710



Experiment manuals:

Basic elements and circuits of digital technology:

- To get to know and analyse inverters and buffers
- To analyse and understand an AND element
- To analyse and understand an OR element

Setup, connection, measurement and analysis of combinations of basic elements:

- To connect and examine AND with inverter
- To connect and examine OR with inverter
- To examine and understand NAND
- To examine and understand NOR
- To set up, analyse and understand flipflop

Learning objectives:

- To understand functional equations of the basic elements of digital technology
- To get to know circuit symbols of the basic elements
- To get to know function charts of the basic elements
- To create and understand function charts of combinations from the basic elements
- To create and understand wiring diagrams on the basis of function charts
- To understand and apply function tables and digital circuits
- To understand and create signal time schedules

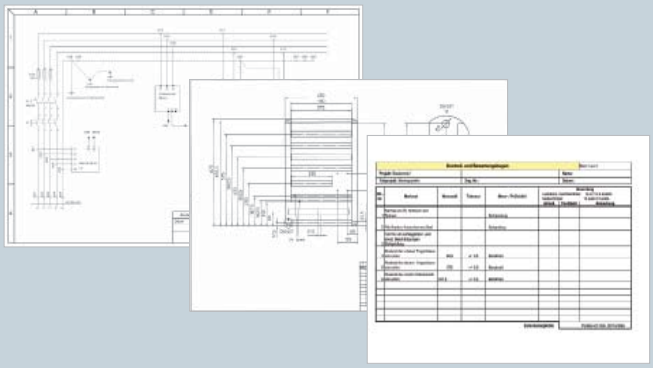
Digital technology experiment manual (trainer/teacher)

Digital technology experiment manual (trainee/student)

Article	Order-No. English	Order-No. Spanish
Digital technology - experiment manual for the trainer	93925	94640
Digital technology - experiment manual for the trainee	93924	94639

Training Concept for Switch Cabinet

As a trainer in technical or industrial electronics professions, by acquiring this material kit for a switching cabinet, you are investing in didactic materials which can accompany training over the long term.
The modular concept allows you to use the switching cabinet again for future learning situations, either by using our enhancement modules or with your own enhancements. You can connect functional models via the interfaces in the side wall (sensors, actuators, safety circuit, motors). The switch cabinet fits easily on a work bench and can be conveniently worked on whether you are standing or sitting. This project contains an aluminium practice sheet and an accompanying task, making it suitable for practice in sheet metal working, even for beginners. The primary task for the basic module material kit involves: Processing, equipping, assembly and wiring of the switch cabinet, using a rectified voltage of 24 V DC.



Trainer

Trainee

Tasks (extract)

Mechanical processing
Assembly of the base support, making a practice sheet, creating the cut-outs for the side panels, processing and assembling the side and front panel.
Assembling and wiring
Preparing the mounting plate, equipping the mounting plate, equipping the side and front panel, installing the mounting plate, fitting the main switch and the buttons, basic wiring of the mounting plate, wiring the safety relay, producing the PCB for the low voltage supply.
Testing and commissioning
Visual inspection, acceptance report in accordance with DIN VDE 0100 Part 610, commissioning.

Contains basic information on

- Vernier gauges
- Scribing and centre punching
- Drilling
- Countersinking
- Thread cutting
- Punching holes in sheet metal
- Dimensioning
- Filing
- Deburring
- Conductor colours
- Protective earth connection
- Soldering
- Actual measurements DIN VDE 0100

Suitable for:

All electronics professions

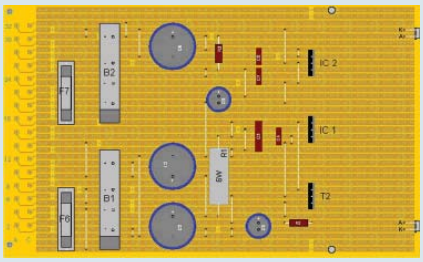
Learning objectives:

Mechanical processing
Scribing, centre punching, filing, sawing, drilling, punching, deburring
Assembly
Installing, mounting, preparing, screwing, connecting
Wiring
Connecting to the mains, connecting
Soldering technology
Wiring, soldering, contacting
Commissioning
Checking, testing, measuring

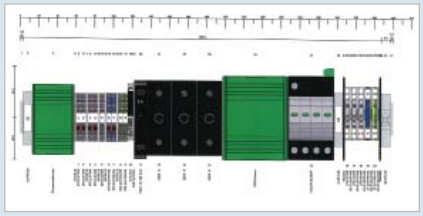
Duration:

approx. 2 weeks

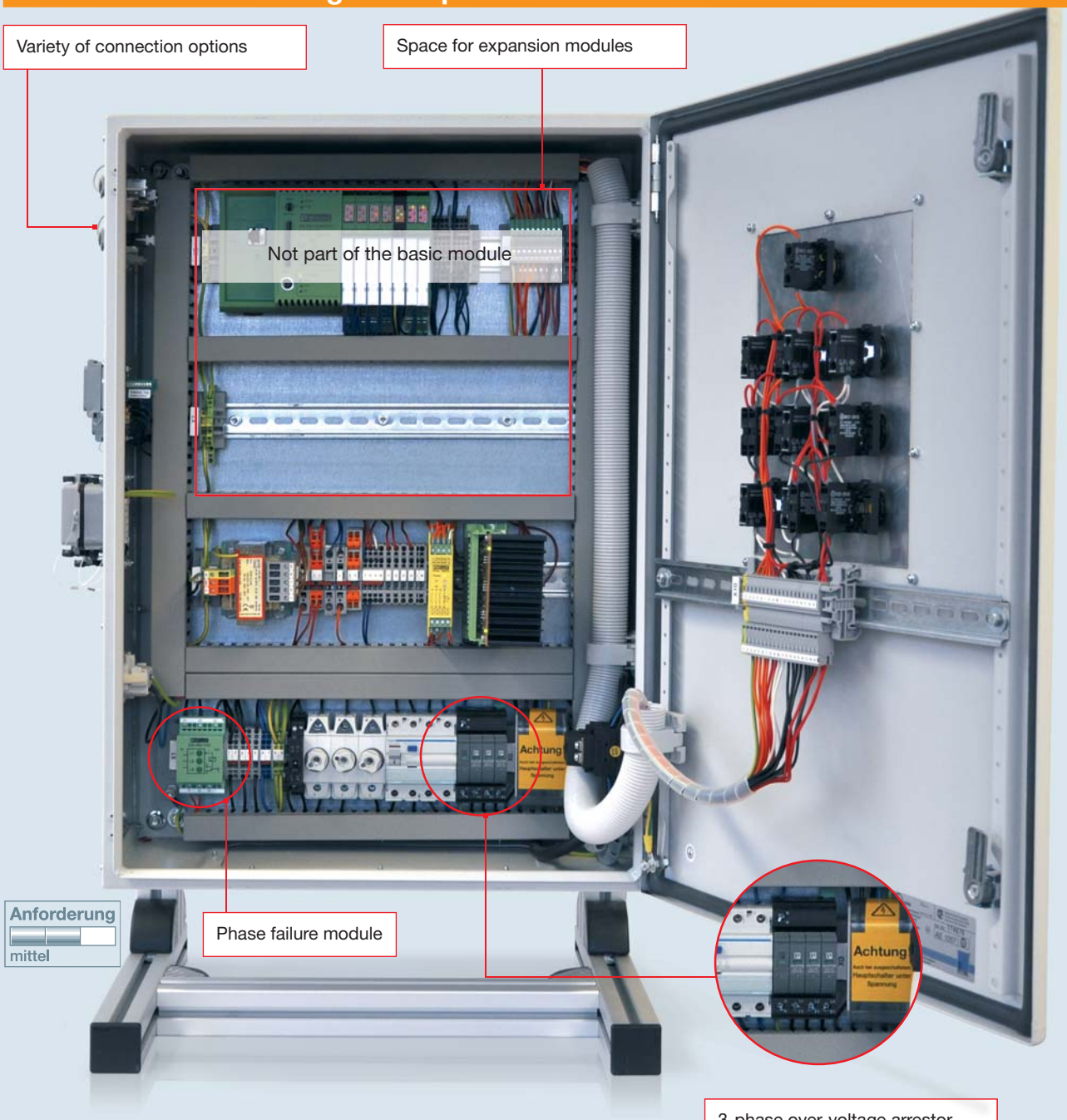
More information:
www.christiani-international.com/65992



Soldering technique task


Colour illustration of the terminal

Switch Cabinet Training Concept – Basic Module



The figure shows the switch cabinet created from the basic module material kit, with a PLC expansion.

Equipment (extract)

- Switch cabinet WxHxD (mm): 500 x 700 x 250
- Transformer and rectifier circuit (machining kit) for 24 V and 5 V DC
- Safety relay
- 400 V AC connection (230 V also possible)
- Phase failure module
- Over-voltage arrestor
- RCD
- PCB holder
- Various types and sizes of terminal blocks
- Profile frame
- Detailed work plans
- Sample inspection sheets
- Detailed introduction to the action-oriented concept

Article	Order-No. English	Order-No. Spanish
Basic material kit module All components, incl. switch cabinet and assembly frame	65992	
Document for the trainer (basic module) Action-oriented, content as for the trainees, plus presentation of the training concept, with solutions to guiding question and completed work plans. With master copies for forms. High-quality four-colour print, in A4 folder.	93366	89966
Documents for the trainees For the basic module. A4 folder in four-colour print. Favourable bulk prices	93367	89967

Flowcode 6 programming software

Flowcode is one of the world's most modern graphical programming languages for micro-controllers and enables you to create a complex electronic system within just a short period of time, even with minimal knowledge of programming. The use of macros means there is no need for training in complex programming languages. For this reason, Flowcode is ideal for trainees and students. Flowcode is already used by thousands of engineers and teachers worldwide and is available in more than 20 languages. It currently supports PICmicro, dsPIC, PIC24, AVR and the ARM micro-controller series.

Find out more at www.christiani-international.com

Available in more than 20 languages!

Flowcode 6 – PICmicro

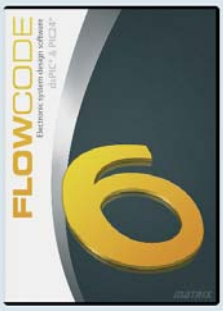
Article	Order-No.
1 corporate licence (FC6CM01NEPIC)	12500
1 classroom licence (FC6AC01NEPIC)	12501
10 classroom licences (FC6AC10NEPIC)	12505
50 classroom licences (FC6AC50NEPIC)	12507

Flowcode 6 – ARM

Article	Order-No.
1 corporate licence (FC6CM01NEARM)	12509
1 classroom licence (FC6AC01NEARM)	12510
10 classroom licences (FC6AC10NEARM)	12511
50 classroom licences (FC6AC50NEARM)	12512

Flowcode 6 – AVR Arduino

Article	Order-No.
1 corporate licence (FC6CM01NEAVR)	12513
1 classroom licence (FC6AC01NEAVR)	12514
10 classroom licences (FC6AC10NEAVR)	12515
50 classroom licences (FC6AC50NEAVR)	12516



Flowcode 6 – dsPIC/PIC24

Article	Order-No.
1 corporate licence (FC6CM01NEDSP)	12517
1 classroom licence (FC6AC01NEDSP)	12518
10 classroom licences (FC6AC10NEDSP)	12519
50 classroom licences (FC6AC50NEDSP)	12520

No delivery by post
When placing your order, please specify your e-mail address. Once your order has been placed, you will receive the activation code by e-mail within three days.

E-blocks modular micro-controller lab system

E-blocks was specially developed for educational institutions and is a cost-effective and time-saving lab solution for schools.
E-blocks are modularised plug-in boards, which contain typical electronics for embedded systems. E-blocks can easily be combined into different electronic systems by means of SUB-D plug-in connections and thus offer a wide range of possible applications. More than 50 E-blocks module boards are available, beginning with simple LED indicators through to complex boards such as programming devices, Bluetooth boards and TCP/IP boards. The range is rounded off with sensors, software, application information and curricula. The individual E-blocks can quickly and easily be combined into a wide range of systems, and you yourself can determine the level of complexity. Programming is carried out on a PC, via a USB connection, and using C, Assembler or Flowcode language. E-blocks are extremely flexible, making them ideal for anyone starting their professional training, as well as for universities and technical colleges.

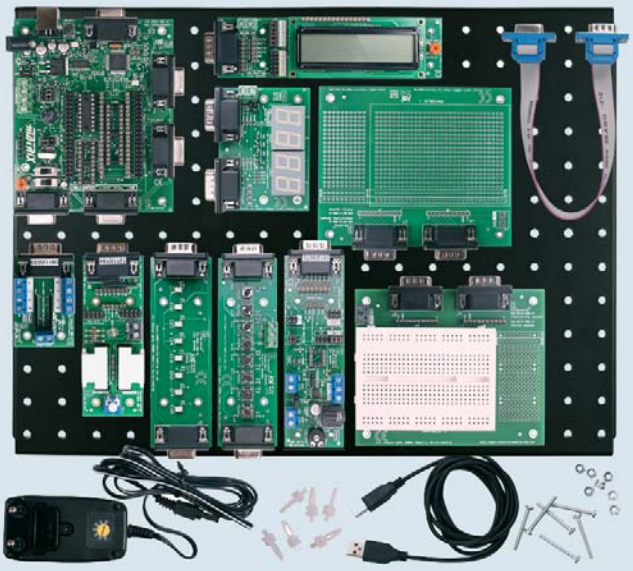
E-blocks Starter Kit EB215 – PICmicro

To make it easier to start using this system, the E-blocks starter kit contains a wide range of components for the most varied applications. In addition to the main section, the programmer board, it also includes additional E-blocks, a power supply, a USB connection cable, a robust metal base plate for assembling the E-blocks, mounting material as well as a storage box. With this modular system, you can guide your trainees and students through micro-controller technology step by step. They will gain a basic understanding of the main program structures as well as programming of delays, loops, inputs, links, LCD displays, keyboards, analogue inputs, subprograms and troubleshooting. In addition, since it can be extended using additional E-blocks elements, it is ideal for project work and for courses for more advanced users.

Scope of delivery:

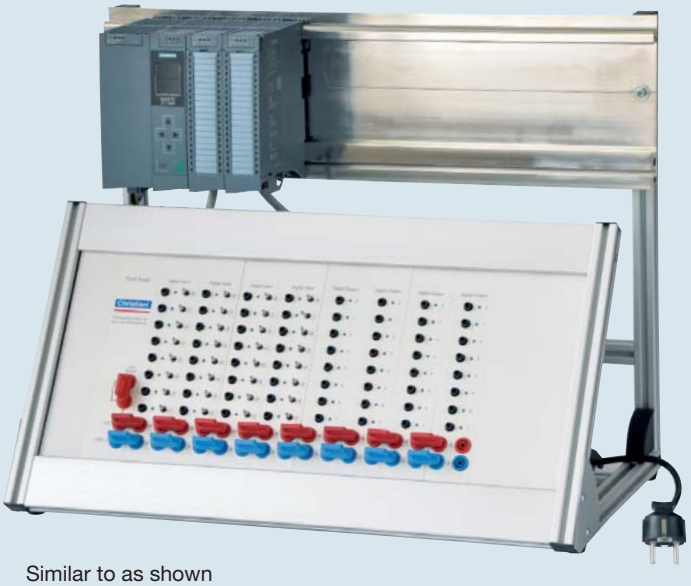
- Metal back panel 270 x 350 mm
- Quadruple 7-segment board
- USB multiprogrammer
- SPI Bus D/A and memory board
- Patch board kit
- 100 x M3 self-locking nuts
- Plastic tidy system
- Introduction to programming of micro-controllers on CD-ROM*
- LED board
- LCD board
- Sensor board
- IDC cable
- USB cable
- 100 x M3 x 12 screws
- Foam inserts
- Switch board
- Prototype board
- Terminal board
- User guide*
- Mains adapter
- Plastic storage box

*in English



Order-No.
13300

PLC Training Rack with SIMATIC® CPU S7-1500*



Similar to as shown

PLC training equipment with the new SIMATIC S7-1500 PLC

Enter the world of the new innovative SIMATIC S7-1500 control systems and prepare your students and trainees for the next generation of ground-breaking control systems made by the German market leader.

Ideal for practical PLC teaching. The Christiani PLC Training Racks not only allow you to impart programming knowledge to your students and trainees but also to enable them to collect practical experience in working with PLC hardware.

More information at: www.christiani-international.com/59607
www.christiani-international.com/59608

PLC Training Rack with S7-1513-1PN

Specifications:

- Aluminium profile table-top support
- CPU S7-1513-1PN
- 32 x 24 VDC digital inputs
- 32 x 24 VDC/0.5 A digital outputs
- With integrated PROFINET interface
- Power supply: 24 VDC/8A
- Including Ethernet cable and 24 MB micro memory card
- Dimensions (WxHxD): 520x420x300 mm

Order-No.
59607

PLC Training Rack with S7-1516-3PN/DP

Specifications:

- Aluminium profile table-top support
- CPU S7-1516-3PN/DP
- 24 x 24 VDC digital inputs
- 24 x 24 VDC/0.5 A digital outputs
- 4 x 0 - 10 V analogue inputs
- 2 x 0 - 10 V analogue outputs
- With one integrated PROFIBUS interface and two PROFINET interfaces
- Power supply: 24 VDC/8A
- Including Ethernet cable and 24 MB micro memory card
- Dimensions (WxHxD): 520x420x300 mm

Order-No.
59608

* On request, PLC Training Racks can be provided with every CPU S7-300/1500.

PLC Training Rack with SIMATIC® CPU S7-300*

The classic: PLC training equipment with the tried and tested SIMATIC S7-300 PLC

PLC training equipment with S7-300 CPU. Ideal for action-oriented PLC teaching. The Christiani S7-300 PLC Training Racks not only allow you to impart programming knowledge to your students and trainees but also to enable them to gain practical experience of working with the tried and tested SIMATIC S7-300 PLC hardware.

More information at: www.christiani-international.com/58136
www.christiani-international.com/56780

PLC Training Rack with S7-315F-2PN/DP

Specifications:

- Aluminium profile table-top support
- Fail-safe CPU 315F-2 PN/DP
- 16 x 24 VDC digital inputs
- 16 x 24 VDC/0.5 A digital outputs
- 4 x 0-10 V, 0-20 mA analogue inputs
- 2 x 0-10 V, 0-20 mA analogue outputs
- With PROFIBUS DP-Master/Slave interface and PROFINET interface
- Power supply: S7-PS307/5A
- Incl. 512 KB micro memory card
- Dimensions (WxHxD): 520x420x300 mm

Order-No.
58136

PLC Training Rack with S7-300 314C-2PN/DP

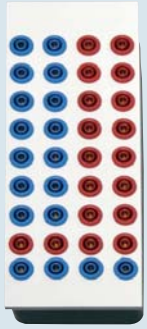
Specifications:

- Aluminium profile table-top support
- CPU S7-314C-2PN/DP
- 24 x 24 VDC digital inputs
- 16 x 24 VDC/0.5 A digital outputs
- 4 x 0-10 V, 0-20 mA analogue inputs
- 2 x 0-10 V, 0-20 mA analogue outputs
- MPI, PROFIBUS DP, PROFINET PN interfaces
- Power supply: S7-PS307/5A
- Incl. USB-MPI adapter and 512 KB micro memory card
- Dimensions (WxHxD): 520x420x300 mm

Order-No.
56780

* On request, PLC Training Racks can be provided with every CPU S7-300/1500.

PLC Training Rack – Accessories



Article	Order-No.
Potential distribution 24 VDC	57508
PLC-mMS connection cable	53609

More information at: www.christiani-international.com/57508
www.christiani-international.com/53609

More details on the different variants as well as the individual components of the PLC Training Racks are available on request or on the Internet at **www.christiani-international.com**

Exclusively for training – The new elneos® connect workstation systems

elneos® connect

As a manufacturer and market-founder of technical workstation systems for the specialist area of electrical engineering and electronics, *erfi* was already developing furniture systems at the end of the 50s. The new *elneos*® connect furniture series has won design awards and its technical safety has been (German safety standards).

The new *elneos*® *connect* workstation system stands for flexibility and modularity, with its various extendible aluminium profiles, and is characterised by its timeless shape, colourful accents and structural simplicity. The sophisticated system design of *elneos*® *connect* enables, amongst other things, uninterrupted cable routing and guiding as well as adjustment of the working height. It therefore guarantees maximum functionality and, with its innovative structures, can keep pace with rapid developments in the field of technology and communication.

Specifications:

Basic dimensions (W x D x H) of our standard benches (up to bench top): 1600 x 850 x 780 mm
Other sizes available on request.

Working area: 30 mm HPL-coated chipboard, front corners with 20 mm radius (alternative shapes: ergo-line with Tech edge or alu-line).

ergo-line: front corners on left and right rounded with 20 mm radius to prevent bumping into the bench corners; 30 mm thick HPL-coated chipboard;

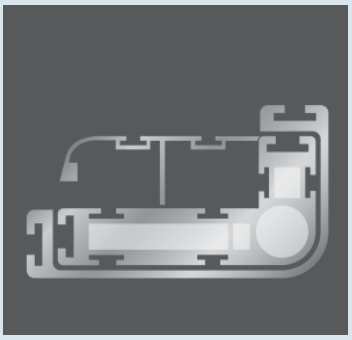
alu-line: Front edge with aluminium core including two functional slots on the underside for connection of vices or similar; top and front made of hard-wearing special plastic profile, incl. storage trough and horizontal, frontside fluting for protection against damage; 30 mm thick HPL-coated chipboard;

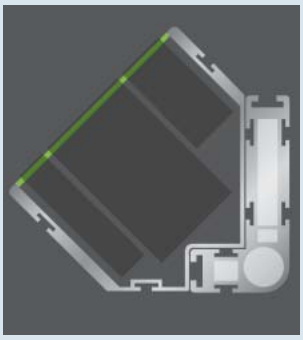
Aluminium profiles

Four aluminium profile feet with two cable ducts for separated media supply, intelligent clip/groove technology for holding expansion profiles, eight slots for standard slot nuts and a bracket for holding the electromotive height adjustment. Can be mounted at any position on the aluminium bench frame; can be extended upwards as desired.

Bench frame

Ultra-stable aluminium bench frame with circumferential groove technology – flexible connection of system components and significant weight saving.





Connector

elneos® green (RAL design system 1107070), alternative colours pure white (RAL 9010), graphite black (RAL 9011) and high-gloss chrome-plated; central component made of die-cast aluminium

The main advantages of the connector

1. Very stable connection of L profiles with aluminium bench frame, at any desired position.
2. Implementation of expansion profiles from the floor up to board and cockpit level on the inside.
3. Infinite lowering of the bench top
4. Free space under the bench top for additional elements

elneos® connect

Cable flap

180° opening, split flap possible or inwards-opening flap with two brush strips and two opening positions (centred and complete)

Special features

- Easy opening and quick access thanks to One-Finger-Touch and Quick-Access
- Perfect sorting of the media exiting at the bench top (2 brushes)
- No protrusion of the cable flap during opening and closing
- Improved accessibility (front brush)
- Optimisation of work area (rear brush)
- Lateral cable outlet through brushes on the sides

Cable trough

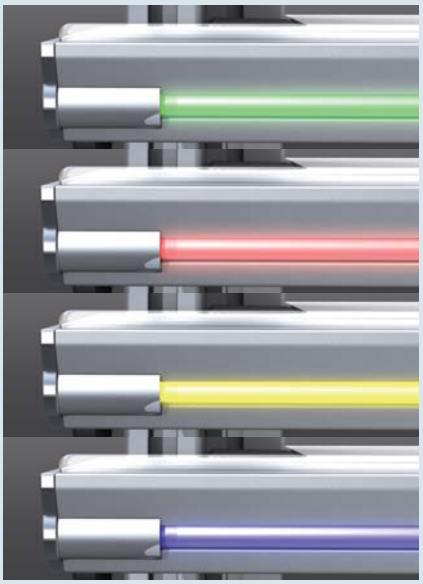
Can be mounted flexibly on the aluminium function frame (150 to 300 mm useful depth), ergonomic function area for socket strip;

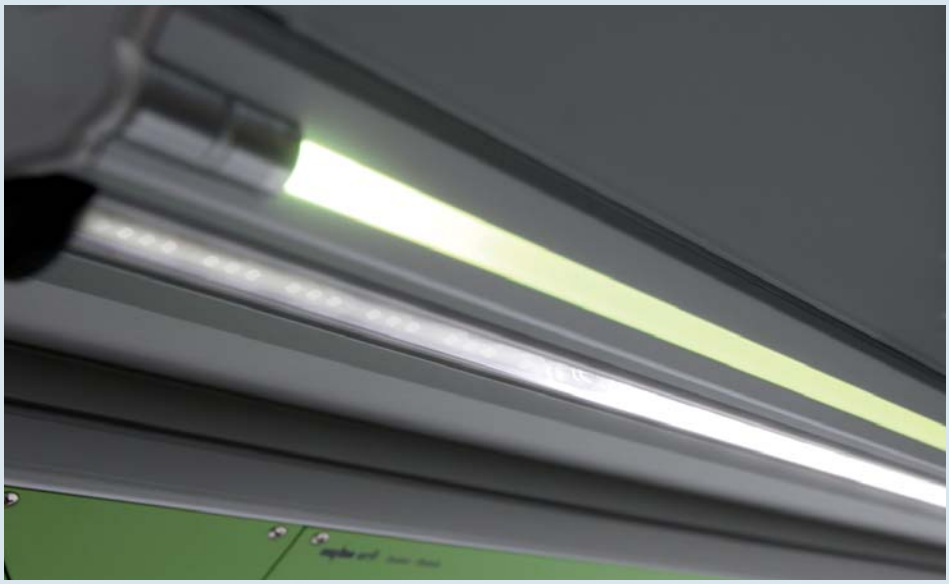
Work area with conductive ESD design

All bench tops are alternatively available in ESD design and with elegant white-fronted design. With the alu-line bench top, the plastic coating of the aluminium profile is made from a high-quality, conductive plastic.

Lighting and signal light

The innovative RGB-LED indicator light displays the table status and the swivelling RGB-LED workstation lighting is intuitively controlled via sensors.





Indicator light

The indicator light is a special LED light conductor. Flowing colour transitions as well as flashing functions are also possible. Signalling of the table status is essential during training:

Green = everything OK and table switched on
Red = danger, e.g. thresholds exceeded
Yellow = extra-low voltage devices are enabled
Blue = low voltage and extra-low voltage devices are enabled

Workstation lighting

In the bottom profile, the swivelling RGB-LED working light for the bench is fully concealed. This light is controlled via powerful RGB-LEDs as well as white, high-output LEDs. The light can be swivelled in its bracket, can be dimmed and any desired light colours can be configured. The workstation is therefore always optimally illuminated, preventing shadows in daylight. The new light is also available with white LEDs only.

elneos® five

The *elneos® five* device system impresses with its consistent and user-friendly optics, which have retained the fresh and modern green colour in many areas. Thus, *elneos®* connect and *elneos® five* form one homogeneous unit.

More on *elneos® five* **on page 140 onwards**

The container

The *elneos® connect* container range offers Touch-to-Open technology as standard. A special running gear with large rollers ensures maximum stability. In addition, roller containers can be converted into screw-on containers at any time, and vice versa, of course.

Adaptable to local requirements on request.

reddot design award winner 2013

German Design Award WINNER 2014

if product design award 2014

elneos® Bench with Cable Flap

This elneos® connect series bench, with cable flap, cable trough and socket strip, is ideal for theory lessons which also require the use of electronic devices. With its 230 V power supply, it is equipped for all electronic aids, such as laptops, or small experiments (e.g. with our MobileLab).

Subsequent modifications are possible.
By using a well thought-out aluminium profile system, extensions can be added at a later date. These could be roller or screw-on containers, PC and monitor brackets, experiment frames or lateral, vertical energy ducts (expansion profile 2) in which a wide range of devices can be integrated.

The following variants are based on the bench with cable flap and demonstrate the versatility and flexibility of the possible configurations.

Article	Order-No.
elneos® bench – with cable flap	94077

elneos® Bench with Cable Flap and Brackets for PC and Monitor

The elneos EDP bench has an expansion profile on one of the rear bench legs (expansion profile 2). This has integrated safety sockets, as well as RJ45, VGA and USB ports, meaning there is no need for the laborious process of laying cables. Thanks to the brackets mounted on the bench, your PC and flat-screen monitor can be easily accommodated.

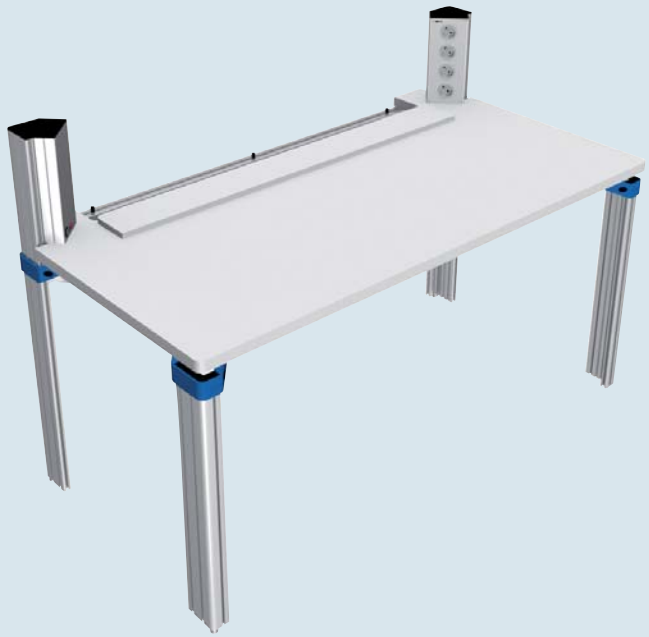
Just like the theory bench, this bench also has a cable flap and socket strip in the underlying cable trough and thus offers the possibility of connecting additional devices.

EDP bench can also be configured as a two-seater solution

In addition to the single seater solution, the elneos EDP table can also be expanded into a two-seater solution. This can be done with just a few extra components, which can also be fitted retrospectively without any difficulty.

Article	Order-No.
elneos® bench – for one PC	94078
elneos® bench – for two PCs	94079

elneos® Laboratory Bench with Cable Flap, Expansion Profile 2, Sockets and 24 V Power Supply



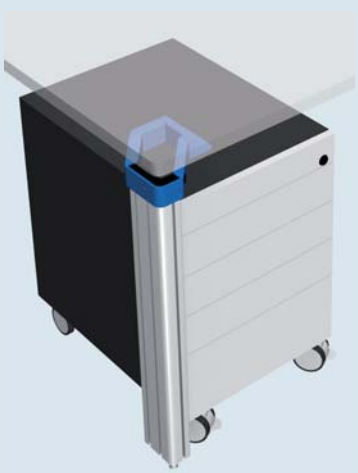
Lessons on programmable logic controllers (PLCs) demand particular requirements of workstation systems.
This bench provides the essential equipment, such as 230 V safety sockets and a 24 V power supply, which are easily accessible via expansion profile 2, which protrudes beyond the bench top.
The bench also has a cable flap and socket strip in the underlying cable trough, in case additional 230 V connections are required.

Thanks to the lateral supply ducts, almost 100% of the bench top remains clear allowing you to maintain clarity in the training lab.

Further extensions, such as PC and monitor brackets, screw-on or roller containers, extension of the vertical ducts, both in terms of height-adjustment and in terms of the equipment, or mounting of a 1-row experiment frame, are possible at any time, on request.

Article	Order-No.
elneos® bench – with cable flap, expansion profile 2, sockets and 24 V power supply	**95370**

elneos® Roller Container (Example Configuration)



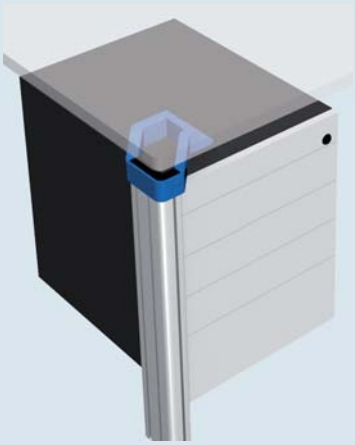
Roller containers are a flexible means of storing all kinds of tools, auxiliary resources and measuring tools.

This standard roller container is equipped as follows:
Size: 430 x 577 x 635 mm (L x W x H)
Touch-to-Open technology: Open drawers with just a gentle touch
Full drawer extension: Useful depth of drawer 490 mm
Drawer partitions: 1x material insert 1HU, 3x drawers 2HU, 1x drawer 3HU
Locking: Via a central lock
Design rollers: 75 mm, fixable at front

Other variants on request!

Article	Order-No.
elneos® roller container	**95381**

elneos® Screw-on Container (Example Configuration)



Screw-on container for fixed installation under the table, for storage of all kinds of tools, auxiliary resources and measuring tools.

This standard screw-on container is equipped as follows:
Size: 430 x 577 x 551 mm (L x W x H)
Touch-to-Open technology: Open drawers with just a gentle touch
Full drawer extension: Useful depth of drawer 490 mm
Drawer partitions: 1x material insert 1HU, 3x drawers 2HU, 1x drawer 3HU
Locking: Via a central lock

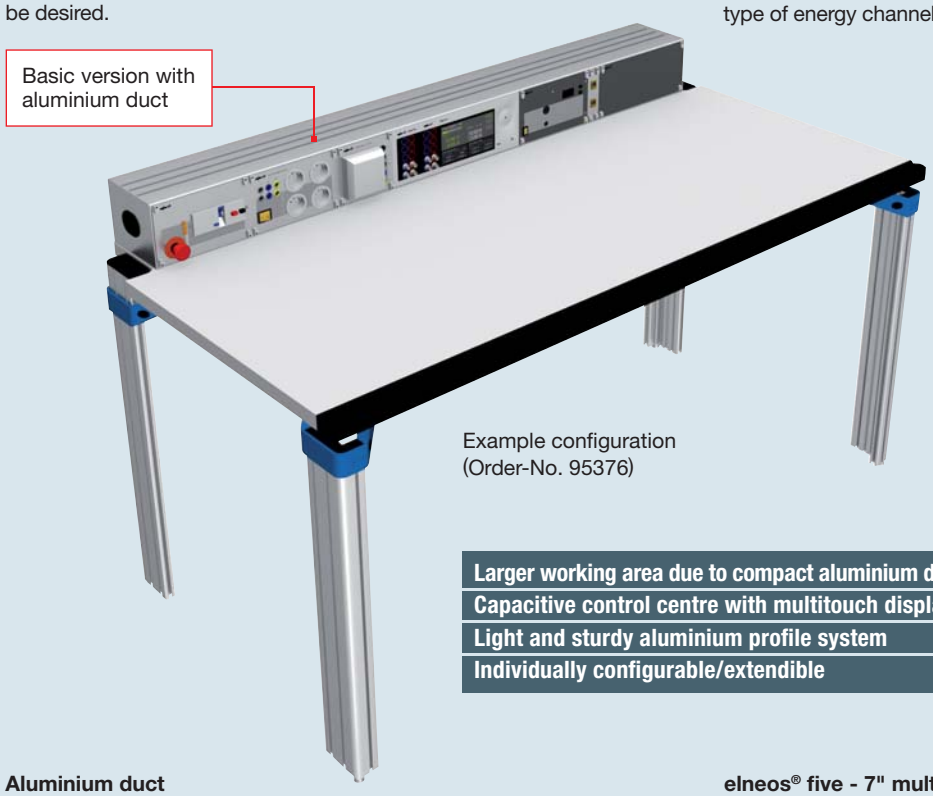
Other variants on request

Article	Order-No.
elneos® screw-on container	**95382**

elneos® Laboratory Bench with Aluminium Duct

The ultra-flexible sizing (LxWxH), add-on and expansion options (cable flaps, ducts, cockpits, expansion profiles, lighting, containers, etc.), as well as the wide range of built-in devices, leaves nothing to be desired.

The versions offered here (with aluminium duct, 19” bench top) have exactly the same built-in devices and are modern and solid basic equipment for training workshops. They differ only in terms of the type of energy channels used.



Example configuration (Order-No. 95376)

elneos® five capacitive control centre with multitouch display and intelligent connection field with colour-coded RGB ring lighting

Larger working area due to compact aluminium duct
Capacitive control centre with multitouch display
Light and sturdy aluminium profile system
Individually configurable/extendible

Aluminium duct

Advantages: The aluminium duct holds the electronic equipment and, at the same time, cools the built-in devices. Due to the compact design, this duct offers increased working area on the bench and is also particularly cost-effective. Due to the narrow depth, however, not all conventional 19" slide-in modules can be used.

Built-in devices
3-phase safety and switching device

- Motor protection switch
- RCD switch
- Emergency stop mushroom button
- Can be looped into the room's emergency stop circuit
- Phase control lights

elneos® five - 7" multitouch capacitive control centre

- 2 x precision control power supply and measuring device
- Precision digital universal multimeter
- Power, energy and digital multimeter
- Dual-function generator, incl. modulation
- Additional connection field

Socket module

- 4 x Safety sockets
- Safety lab connectors

Three-phase current module

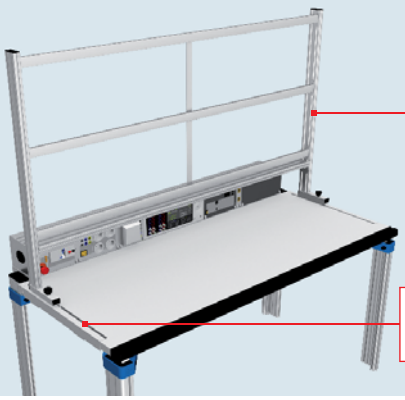
- CEE connector
- Safety lab connectors

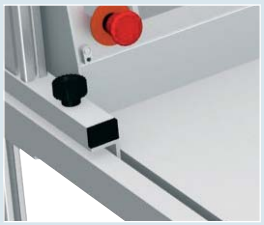
80 W soldering station with digital display

- 2 x RJ45 sockets

Experiment frame

With the experiment frame, the laboratory bench can be extended for the use of A4 training boards or for hanging up assembly boards.





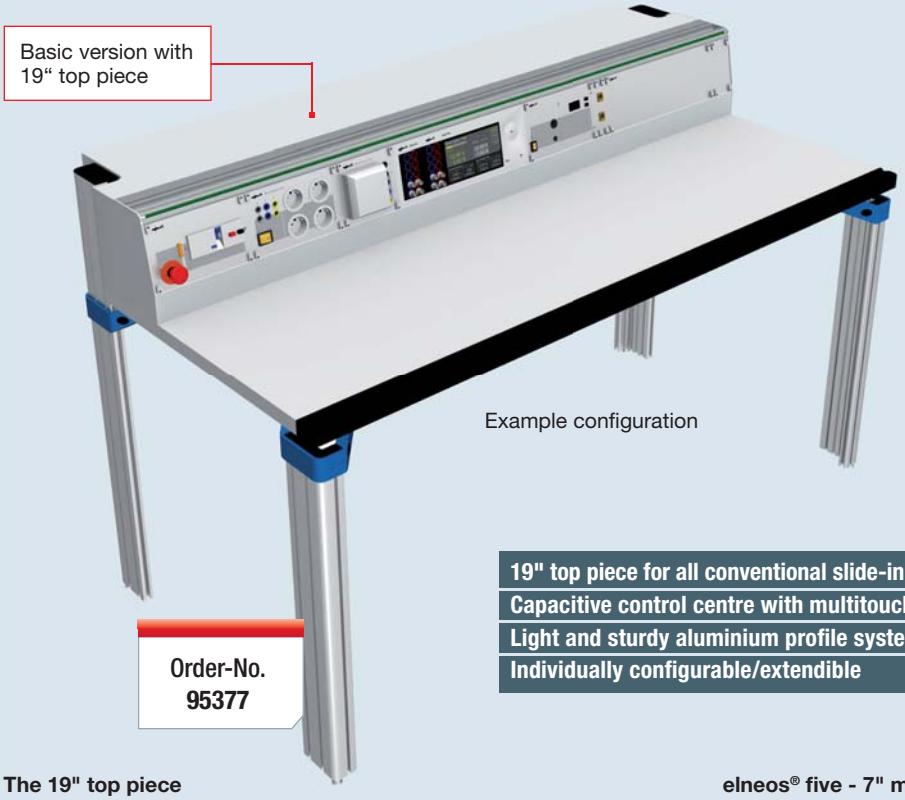
Professional guide unit for experiment frame

Work with the professional guide unit is even more flexible and ergonomic. The guide, which runs on a ball bearing, is very smooth running and can be locked at any desired position via knurled screws.

Article	Order-No.
elneos® laboratory bench with aluminium duct	95376
Addition of 2-row experiment frame 1600 mm	95379
Addition of prof. guide unit and 2-row experiment frame	95380

elneos® Laboratory Bench with 19” Top Piece

The laboratory bench with a 19” top piece, based on the variant with an aluminium duct, is certainly the most functional.
In addition to its optics, this version also offers the possibility of adding on the RGB-LED indicator light.



Example configuration

Increased safety at the workstation: Intelligent LED indicator light provides information about the current state of the laboratory station

Green: Normal status
Red: Error/Danger
Yellow: Devices enabled

19" top piece for all conventional slide-in modules
Capacitive control centre with multitouch display
Light and sturdy aluminium profile system
Individually configurable/extendible

The 19" top piece

The 19" wooden top piece accommodates the electrical equipment from 3HU slide-in modules.
Due to its depth of 360 mm, it can be equipped with all conventional 19" slide-in modules. The front panel is at an angle of 10° for good ergonomics. The well thought-out ventilation system means that air circulation for cooling of the built-in devices is guaranteed.

RGB-LED indicator light

This bench has an indicator light, which can signal the status of the bench (error, emergency off, used voltage, etc.).

Built-in devices 3-phase safety and switching device,

- Motor protection switch
- RCD switch
- Emergency stop mushroom button
- Can be looped into the room's emergency stop circuit
- Phase control lights

elneos® five - 7" multitouch capacitive control centre

- 2 x precision control power supply and measuring device
- Precision digital universal multimeter
- Power, energy and digital multimeter
- Dual-function generator, incl. modulation
- Additional connection field

Socket module

- 4 x Safety sockets
- Safety lab connectors

Three-phase current module

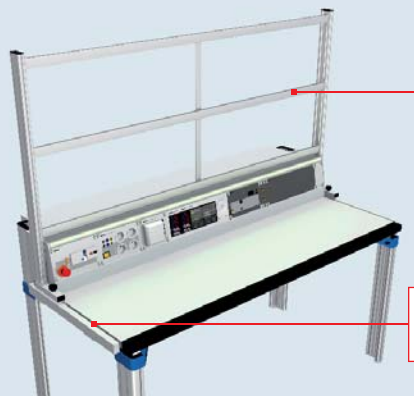
- CEE connector
- Safety lab connectors

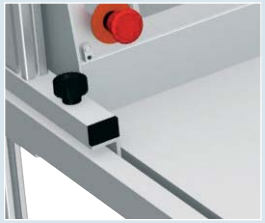
80 W soldering station with digital display

- 2 x RJ45 sockets

Experiment frame

With the experiment frame, the laboratory bench can be extended for the use of A4 training boards or for hanging up assembly boards.





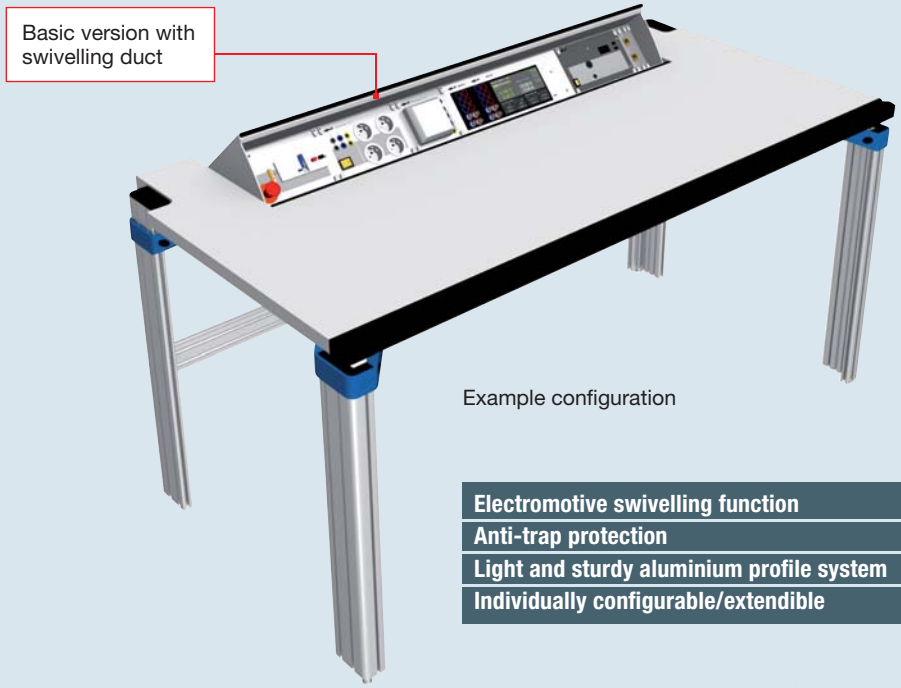
Professional guide unit for experiment frame

Work with the professional guide unit is even more flexible and ergonomic. The guide, which runs on a ball bearing, is very smooth running and can be locked at any desired position via knurled screws.

Article	Order-No.
elneos® laboratory bench with 19" top piece	95377
Addition of 2-row experiment frame 1600 mm	95379
Addition of prof. guide unit and 2-row experiment frame	95380

elneos® Laboratory Bench with Swivelling Duct

Do you want to approve trainees' or students' access to the mains voltage and built-in devices, or do you use the laboratories for lessons without experiments? Then simply make the devices disappear at the push of a button! No preparation, no need to tidy away devices, no additional storage space required.



Example configuration

The swivelling duct allows you to fully conceal the devices in the bench top and has a security function

Electromotive swivelling function
Anti-trap protection
Light and sturdy aluminium profile system
Individually configurable/extendible

The swivelling duct

The swivelling duct accommodates the electrical equipment from 3HU slide-in modules and, when retracted, conceals them fully in the bench top. The electromotive swivelling function can be actuated individually via a key switch underneath the bench top, but can also be networked via an integrated interface. A microprocessor-controlled drive swivels the aluminium duct quickly and smoothly into position. The security function offers reliable protection against trapping. With continuous monitoring of the power draw, any resistance during closing is noticed immediately and the duct is immediately moved back to the open position. A double sealing lip at the front of the swivelling duct prevents the built-in devices from getting dirty.

Built-in devices 3-phase safety and switching device

- Motor protection switch
- RCD switch
- Emergency stop mushroom button
- Can be looped into the room's emergency stop circuit
- Phase control lights

elneos® five - 7" multitouch capacitive control centre

- 2 x precision control power supply and measuring device
- Precision digital universal multimeter
- Power, energy and digital multimeter
- Dual-function generator, incl. modulation
- Additional connection field

Socket module

- 4 x Safety sockets
- Safety lab connectors

Three-phase current module

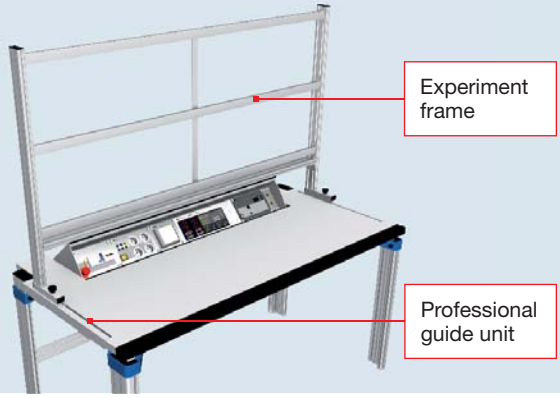
- CEE connector
- Safety lab connectors

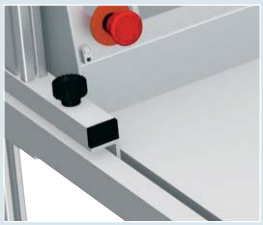
80 W soldering station with digital display

- 2 x RJ45 sockets

Experiment frame

With the experiment frame, the laboratory bench can be extended for the use of A4 training boards or for hanging up assembly boards.





Professional guide unit for experiment frame

Work with the professional guide unit is even more flexible and ergonomic. The guide, which runs on a ball bearing, is very smooth running and can be locked at any desired position via knurled screws.

Article	Order-No.
elneos® laboratory bench with swivelling duct	95378
Addition of 2-row experiment frame 1600 mm	95379
Addition of prof. guide unit and 2-row experiment frame	95380

elneos® Laboratory Bench with Two Expansion Profiles (Left/Right)

The drive technology in school-based training, but also in in-house training within a company, demands special requirements of a laboratory bench. Thus, with this laboratory bench, particular attention was paid to easy accessibility of the connections, through targeted positioning of the devices in the vertical expansion profiles. The bench top is thus kept clear for notebooks, documents, motors and other devices or additional equipment. In the double-row experiment frame, there is plenty of room for commercially available A4 training boards.

This basic version has the following built-in devices as standard:

Built-in devices
3-phase safety and switching device
- Motor protection switch
- RCD switch
- Emergency stop mushroom button
- Can be looped into the room's emergency stop circuit
- Phase control lights

Three-phase current module
- CEE connector
- Safety lab connectors

Double data socket RJ45

Fixed voltage source
- 24 V / 5 A

Socket module
- 3 x safety sockets

Supply module
- 2 x safety sockets
- Safety lab connectors

Article	Order-No.
elneos® laboratory bench with two expansion profiles (left/right)	**95373**

elneos® Laboratory Bench with Two Expansion Profiles (Left/Right) and a 19” Cockpit

This extended configuration meets even higher demands. Along with the advantages specified for the previous variant, this laboratory bench is also equipped with an additional cockpit. The aluminium duct contains, in addition to many other helpful devices, the elneos® five capacitive control centre, an indicator light and a workstation light.

Built-in devices
3-phase safety and switching device
- Motor protection switch
- RCD switch
- Emergency stop mushroom button
- Can be looped into the room's emergency stop circuit
- Phase control lights

elneos® five - 7" multitouch capacitive control centre
- Precision control power supply and measuring device
- Precision digital universal multimeter
- Dual-function generator incl. modulation
- Socket module
- 3 x Safety sockets

Three-phase current module
- CEE connector
- Safety lab connectors

Compressed air supply
Socket module
- 2 x Safety sockets

Supply module
- Safety lab connectors L1, N and PE

Fixed voltage source
- 24 V / 5 A

Double data socket RJ45
Compressed air supply, adjustable remotely controllable stabilized power supply
- 0-30 V / 0 – 2 A

Isolating transformer
- 230 V / 115 VA 50 Hz, floating

Sensor-controlled LED workstation lights
RGB-LED indicator light

Article	Order-No.
elneos® laboratory bench with two expansion profiles (left/right) and 19” cockpit	**95375**

Find suitable training board systems **on Page 152**

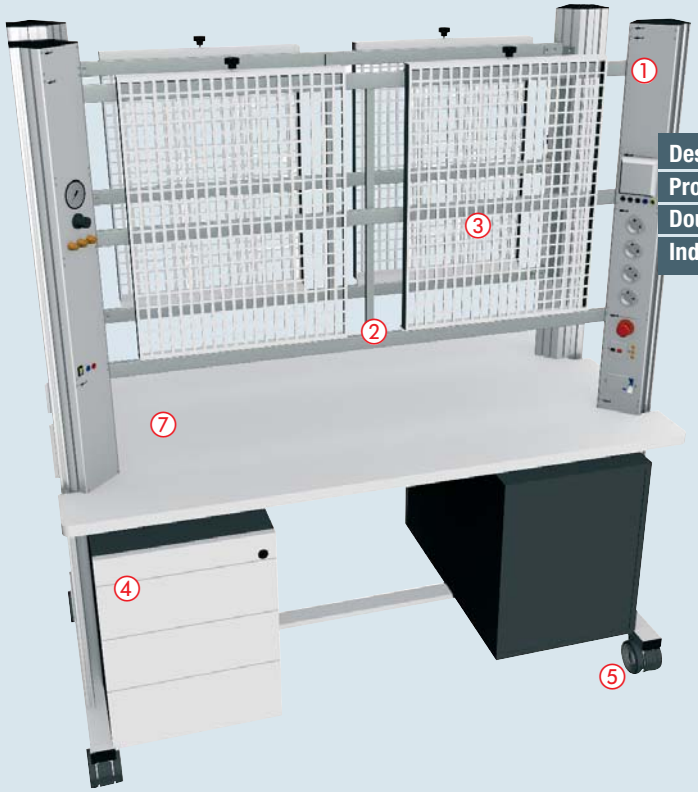
elneos® 2-FLEX Carrier System

The 2-FLEX carrier system from the elneos® connect series offers the maximum in mobility, the minimum in space requirements and the maximum in versatile usability.

In collaboration with Erfi, we have designed these electrical engineering carrier systems with the vocational and further training target group in mind. For this reason, we have based the elneos® connect series on the successful control technology concept which has already enjoyed great popularity for several years with the multifunctional training desk system from the varantec® series.

The slim dimensions 1200 (1600) x 850 x 1800 mm and mobile rollers make it possible to move the 2-FLEX carrier system through almost any door or in elevators.
Yet, depending on the task/application, 2 to 4 persons can be taught at one bench system (with the 1600 mm version).

The 2-FLEX carrier system has two screw-on containers, e.g. for tools, and a double-row experiment frame, to which A4 training boards or various perforated sheets can be attached.



Desk width 1200/1600 mm
Provides up to four workstations
Double-sided experiment frame
Individually configurable/extendible

① Devices are easily accessible in the vertical expansion profile 2
② 2-row experiment frame for training boards and other screw-on systems
③ Assembly boards to be attached to the experiment frame
④ Screw-on container
⑤ Lockable castors for mobile use
⑥ The reverse side is identical; two identical workstations for up to 4 persons
⑦ Continuous work top

Equipment:

Screw-on container
4x drawers

Work top share of 50% of the total area
2-row experiment frame
2x perforated screens
for hanging on and locking in the experiment frame

Vertical expansion profile 2 on left and right
with the following built-in devices

3-phase safety and switching device
- Motor protection switch
- RCD switch
- Emergency stop mushroom button
- Can be looped into the room's emergency stop circuit
- Phase control lights

Socket module
- 4 x Safety sockets
- Safety lab connectors

Three-phase current module
- CEE connector
- Safety lab connectors

Fixed voltage module
24 V / 5 A

Compressed air supply
adjustable

! Other add-ons, such as the addition of a cockpit with an elneos® five capacitive control centre, an indicator light or an LED workstation light are of course also easily possible.

Article	Order-No.
2-FLEX carrier system 1200	59733
2-FLEX carrier system 1600	59699

ABZ® and varantec® series workstation systems

In addition to the new elneos® connect workstation system, we also continue to offer the ABZ® and varantec® series from erfi. These have been a fixed part of technical training labs in many schools and training centres for many years and also offer high flexibility in terms of equipment and configuration.

In addition to laboratory benches for electrical engineering, we also offer other furniture systems for your workspace/workshop requirements, such as workbenches for metal training or storage and cabinet systems.

Please contact us to discuss your requirements.

ABZ® Series Laboratory Benches

The ABZ® aluminium system profile ensures high functionality in terms of connection and cable management. 19" device cockpits, storage shelves and other system components can be adapted flexibly and grooves enable infinitely variable height adjustment. There are also additional wiring ducts for extra cables, which can be adapted directly to the system profile, according to requirements.

ABZ® Didactic

This model series was developed for vocational schools, technical colleges, universities, chambers of trade, professional colleges, for all technical training centres and training organisations in the industrial technology area.

Learning islands with polygonal add-ons, electromotively controlled lowerable benches and swivelling benches for multifunctional lessons, as well as modern built-in monitors leave nothing to be desired during configuration planning.

varantec® Series Laboratory Benches

Equipped with the varantec® bench series, the Hansgrohe Talentschmiede

varantec® from erfi – the workstation range with no need for compromise

The wide range of powerful varantec® system components consistently appeal to all areas of training centres and companies for electrical engineering professions.

The varantec® furniture system is available as a 4-feet version (varantec® 4) or as a C-foot version (varantec® C). Both model series are offered either as efficient linking systems (varantec® 4 link and varantec® C link) or as standalone systems (varantec® 4 classic and varantec® C classic). They can also be combined with ABZ®, thus creating an efficient solution.

The varantec® bench series is the predecessor to the new elneos® connect brand. The systems differ in particular in the design and the aluminium profiles used.

Built-in devices for your laboratory benches

To fit the elneos®, ABZ® and varantec® bench systems

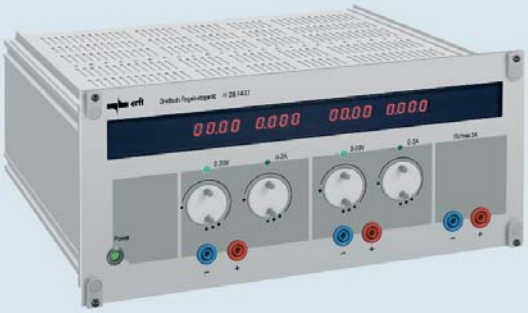
With three extensive device systems, erfi-instruments today offers modern and efficient devices on the market for electronics laboratory equipment and test systems for electrical safety and function. In this extensive range of devices, you can always find the right solution for your use case.

acto® Devices System

acto® - The new powerful insert system

The compact basic system impresses with its low height (113 mm) and narrow depth. The system is equally well suited to laboratory, assembly and training devices. The device widths conform to 19" slide-in module technology.
(7 DU grid, 1 DU=5.08 mm). The system can be combined with the 19" device systems for high packing densities.

highlab® Device System



highlab® - 19" device system with outstanding design and extraordinarily good functionality

The professional 19" highlab® device system is characterised, in particular, by its very high-quality design and extraordinarily good operating concept. Multiple design awards have been awarded to this system.

Sandwich design:

The front of the device is executed in a sandwich design. All operating and display elements are mounted on a solid assembly board. A superimposed graphic front panel guarantees flush installation. The sandwich design has enabled the modern operating elements to be designed in such a way that no caps or other elements can be removed or damaged. This is a particular advantage in the training area (protection against vandalism).

Graphical user interface:

The graphic panel is produced using the "SEO photo process", in which the labelling is embedded absolutely permanently beneath the anodized layer. Additional grid areas ensure an unequalled high-quality and well-structured device front.

basic® Device System

basic® - 19" device system – The basic design alternative also follows the principle of 19" slide-in module technology. Every highlab® device is also available in the basic® design line. basic® differs from highlab® in terms of the device front panel design and the operating elements. The switching technology is identical. The system is characterised in particular by its mechanically high-quality, smooth surface. The smooth surface ensures that dirt is repelled effectively. Due to a special two-layer paintwork coating, the front panel surfaces and the multi-component pressure are particularly resistant to impacts, scratches and chemical stresses. The surface quality achieved is far superior to that of any silk-screen printing process.

Highlink® – Software for convenient remote control of complete laboratories

The innovative software architecture of highlink® Power combines all functions under one roof, unlike any other instrument.
It enables elegant and convenient control of all laboratory functions at a glance. In addition to all erfi device functions, the statuses of electronics laboratory rooms can be controlled and queried.

Visualisation of the laboratory rooms

Thanks to the efficient and powerful software package, your laboratory rooms can be visualised in a very short period of time. This allows you to see all statuses of the laboratory at a glance. The erfi spatial planning manager enables free room selection in more extensive premises. If desired, this package even allows access to rooms in other buildings.

Device visualisation

Thanks to its modern software architecture, highlink® Power guarantees the homogeneous integration of all erfi devices and established third-party products, incl. those of the erfi-Didactic world. Of course, all established teaching material products can also be implemented in the concept without increased effort. The package presents the user with all devices with a true-to-the-original front incl. all operating elements. The advantages are obvious. For the user, it is irrelevant if the device is operated directly or via the software. There are no lengthy training times.

Activation/control of individual function and device groups

Modern laboratory benches not only have the usual 230 V and 400 V power supply, but also modern DC power supplies (low voltages) and measuring devices with intelligent functions. These individual device or function groups can be controlled elegantly. The upwards and downwards movement of the lowerable and swivelling benches can also be controlled conveniently at the push of a button from the teacher's station. At the same time, the statuses of the individual laboratory benches can be displayed. You can begin as soon as the software is launched. Highlink® Power also enables communication with the respective device, thus preventing delays. Here too, you can benefit from our many years of experience in the field of software development.

The planning manager for lessons and examinations (optimal time management)

Get started immediately without wasting any of your teaching time! The complete package enables perfect time management in your lessons. During lesson planning, the individual device parameters can be preconfigured for each pupil workstation and pupil, and linked with a clear annual schedule. When the set time is reached, all stations integrated in the plan are automatically set to the desired configuration. For example, lowerable tables can move automatically into the desired position, and the power supplies can be configured to the corresponding maximum currents for the experiment.

Highlights:

- Web-based software
- Illustration of the actual room layout
- Immediate status recording of all laboratory benches
- Individual actuation of the individual workstations from the trainer's bench
- State-of-the-art network technology (LAN, WLAN, etc.)
- Control/release of individual function groups
  - General release
  - 50 V
  - 230 V / 400 V
  - Lowerable/swivelling tables
- Visualisation of all statuses:
  - Emergency stop function
  - Position of the lowerable/swivelling tables
  - Approval issued/not issued
  - 50 V / 230 V / 400 V release
- Bench grouping
- Remote control of all device groups and functions
- Photo-realistic device display
- Detect faults and avoid operating errors (Fault manager)
- Optimal lesson planning through chronologically controlled parametrisation of all functions (immediate lesson start and thus optimal utilisation of the lesson times)
- Increased learning quality
- Any desired number of experiments and parametrisations can be saved for each student workstation and called up at any time (laboratory workstation configuration)
- Professional measured data logging with integrated report generator
- Student-oriented evaluation option for individual experiments
- Measured data can also be displayed in HTML format
- Recording and playback function for measured curves
- Simulation of expected measured curves (target/actual)
- Password management for individual access rights
- Restriction of the configuration areas for individual workstations
- Visualisation and transfer of individual screen contents to any desired number of workstations
- Outstanding didactic features
- erfi laboratory manager

In more extensive premises, individual room plans can be selected and remotely controlled through networking. All the functions necessary for the respective laboratory room can be configured from the teacher's room.

- Integral concept as a result of elegant integration of erfi teaching materials systems from the erfi Didactic range:
  - Automation technology with Logo! and S7
  - Buildings automation
  - and much more.

Exclusively for training – The new elneos® five electronic devices system

elneos® five

As a manufacturer and market-founder of technical workstation systems for the specialist area of electrical engineering and electronics, erfi began developing furniture systems at the end of the 50s. The new elneos® connect furniture series has won design awards and its technical safety has been GS-certified.

Up to seven devices can be built into the elneos® five control centre and eight further plug-in modules can be docked, each with a maximum of four devices, on the left and right. Thus, up to 32 devices can be controlled at the same time.

Size: 3 HU / 56 DU
Capacity to hold: Up to seven different devices
Phys. control capacity: Up to max. 32 devices

The continuous glass front of the elneos® five is fully equipped with capacitive technology. Ultra-stable, scratch-proof and protected against vandalism.

Wipe, tap and... The 7" multitouch capacitive display

The 7" multitouch display of the elneos® five is operated using gestures with up to five fingers and enables extreme operating comfort.

1 finger: Change device, wipe and tap
2 fingers: Zoom in on X-Y graphs / operate icon device bar / scroll through tables
3 fingers: Display all devices at a glance
4 fingers: Activate Safe-Guard function
5 fingers: Activate lock function

A multitouch display for the 19" device range is used in an innovative way here. This is possible due to Projective Capacitive Touch Technology (PCT). The display's touch sensors are therefore extremely mechanically stable and have first-class properties. The display is positioned behind the thermally hardened and scratch-proof glass front, which runs over the entire front. Thus, in contrast to a resistively controlled touch display, the display itself is not touched, but only the external glass sensor. The visionary capacitive technology, together with the device combinations and modularity of the elneos® five, are outstanding in the field of measuring technology.

Display layout and operating surfaces

1. Layout:

The monitor is split into three areas, a lighter primary area and two darker secondary areas. The primary area provides active access to the device. By wiping your finger across the screen or tapping quickly on information in the secondary area, you can switch a secondary screen into the primary area.

2. Device name:

The device names of the three currently displayed devices are located in the top left corner in each case.

3. Measured values:

Each device display has a defined area for illustration of the measured values.

4. Selection areas:

Up to eight areas can be used for selection of device-specific setting options.

5. Colour indication:

Each device group is indicated by a coloured bar next to the device name. Control power supplies, digital multimeters, power and energy meters, function generators and arbitrary generators are all distinguished by colours.

Modular 19" additional slide-in modules

If, for physical reasons, not all planned devices fit in the control centre, additional 19" slide-in modules can be used and positioned directly to the left or right of the control centre. The control centre is the master and the slaves follow the master's commands. The command and measurement data is exchanged in real-time via the e-Bus. The 19" additional slide-in modules have connection sockets on the front panel and are operated via the control centre.

Extendibility

elneos® five is extendible and individually adaptable to your requirements. The elneos® five control centre and the 19" additional slide-in modules can be integrated both in the existing erfi laboratory bench series, and in the new elneos® connect bench series, as modular extensions.

Size: 19" additional slide-in modules, 3HU
Width, depending on version: 14, 28, 42, 56, 70, 84 DU

Intelligent connection field

The elneos® five connection field, with its colour-coded RGB ring lighting, features a disappearing effect. When the rings are not lit up, they disappear and are invisible. The RGB ring lighting guides the user to the correct connection and incorrect connections are avoided. The statuses are also signalled with different colours.

Integrated web server (optional)

elneos® five has a modern web server for remote control of all devices via a web browser.

Remote control, interfaces and software

The device functions can all be remotely controlled via the SCPI standard (Standard Commands for Programmable Instruments). The erfi highlink® power software and the LabVIEW device drivers visualise the incoming data.

Measured value memory

elneos® five has an internal device memory for up to 2000 measured values. An additionally integrated time stamp ensures professional recording of measured values.

Plug and Play function

All devices have an intelligent Plug and Play function and can independently detect additionally connected devices. Time-consuming installation is thus a thing of the past.

Graphical measured value display

The saved measured values and the current measured values can be displayed quickly in XY graphs on the large 7" multitouch display.

Features for training institutions

- Vandal-proof device front offers all-round security for use in teaching
- Indestructible and capacitive operating sensors (PCT)
- Safe-Guard function prevents dangerous situations in the vicinity of the student
- Glass front can only be removed with special expertise
- Remote control enables configuration for exercises and tests
- Any values worked out are not lost even after breaks - device memory for up to 2000 measured values
- Graphical measured value display and scale clarifies the results
- Ring socket lighting prevents incorrect connections
- Eight digital I/Os as PLC replacement for exercises in automation technology
- Password protection controls device access

Easy to service

elneos® five, with its modular design, offers extreme ease of service. In the event of incidents, the board concerned can be replaced immediately. This means functionality can be restored in a very short amount of time. Time-consuming shipping of devices and long repair waiting times are now a thing of the past.

reddot design award winner 2013

German Design Award WINNER 2014

product design award 2014

elneos® five – Precision Control Power Supply with Universal Measuring Device

Special features

There are many different control power supplies, which come in a range of different voltages and currents. elneos® five thus offers variable direct voltage power supplies including an ultra-precise universal measuring device.

The main innovation is the newly developed control board, with its outstanding dynamics. Powerful arbitrary signals up to the kHz range are new to this class of device. This control board is equipped with corresponding heat sinks and power transistors and, depending on the model, has different add-ons. Each device also has a different strength of transformer.

In addition to this improvement, the device is also significantly smaller thanks to the SMD technology. This technology, with multi-level electronic pre-control, enables the installation of power packs with a size of up to approx. 600 W. Power packs can also be integrated in compact housings.

Another new feature of the elneos® five, in addition to the extra functions, is the technical control data with a measurement precision of 16 Bit resolution, control times of just a few microseconds and control deviations in the micro-ampere range. The extraordinarily good control dynamics open up new possibilities in the generation of fast arbitrary signals.

Technical data:

- Setting tolerance: 14 Bit D/A converter (1 mV, 1 mA)
- Measurement precision: 16 Bit A/D converter (1 mV, 1 mA)
- Voltage range: 0-100 V (depending on model)
- Current range: 0-50 A (depending on model)
- Standard deviation 1: Voltage: 300 µV/A, current: 150 µA/V (with load change 0-100%)
- Standard deviation 2: Voltage and current: <0.01% (with network change 10%)
- Coefficient of temperature: Voltage: 0.002%/K, current: 0.008%/K
- Stepped pre-control: New software-based winding reversal with minimal heat development
- Residual ripple: Voltage: 100 µVeff, current: 200 µAeff
- Setting time: 12 µs load jump 0-100%

elneos® five – Graphical Power Arbitrary Generator

Special features

elneos® five has a powerful arbitrary generator, which combines the advantages of a precision control power supply with the advantages of a function generator. With the power arbitrary generator, any desired curve shapes and standard signal forms can be mapped, such as sine, rectangular, triangular, saw tooth. The arbitrary generator also has the same technical data and functions as the control power supply. It is a precision control power supply with universal measuring device and additional integrated arbitrary generator. Here, the elneos® five plays out its advantages in the dynamic area to the full. Arbitrary signals with high power of up to 1 kHz are now possible.

Outstanding technical characteristic of the graphical power arbitrary generator

Sequencer function

With a modern sequencer, convenient, free signal programming is possible. One hundred segments can be transferred into the internal memory via an interface. Every segment has a wave form, a duration and an amplitude. Every wave form has its own frequency. The device processes the segments directly from the internal memory and thus provides the functions of an arbitrary generator with higher electrical output power. With the sequencer, it is possible to cascade signal forms consecutively using different frequencies. The signals can therefore be sequenced and all signal forms can be mapped. The outstanding dynamics of the new measuring board enable reproduction of almost all signal forms.

Vehicle on-board supply voltage pulses can now be simulated in the lab easily. The sequencer is ideal as a highly efficient and useful tool for training and industry alike.

Technical data:

- Saved standard signal forms:
  Sine,
  Rectangular
  Triangular
- Duty cycle: Variable
- Frequency: Sine up to 1 kHz, rectangular up to 250 Hz
- Sequencer: Enables consecutive cascading of different signal forms with different frequencies. This means almost all signal forms can be represented.
- Segments: 100 units transferable to device.
  Per segment: Wave form, time, amplitude, frequency of the wave form

elneos© five – Precision Digital Multimeter and Universal Test Instrument

Exact – Outstanding measuring accuracy

By using innovative TRMS converter modules with significantly improved linearity and bandwidth, it is possible to achieve outstanding measuring accuracy with a very good crest factor of 5. The new digital multimeter thus makes it possible to record non-sinusoidal signals with an as yet unparalleled level of precision. Voltage measurements with an accuracy of ±0.08% and a resolution of 1 µV meet the elneos® five's claim of maximum precision. A fast 24-bit converter guarantees the outstanding resolution.

Strong – High currents and voltages

elneos® five enables recording of currents up to 40 A and voltages up to 1000 V.

Versatile – Additional functions

Thanks to intelligent additional functions, such as capacity and inducitvity measurements, RLC meters can be replaced. An integrated diode test, as well as temperature and frequency measurements, make the elneos® five multimeters real all-rounders.

Indispensable – Save measured values securely

The integrated data logger saves up to 2000 measured values and records all measurement results with a time stamp. The results can be called up at any time, displayed in a X-Y graph and can be read out via the interface.

Amazing – Graphical measured value display

The digital multimeter enables graphical display of the current and saved measured values by means of modern X-Y graphs.

Reliable – Capture limits and respond correctly

When limit values are exceeded, a digital output can be set. An external circuit can respond to hazardous situations, where necessary

Technical features:

- DC voltage measurement: Up to 1000 V; 1 µV; ± 0.08% + 10 dgt.
- AC voltage measurement: Up to 750 V (peak 1060 V); 1 µV; ± 0.5% + 10 dgt.
- DC current measurement: Up to 32 A continuous current (up to 40 A for brief periods), 100 nA; ± 0.2% + 10 dgt.
- AC current measurement: Up to 32 A continuous current (up to 40 A for brief periods), 100 nA; ± 0.8% + 10 dgt.
- Resistance measurement: Up to 40 MΩ, 1 mΩ; ± 0.8% + 5 dgt.
- Capacity measurement: Up to 400 nF/4/40/400/4000 µF; 1 pF; ± 2.0% + 10 dgt
- Inductivity measurement: 400 mH; 10 µH; ± 1.0% + 10 dgt.
- Temperature measurement: -200 to +600°C, 0.1°C; ± 3.0% + 2°C (Pt -100 sensor with 100 Ohm nominal resistance at 20°C)
- Frequency measurement: Up to 100 kHz,1 Hz; ± 0.1% + 5 dgt; high resolution: Low measuring speed
- True-RMS function: True effective value measurement
- Crest factor: 5 for non-sinusoidal signals, innovative TRMS converter with significantly improved linearity and bandwidth.
- Diode test
- Continuity test
- Thresholds: Programmable limits for all measured values
- Digital output: A digital output is triggered when the measured values are exceeded or undershot
- Digital input: Start of measurement through trigger pulse from the input (flank control)
- Data logger: Storage of 2000 measured values with time stamp Values graphically retrievable (X-Y graph/table) or can be read
- out via interface
- Measured value illustration: X-Y graph can be called up and scaled through 2-finger gesture, ideal for fast recording of changes (long-term measurements)

elneos© five – 1-Phase Performance and Energy Measuring Device

Special features

elneos® five also offers outstanding performance data in the field of power measurement. The modern measuring device enables the recording of high electrical power and energy measured values with extraordinary precision. Power is recorded via the lab sockets on the front of the digital multimeter. This means no additional connections are required. The device's new integrated measurement technology ensures an extremely wide bandwidth.

Exact – Outstanding measuring accuracy

By using the latest measuring technology, a very high level of precision has been achieved. The power and energy measurement can be determined very quickly and accurately.

Strong – Extraordinarily high power

elneos® five enables you to record high power and energy for 1-phase consumers up to 24 kW.

Compact – Without loss of space

The power measurement device is integrated directly behind the lab sockets, in a space-saving design, and does not require any additional slots on the internal back panel. This means even more additional devices can be integrated in the smallest of spaces.

Indispensable – Save measured values securely

The integrated data logger saves up to 2000 measured values and documents all measurement results with a time stamp. The results can be retrieved at any time and can be viewed graphically in an X-Y graph. Of course, the measured values can also be read out via the interface

Amazing – Graphical measured value display

Special emphasis was placed on the illustration of the measured values. The power measuring device enables graphical illustration of the current and saved measured values via X-Y diagrams and thus ensures fast and reliable recording of each measurement.
Reliable – Capture limits and respond correctly When limit values are exceeded, a digital output can be set. An external circuit can respond to hazardous situations, where necessary, and deactivate the corresponding peripheral device.

Technical features:

- Active power: - 24 kW to + 24 kW at 750 VAC
  -7.5 kW to + 7.5 kW at 230 VAC, (9.2 kW for a brief period)
  Accuracy: ± 0.2% + 10 dgt
- Apparent power: 0 to 24 kVA at 750 VAC
  -7.5 kVA to + 7.5 kVA at 230 VAC, (9.2 kVA for a brief period)
  Accuracy: ± 0.4% + 10 dgt
- Reactive power: - 24 kvar to + 24 kvar at 750 VAC
  -7.5 kvar to + 7.5 kvar at 230 VAC, (9.2 kvar for a brief period)
  Accuracy: ± 0.2% +10 dgt
- Active energy: - 24 kWh to + 24 kWh at 750 VAC
  -7.5 kWh to + 7.5 kWh at 230 VAC, (9.2 kWh for a brief period)
  Accuracy: ± 0.2% + 10 dgt
- Apparent energy: 0 to 24 kVAh at 750 VAC
  0 to 7.5 kVAh at 230 kVAC, (9.2 kVAh for a brief period)
  Accuracy: ± 0.4% +10 dgt
- Reactive energy: - 24 kvarh to + 24 kvarh at 750 VAC
  - 7.5 kvarh to + 7.5 kvarh at 230 VAC, (9.2 kvarh for a brief period) Accuracy: ± 0.2% + 10 dgt
- Power factor: Cos phi from -1 to +1
- Max. current (AC/DC): 32 A, 40 A for a brief period
- Max. voltage (AC): 750 V
- Max. voltage (DC): 1000 V

elneos® five – 2 Function Generators in One, Including Meter

Special features

This modern device contains two function generators and uses the operating principle of direct digital synthesis (DDS) with the associated advantages of stable frequency and low distortion signal generation. The maximum output frequency of up to 40 MHz for both generators and the amplitude level of 30 Vss at 50 Ohm are excellent.
In combination with an adjustable duty cycle of 0.1 to 99.9%, elneos® five is equipped for all tasks. Many useful functions, such as the sweep function, an external and internal trigger for defined start conditions, programmable single and multiple pulses, and much more, make the new function generator a real all-rounder.
A meter input of up to 150 MHz guarantees that fast signals can be recorded, and all device statuses can be read out at any time.

Freely programmable modulation by means of two fully integrated function generators

elneos® five offers a special functionality in terms of modulation. The carrier signals and the useful signals (modulation signals) can be parametrised completely independently of one another thanks to the two function generators.
The modulated signal is delivered at the output. A second separate external source or a second function generator is therefore no longer required. The benefit in training and industry is extremely high, since it is possible to produce as many modulations as desired very quickly and without additional external hardware. The carrier signal and the useful signal can be generated conveniently in the device in accordance with the respective expectations. The result of the modulation is immediately visible and the parameters of the signals can be adapted very quickly, in order to achieve the desired result. All parameters of the carrier signals and the useful signals (modulation signal) such as signal shape (sine, rectangular, triangular, etc.), amplitude, frequency, duty cycle, are saved separately and issued in modulated form at the output. The depth of the modulation can be adjusted from 0-100%. With its freely programmable modulation, elneos® five is a productive tool for training and industry with an immediate positive effect in practice.
The device controls frequency modulation (FM), amplitude modulation (AM), pulse width modulation (PWM), burst and the sweep function (special type of frequency modulation) for both function generators.

Specifications: Function generator and meter

- Frequency sources
  Two independently programmable function generators;
  The technical data applies to both function generators.
- Frequency properties
  Sine: 1 µHz to 40 MHz
  Rectangular: 1 µHz to 5 MHz
  Triangular: 1 µHz to 5 MHz
  Saw tooth: 1 µHz to 5 MHz
  Trapezoidal: 1 µHz to 5 MHz
  Ramp: 1 µHz to 5 MHz
- Amplitude
  Amplitude resolution for all signal forms: 14 Bit (16,384) Output amplitude: 30 Vss at 50 Ω from 0 to 20 MHz, 1.8 mV resolution output amplitude: 20 Vss at 50 Ω from 0 to 40 MHz, 1.8 mV resolution
- Pulses
  Single pulse: 200 ns to 999 s / multiple pulse: 200 ns to 999 s
  Burst mode programmable as desired with parameters:
  Pulse and pause times: 200 ns to 999 s
  Number of repetitions: 1 to ∞
- Trigger pulses
  External via BNC socket
  Internal via menu for defined signal start
- Outputs
  BNC lab sockets with innovative ring lighting incl. disappearing effect
- Output: Up to 30 Vss at 50 Ω
- Output: 5 V TTL-compatible
- Inputs
  BNC lab sockets with innovative ring lighting incl. disappearing effect
- Input: Meter input for external input signals up to 150 MHz
- Input: Trigger input for defined signal start, input sensitivity: 100 mVeff

elneos® five – Fast Signal Arbitrary Generator

Special features

This device provides current arbitrary technology and, at the same time, offers all of the functions of the function generator with meter.

Display and control

Due to the additional arbitrary function, any desired curve shapes can be created alongside the standard signal forms. For generation of fast, arbitrary signals, there are 524,288 scanning points (512 kWords =1024 kByte) with a resolution of 14 Bit. This means outstanding reproduction of natural and complex signals is possible. Two signal forms can be saved in the device and retrieved. By means of the modern highlink® power remote control software, any desired curve shapes can be generated on the PC in graphical or tabular form and transferred to the device. With the highlink® power software, even complex signals from the vehicle on-board power supply or from the messaging technology can be reproduced easily, conveniently and quickly. highlink® power also makes it possible to read in a signal recorded with the oscilloscope and to convert this so that the support points acquired from it can be transferred directly to elneos® five. In this way, measured signal forms can be reproduced very quickly in the device. The above-mentioned freely programmable modulation offers an even greater degree of freedom in combination with the additional arbitrary function.

Arbitrary functions

Any desired signal shapes can be transferred to the internal memory via remote control. Signal shapes recorded with an oscilloscope can be transferred to the highlink® power software and, from there, sent directly to the arbitrary generator after conversion.

Freely programmable modulation

By using the arbitrary function as a useful signal and the freely programmable carrier signal, additional levels of freedom can be achieved. With this solution, all signal forms can be modulated and the carrier signal can be modulated with the arbitrary signal, for example. All modulation types and properties correspond to those of the above-mentioned function generator. In the vehicle on-board power supply and other electronics branches, this functionality guarantees reproduction of the desired signal form.

Outstanding performance potential

When this fast arbitrary function generator is combined with the power arbitrary generator for high electrical output signals of the control power supplies, you can carry out all feasible simulations, experiments and measurements of the power electronics and fast signal electronics with one single device.
If the powerful digital multimeter with power meter is selected too, then a complete measuring station can be replaced with one single measuring device. All these functionalities are key modules for training and industry

Specifications: Arbitrary generator

- Two function generators
  All technical parameters as per previous function generator incl. meter;
- Frequency sources
  Two independently programmable function generators;
  Storage level: 524,288 scanning points (512 kWords) /
  Storage slots: 2 units for 2 curves
- Frequency properties
  Sine: 1 µHz to 40 MHz,
  All other shapes: 1 µHz to 5 MHz (arbitrary signals)
  Rectangular: 1 µHz to 5 MHz
  Saw tooth: 1 µHz to 5 MHz
  Triangular: 1 µHz to 5 MHz
  Trapezoidal: 1 µHz to 5 MHz
  Ramp: 1 µHz to 5 MHz
- Amplitude
  Amplitude resolution for all signal forms: 14 Bit (16,384)
  Output amplitude: 30 Vss at 50 Ω from 0 to 20 MHz,
  1.8 mV resolution
  Output amplitude: 20 Vss at 50 Ω from 0 to 40 MHz,
  1.8 mV resolution
- Pulse
  Single pulse: 200 ns to 999 s / multiple pulse: 200 ns to 999 s
  Burst mode programmable as desired with parameters:
  Pulse and pause times: 200 ns to 999 s
  Number of repetitions: 1 to ∞
- Trigger pulses
  External via BNC socket / internal via menu for defined signal start
- Outputs
  BNC lab sockets with innovative ring lighting incl. disappearing effect
  Output: Up to 30 Vss at 50 Ω
  Output: 5 V TTL-compatible
- Inputs
  BNC lab sockets with innovative ring lighting incl. disappearing effect
  Input: Meter input for external input signals up to 150 MHz
  Input: Trigger input for defined signal start
  Input sensitivity: 100 mVeff
  Duty cycle: 0.1 to 99.9%
- Frequency meter
  Measuring scope: 1 µHz to 150 MHz
  Input voltage: 100 mVeff to 5 Veff

elneos® five – As Standalone Devices and Extensions (Slave)

The elneos® five series devices are also available as standalone devices in a handy aluminium bench-top enclosure. When released from the laboratory bench, the elneos® five becomes a real all-rounder, which can support you with any task.

But you don't have to lower your expectations, for you can draw on the full range of services of the available devices and extensions (slaves).

Extendibility

elneos® five is extendible and individually adaptable to your requirements. If the planned devices cannot all be integrated in the control centre, additional 19" slide-in modules can be positioned next to the control centre by means of an e-Bus. These slide-in modules are also known as slaves and communicate with the control centre via the internal e-Bus.
Eight physical 19" additional slide-in modules can be connected to the e-Bus. Each slide-in module in turn can hold four devices of your choice (power pack, digital multimeter, function generator, etc.) and thus up to 32 devices can be managed for each control centre.

Equipment for the slaves

The control centre is the master, which controls the additional slide-in modules, the slaves, and these in turn follow the commands of the master. The exchange of commands and measuring data is regulated via the internal e-Bus. The slaves have the necessary connection sockets on the front panel and do not require a separate control unit. They have ring lighting with a disappearing effect in all variants.

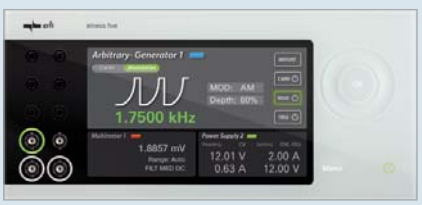
Slave 14TE

Power and energy measuring unit, 1-phase

Precision control power supply with rectangle generator

Two function generators in one, incl. meter

Graphical power arbitrary generator



Fast signal arbitrary generator

Precision digital multimeter and universal testing instrument

Standalone Device – Supply Device (Power Source) 1-Phase

With this bench-top device, you can guarantee sufficient safety at any location during live work. Whether in an experimental configuration or a practice/exam set-up, the feed-in unit with safety and switching device in a handy bench-top enclosure is an absolute must in vocational training.

The 1-phase feed-in unit in bench-top enclosure offers a flexible solution for your experiments.
The feed-in unit as a bench-mounted device has a mains connection (1-phase safety socket) to supply the device with power. The set-ups (examination, project work, teaching system) can now be plugged in accordingly via the sockets and/or safety laboratory sockets on the front of the device.

The device has an emergency off switch, an universal current RCD type B and a motor protection switch. In addition, a phase control light indicates whether the connected experiment is live. Thus, the protection meets the requirements for laboratory use.

Scope of delivery:

Aluminium bench-top enclosure and energy duct
1-phase safety and switching device

- Motor protection switch
- RCD switch
- Emergency stop mushroom button
- Phase control lights

Socket module

- with 4 safety sockets 230 V /16 A
- 2x 3 safety laboratory sockets

Article	Order-No.
Feed-in unit, 1-phase	59687

Standalone Device – Supply Device (Power Source), 3-Phase

Safety is the first commandment when it comes to using electricity and, in particular, 400 V. Therefore, the maximum in accident prevention measures must be taken here.

The 3-phase feed-in unit in the bench-top enclosure offers a flexible solution to safeguard your experiments according to requirements.
The feed-in unit as a bench-mounted device has a mains connection (3-phase CEE connector) for the power supply. The set-ups (examination, project work, teaching system) can now be plugged in accordingly via the sockets and/or safety laboratory sockets on the front of the device.

The device has an emergency off switch, an universal current RCD type B and a motor protection switch. In addition, the phase control lights indicate whether the connected experiment is live. Thus, the protection meets the requirements for laboratory use.

Scope of delivery:

Aluminium bench-top enclosure and energy duct
3-phase safety and switching device

- Motor protection switch
- RCD switch
- Emergency stop mushroom button
- Phase control lights

Socket module

- with 4 safety sockets 230 V /16 A
- 2x 3 safety laboratory sockets

Three-phase current module

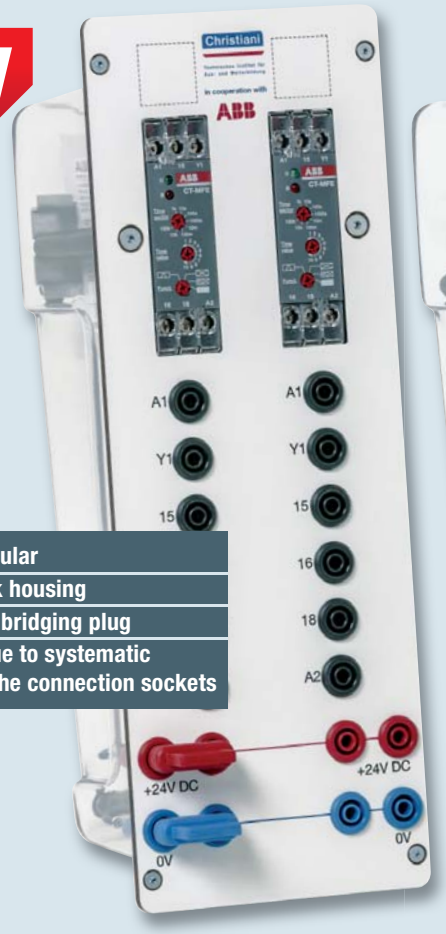
- 1x CEE socket 400 V / 230 V max. 16 A per phase
- 1x 5 safety laboratory sockets

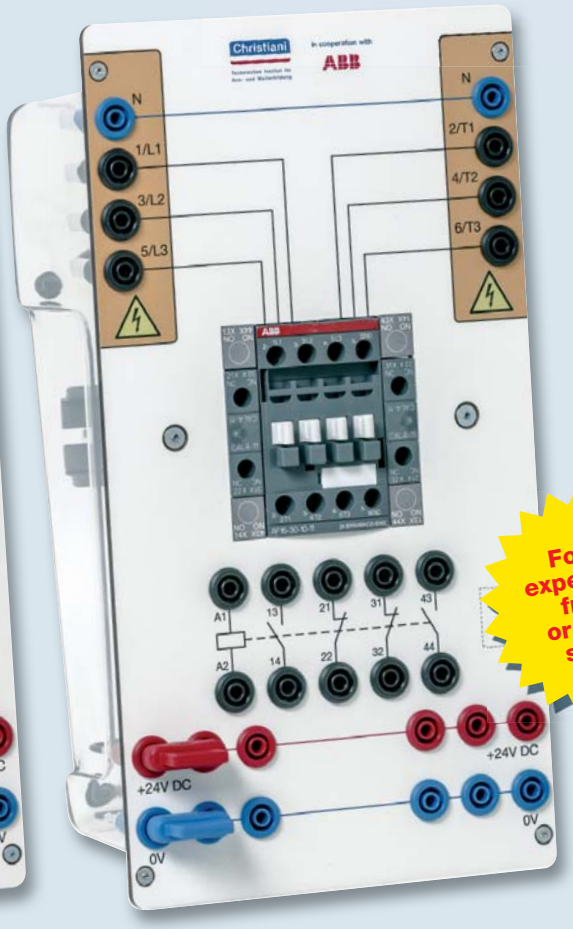
Article	Order-No.
Feed-in unit, 3-phase	59688

NEW: Modular training board system for drive engineering

With the new training on-board system, you can teach your trainees about the exciting topic of drive engineering using practical experiments. Safety, transparency and fast set-up – these are the plus points of Christiani training boards for drive engineering

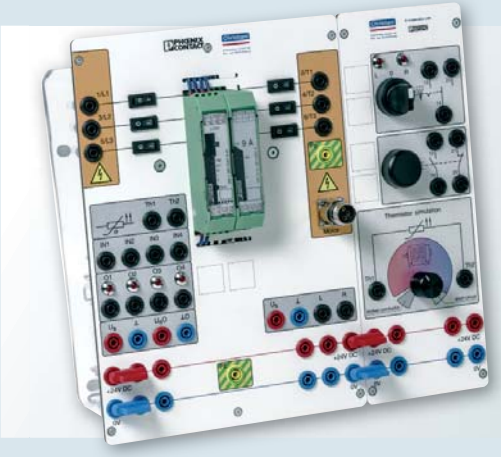
NEW





- Flexible and modular
- Transparent desk housing
- Clarity thanks to bridging plug
- Greater safety due to systematic arrangement of the connection sockets

For A4 experiment frame or bench set-up



With modular training board systems, you can teach your trainees/pupils all about the motor through extensive experiments in a laboratory environment.

Suitable for:

All professions in the field of electronics and mechatronics.
Especially for the specialist areas of automation or operating technology as well as machines or drive technology.

By using the minimum number of components per training board, the maximum in modularity has been achieved. This provides greater flexibility and clarity during work as well as a space-saving effect due to the uncompromisingly narrow A4 panels (½-A4, ¾-A4, A4).

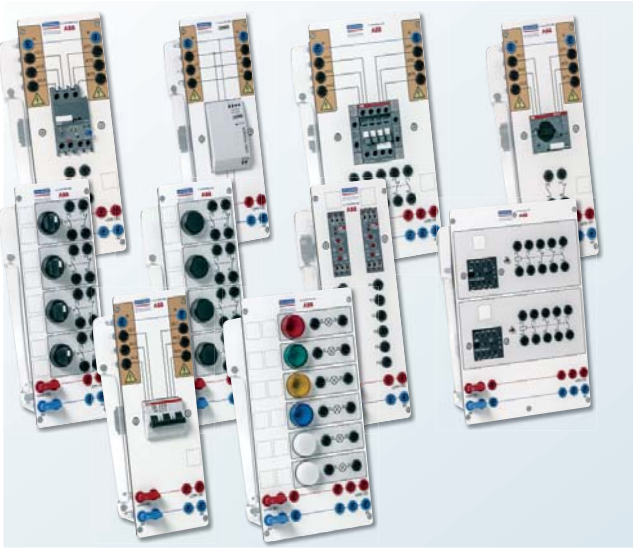
Section: hardwired control

Conventional control of three-phase motors – Principles of electromechanics

Automated systems are a fixed part of our industry. With this modular teaching system you can teach the basics of drive technology and hardwired control units.
This includes:

- Direct activation of three-phase motors
- Star-Delta connection of three-phase motors
- Pole changing of three-phase motors
- Dahlander circuits
- Operation in different speeds as well as in forwards/reverse mode

Training Board Set: Electrical Machines – Section: Hardwired Control (Hardwired Control Units)

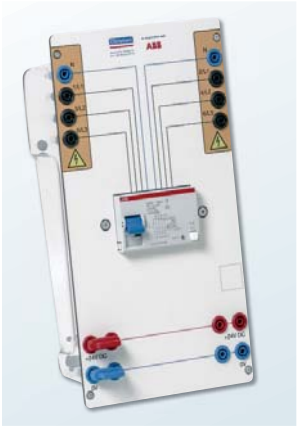


Training boards for teaching the basics, to enable configuration and testing of experimental set-ups for most of the above-mentioned circuits in a laboratory environment.

1x training board with 24 V / 4.2 A power supply
4x training board protectors with auxiliary contacts
2x training board electronic overload relays
1x training board with 2 multifunction time relays
1x training board stren triangle time relay
2x training board motor protection switch
1x training board 4 rotary switches
1x training board 4 push-buttons
1x training board signal lamp
1x training board circuit breaker
1x training board auxiliary contactor

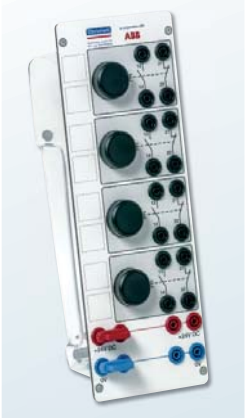
Order-No.
98199

To Complement the Training Board Set 98199 we offer you the following



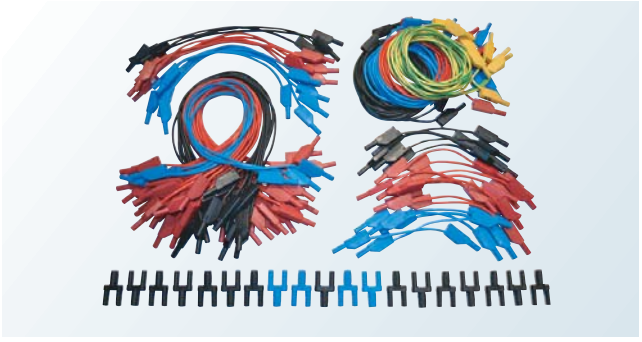
Training board Fault-current circuit breaker

...for the basic insurance of your exeperimental setups respectively for exercises and experiments of FI.



Training board Operate (Button)

...because you need five or more buttons for a few circuits, p.e. not simplified dahlander circuits.



4 mm-PVC measuring line set electrical machines

Measuring cable set – Compiled to match the drive technology training boards. Specifi cations: 4 mm laboratory safety measu-ring cables, 600 V, CAT III ~ 1000 V CAT II / 32 A, 2.5 mm²

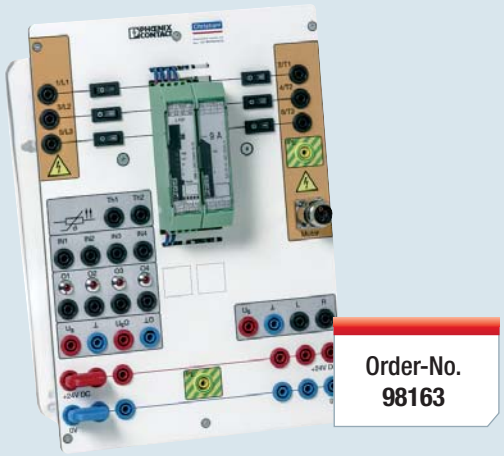
Article	Order-No.
Training board Fault-current circuit breaker	98151
Training board Operate (Button)	98152
4 mm-PVC measuring line set	98141

Section: motor management system

Programmable control and monitoring of three-phase motors

This A4 training board contains a combination of an motor management system and an electronic load relay. The motor management system has an integrated current converter up to 16 A, an active power measurement for overload and underload monitoring and freely programmable switching and reporting thresholds. The electronic load relay enables control of 3~AC motors up to 550 V AC with a load current of maximum 9 A. In this combination, the electrical variables such as current, voltage and power, as well as fault or other statuses, can be observed easily via the software.

Motor Management



Order-No. 98163

Motor management relay (left on the training board)
- Overload and underload monitoring
- Thermistor monitoring
- Phase input monitoring and phase failure simulation
- Rated current max. 16 A
- 24 V DC control voltage

Electronic load relay (right on the training board)
- Clockwise and anti-clockwise rotation
- Phase output monitoring and phase output simulation
- Electronic motor protection
- Motor connection field with 4 mm lab sockets and motor connector
- Rated current max. 9 A
- Rated voltage 550 V
- 24 V DC control voltage

Operation/Thermistor Simulation

Order-No. 98164

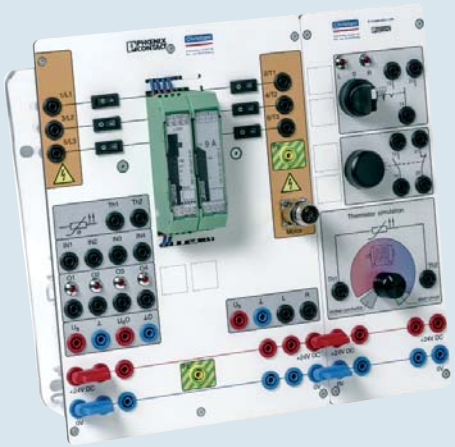
This training board is a valuable addition to the motor management training board and has the following equipment:

Latching switch 1-0-1 (2 NO) for clockwise and anti-clockwise rotation
- Display of direction of rotation via LED signal lights

Push button (1NO 1NC)
- Clockwise and anticlockwise rotation

Thermistor simulation
Achieved via a potentiometer with switching function.
The following states can be simulated:
- Motor cold/warm
- Short circuit to the thermistor supply line
- Cable break in the thermistor supply line

Motor Management and Operation/Thermistor Simulation Training Board Set



Incl. bridging plugs (2 x red, 2 x blue), programming cable

Article	Order-No.
Motor mgmt. and operation/thermistor training board set	98167
Training board power supply 24 V DC 100 W	98198

Section: PLC and frequency converter

Programmable logic control and monitoring of three-phase motors

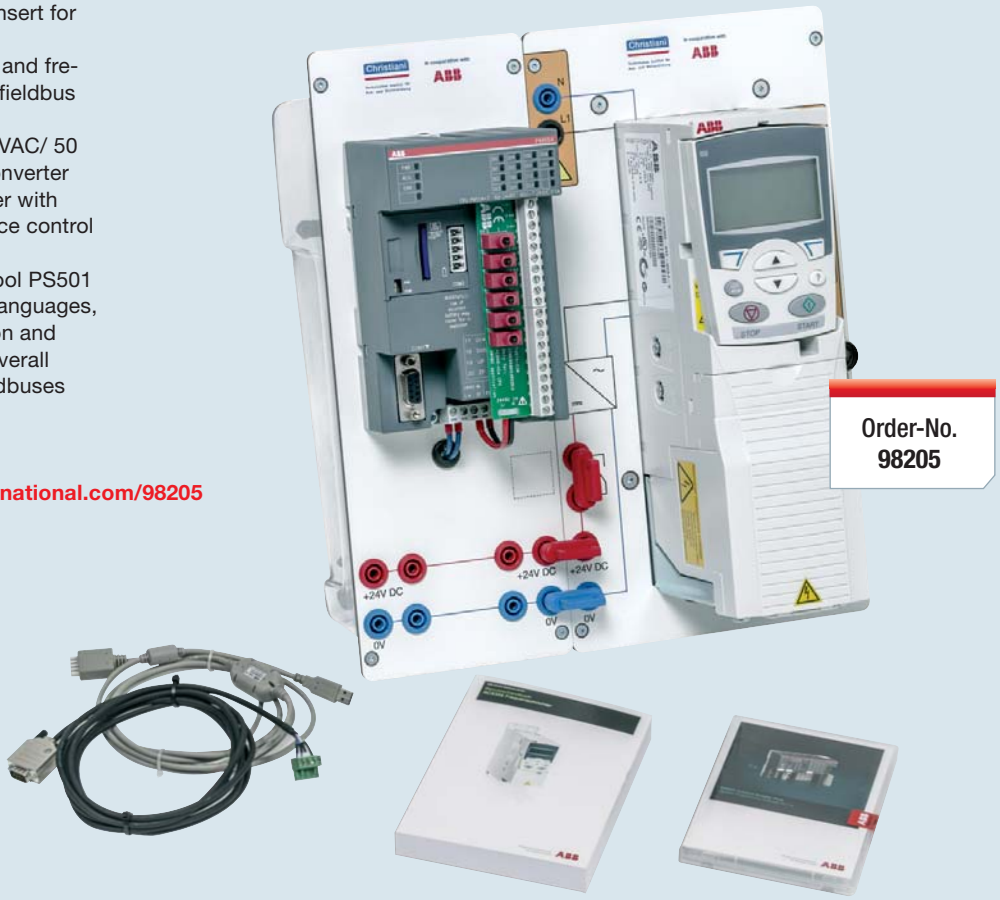
With this training board set, you can start a three-phase motor in just a few minutes and operate it in a speed-controlled manner. The package includes the ready-to-use user program and the required accessories. Both the programming with function modules as well as the visualisation of the application are also supplied ready-to-use, so that the starter kit can be put to use very quickly.

PLC and Frequency Converter Training Board Set

NEW

- PLC with SD card insert for transfer of programs
- Connection of PLC and frequency converter via fieldbus module
- Power supply: 230 VAC/ 50 Hz 1-phase for the converter
- Frequency converter with removable convenience control panel
- With Engineering Tool PS501 for six programming languages, integrated visualisation and configuration of the overall system, including fieldbuses and networking

More information:
www.christiani-international.com/98205



Order-No.
98205

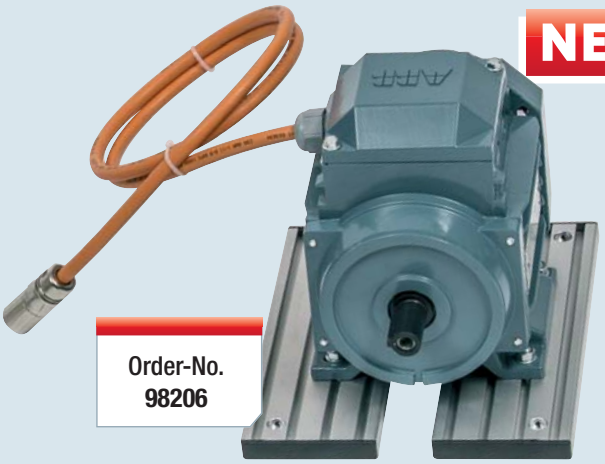
Starter Kit Option 3-Phase Squirrel Cage Motor

NEW

Motor for starter kit, which can be simply and quickly connected with the corresponding connection cable.

- 3-phase squirrel cage motor
- 400 V Y/ 50 Hz / 0.37 kW
- Speed 1355 rpm
- Design 71 B3
- Degree of protection IP55
- Weight 5.9 kg

More information:
www.christiani-international.com/98206

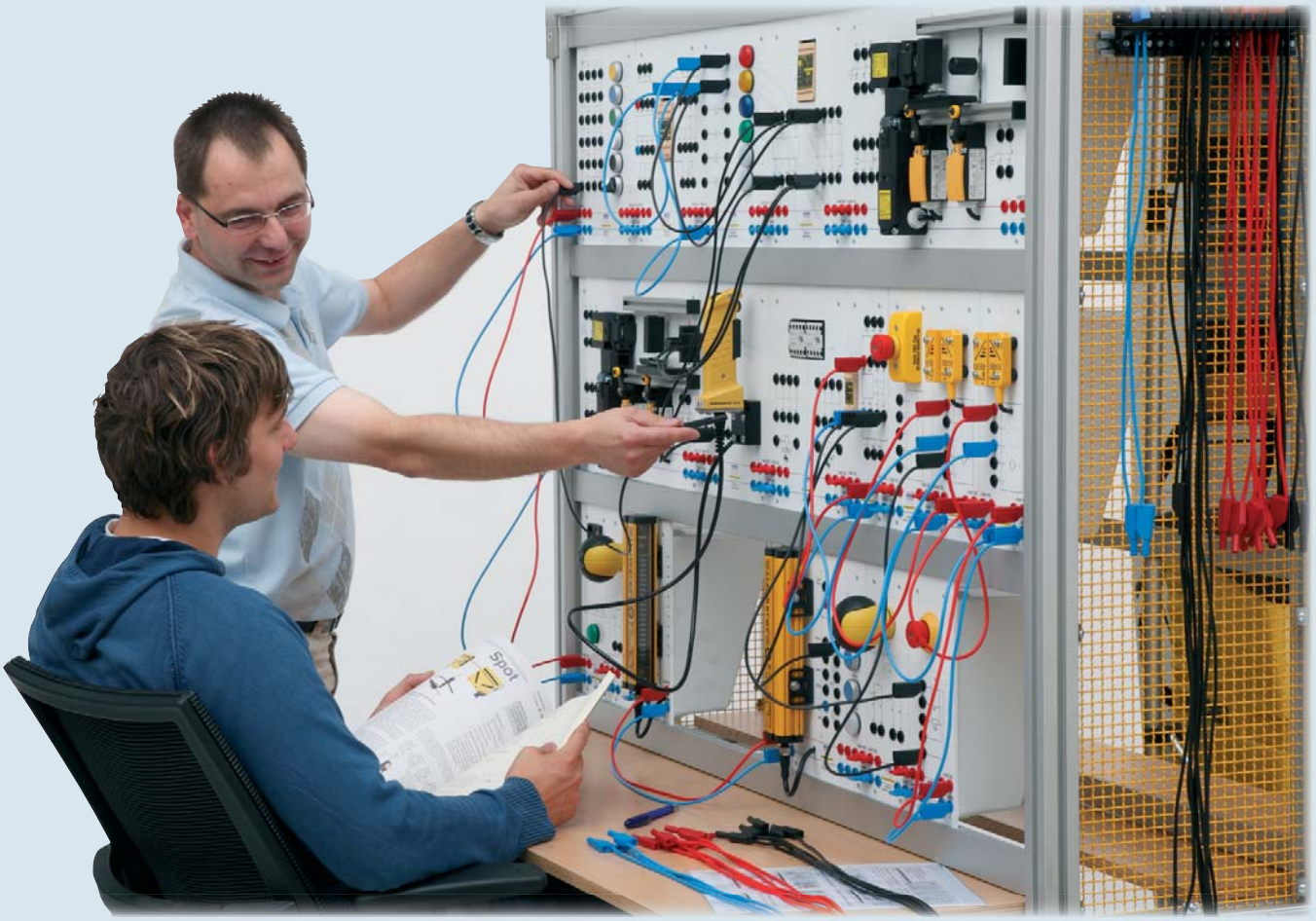


Order-No.
98206

For more information on the squirrel cage motor see
www.christiani-international.com/98206

EDISONS – Machine safety teaching system
in accordance with European Machinery Directive 2006/42/EC for safety functions

The EDISONS teaching system from Christiani is the optimum aid during lessons about machine safety. With this system, you can provide your trainees, pupils, students or employees with the best possible preparation with regard to the new requirements of safety functions in machines and machinery in the industrial area, in conjunction with Machinery Directive 2006/42/EC. Of course, with the EDISONS teaching system, safety functions can also be configured and tested. The sturdy yet easily mobile carrier system offers space for 18 training boards in A4 format, split across three levels. It is available in a one-sided or two-sided version and thus offers space for two or four learners.



Learning objectives:

- Safety functions on machines for locked, isolating safety devices with electromechanical position switches
- Non-isolating safety devices with electronic, contactless position switches
- Non-isolating safety devices with light barrier
- Non-isolating safety devices with two-hand control
- Non-isolating safety devices with enabling switches
- Handling in emergencies (emergency off/emergency stop) for personal protection

Learning objectives:

- Safety door interlock
- Direct shut-down with safety door interlock
- Redundant safety circuits
- Using and connecting safety switching devices

More information available at
www.christiani-international.com

EDISONS Basic Set

The basic set is the foundation for all other sets and provides power supply, contacts and input/output elements for the exercises. It is always required.

Order-No.
58140

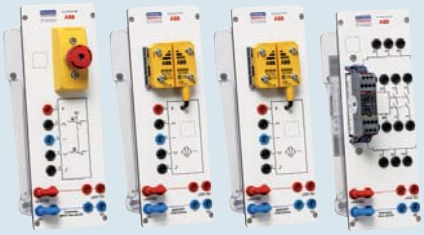
EDISONS Set: Safety Devices 1 – Electromechanical Position Switch

Locked, isolating safety devices (electro-mechanical) with and without interlock, handling in emergencies.

Order-No.
58141

EDISONS Set: Safety Devices 2 – Electrical Position Switch

Locked, isolating safety devices (electronic, contactless), handling in emergencies.

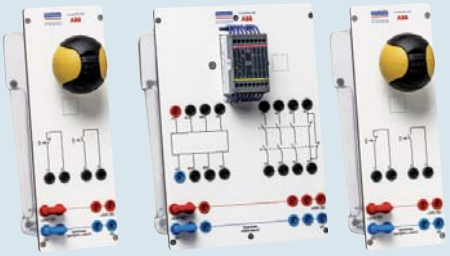


Order-No.
58142

EDISONS Set: Safety Devices 3 – Light Barrier

Order-No.
58143

EDISONS Set: Safety Devices 4 – Two-Hand Control



Order-No.
58144

EDISONS Set: Safety Devices 5 – Enabling Switch

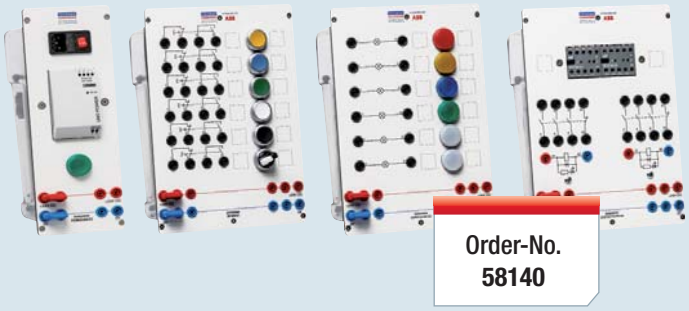
Order-No.
58152

EDISONS Carrier System

Article	Order-No.
One-sided carrier system	58340
Two-sided carrier system	58436

EDISONS – Basic Set

The basic kit is the basis for all other kits and provides the power supply, contacts and input/output elements for the exercises. It is always required.



Order-No. 58140

The **EDISONS basic kit** consists of the following four training boards:

POWER

Power supply with 100 – 240 V AC (47-63 Hz) input and 24 V DC/4.2 A output

OP

Operating unit with five buttons and one rotary switch

SIGNALS

Display unit with six signal lamps in red, yellow, blue, green and 2 x white

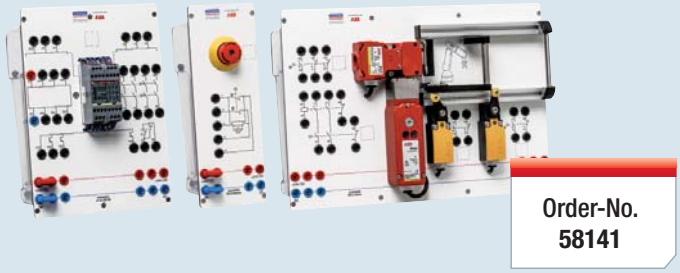
CONTACTS

Contactor unit with two load contactors with four contacts each (3xNO, 1xNC); can be used as a contact extension or to actuate electrical consumers on the training boards (e.g. HAZARDS and SIGNALS training boards.)

! All training boards are also available individually, on request.

EDISONS Kit: Safety Devices 1 - Electromechanical Position Switch

Locked, isolating safety devices (electromechanical) with and without interlock, for use in emergencies



Order-No. 58141

With this kit, you can design and investigate circuits, simulate errors and determine their impact on safety:

- Various types of safety functions for use in emergencies
- Safety functions for locked, isolating safety devices with and without interlock, with the use of electromechanical position switches

The EDISONS “safety devices 1 – electromechanical position switch” kit consists of the following three training boards:

- **INCA1** Actuator for use in emergencies (emergency off/emergency stop) with integrated signal lamps
- **JSNY** Model of a sliding door with two attached roll lever position switches, one position switch with separate actuator and one position switch with interlock (spring-locked)
- **RT7B** Universal safety relay with direct and delayed outputs; 1 or 2 channels, configurable, for realisation of safety functions on machines; with manual/automatic reset

! All training boards are also available individually, on request.

EDISONS Kit: Safety Devices 2 - Electrical Position Switch

Locked, isolating safety devices (electronic, contactless), for use in emergencies

With the EDISONS “safety devices 2 - electronic position switch” kit,

- various types of safety functions for use in emergencies, as well as
- circuits using electronic position switches for locked, isolating safety devices can be configured and
- the safety-technical reliability of circuits using electronic position switches, or
- the functionality of circuits using electronic position switches, can be investigated.

Order-No. 58142

The **EDISONS “safety devices 2 - electronic position switch”** kit consists of the following four training boards:

- **SMILE TINA**
  Actuator for use in emergencies (emergency off/emergency stop) with integrated signal lamps
- **EDEN (2 x)**
  The contactless position switches operate using a dynamic signal. This means up to 30 sensors can be connected in series and can be combined with other safety sensors using the same technology
- **VITAL**
  Safety relay of the highest safety level for sensors that work with a dynamic signal; with manual/automatic/monitored reset

EDISONS Kit: Safety Devices 3 - Light Barrier

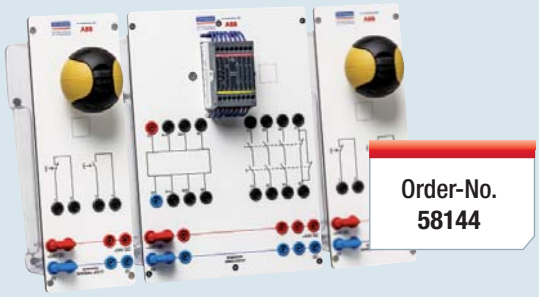
With the EDISONS “safety devices 3 - light barrier” kit,
- safety functions using a light barrier (category "non-isolating safety devices") can be configured and
- their various functionalities and
- additional, optional special functions, such as Muting and Floating Blanking, can be investigated

The **EDISONS “safety devices 3 - light barrier” kit** consists of the following three training boards:

- **FOCUS T and FOCUS R**
  Light barrier with transmitter and receiver, protective field height 150 mm, resolution 35 mm, with manual (monitored), automatic or time-reset via two reset keys (pre-reset) with Muting function (fixed fade out), Floating Blanking function (floating fade out) and freewheel function
- **CUTOUT**
  Spacer panel with cut-out for reaching through and interference finger for testing the Floating Blanking function

EDISONS Kit: Safety Devices 4 - Two-hand Switch

With the EDISONS “two-hand switching” kit, the non-isolating “two-hand switching” safety device, as a means for locating the hands when using particularly ergonomic controls (Safeball), can be configured and investigated as a “two-hand switching” safety function, and, through simulation of errors, the impact on safety can be determined.



The **EDISONS “safety devices 4 - two-hand switching”** kit consists of the following three training boards:

- **SAFEBALL (2x)**
  Ergonomic actuator for single/two-hand applications, ball with two built-in push-buttons with protection against accidental actuation
- **JSBR4**
  Universal safety relay with two monitored control circuits of different potentials; with time monitoring for use as two-hand switching

EDISONS Kit: Safety Devices 5 - Enabling Switch

Enabling switches are used for special safety functions in the “non-isolating safety devices” category. Type JSHD4, which is executed as a “3-stage enabling switch” is used together with a safety relay (e.g. training board RT7B) or a safety PLC (e.g. PLUTO training board - in preparation). Thus, various types of safety functions can be established, investigated and, through simulation of errors, the impact on safety determined.

EDISONS HAZARDS Learning Module

The HAZARDS learning module supplements the basic and advanced kits with actuators and transmitters. These are used to illustrate or signal hazardous situations. The HAZARDS training boards not only offers a motor (fan), but also a solenoid valve as an alternative to a pneumatic cylinder. An acoustic signal transmitter and a flashing lamp can be used as alarm elements.

Flexible training boards for most common controllers

LOGO! 8 training board

LOGO! 8 training board

LOGO! training board with LOGO! module version 8 and DM8 12/24R add-on. 12 digital inputs, 8 digital outputs. To be attached to the experiment frame or for use as a desk-top device.
Operating voltage: 24 V DC; dimensions: 420 x 200 x 240 mm
Including LOGO! SoftComfort programming software.

Article	Order-No.
LOGO! 8 training board	59817
More information: www.christiani-international.com/59817	

S7-1200 training board

S7-1200 training board

Training board with SIMATIC S7-1214C DC/DC/DC. 14 digital inputs, 10 digital outputs. To be attached to the experiment frame or for use as a desk-top device.
Operating voltage: 24 V DC; dimensions: 420 x 200 x 240 mm

Article	Order-No.
S7-1200 training board	59493
More information: www.christiani-international.com/59493	

nanoLine training board

Phoenix Contact nanoLine training board

Training board with Phoenix Contact nanoLine. 12 digital inputs, 8 digital outputs. To be attached to the experiment frame or for use as a desk-top device.
Operating voltage: 24 V DC; dimensions: 420 x 200 x 240 mm

The nanoLine Navigator programming software can be downloaded free of charge from the Internet.

Article	Order-No.
Phoenix Contact nanoLine training board	59530
More information: www.christiani-international.com/59530	

nanoLine individual modules are available at www.christiani-international.com or on request

ILC training board

Phoenix Contact ILC training board

Training board with Phoenix Contact ILC. 14 digital inputs, 10 digital outputs, 2 analogue inputs, 1 analogue output. To be attached to the experiment frame or for use as a desk-top device.
Operating voltage: 24 V DC; dimensions: 420 x 200 x 240 mm

The PC Worx Express programming software can be downloaded free of charge from the Internet.

Article	Order-No.
Phoenix Contact ILC training board	59529
More information: www.christiani-international.com/59529	

Accessories

Connecting cable

"mMS functional unit" training board connecting cable
10-wire, 4 mm safety lab socket on one side,
10-pin socket strip on other side.

Depending on the functional unit to be connected,
1 - 4 connecting cables are required.

Order-No.
53609

Automation Technology

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Christiani materials are available in many different languages. Visit:

christiani-tvet.com

You can directly access the online shops and the contacts for the respective regions.

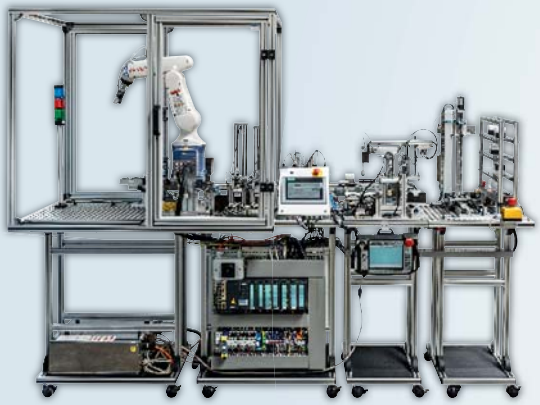
Training equipment and teaching methods

With our mechatronic training concept you not only find sophisticated technology for your training but also a tailor-made solution for your needs. Beginning from small stations up to complex systems with a robot, trainees can easily learn the correlation between electronics, mechanics and robotics. We offer the right PLC for every application, as training racks they can be used in every classroom.

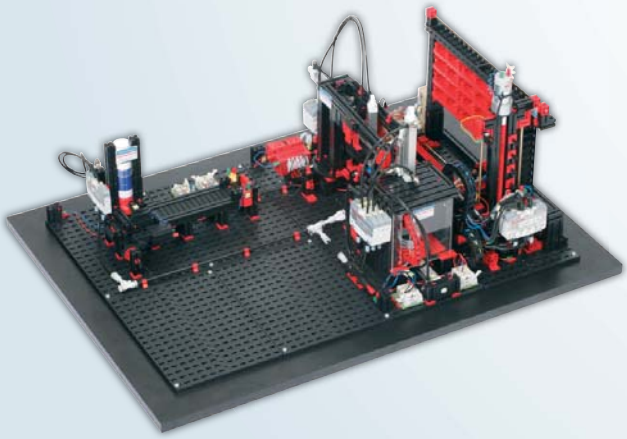
Whether for vocational institutes, colleges and universities or for small and medium-sized companies and major corporations: We offer to our customers guidance, conception, planning and execution as well as train the trainer courses.

As a single-source provider for technical training, our portfolio covers both the hardware for the training labs and the teaching materials prepared for the lessons. This conclusive overall concept contributes to a lasting learning success!

Robotics



Mechatronic Systems



Mechatronic System junior

Christiani materials are available in many different languages. Visit:

christiani-tvet.com

You can directly access the online shops and the contacts for the respective regions.

Simulation Software

Project Workbooks

PLC Training Racks

Pneumatics, hydraulics, mechatronic systems – learning what moves the industry

The “Control Technology” training concept from Christiani is a balanced concept that combines technology, vocational training and modern media in a practical package. The success of your training and the motivation of your trainees are therefore assured.

Our modules

- Requirements analysis
- Planning and consultation
- Conceptual design
- Implementation
- Train-the-trainer

VIRTUAL TOUR

Experience the Christiani Training Labs now online in 3D.

More information:
www.christiani-training-lab.com

COMPACT INFO

Technical Training Lab for Control Technology

Equipment options:

- MAPS multifunctional workplace system:
  - Single-sided and double-sided versions
- Instructor desks
- Student workplaces
- Standard desks for theory work and multimedia workplaces
- Equipment sets – pneumatics, electropneumatics, sensor technology
- Mechatronic assemblies and complex systems
- PLC Training Racks
- Training boards
- Simulation software for pillar drilling machines

Suitable for:

- Metalworking professions
- Mechatronics engineers
- Electrical engineering professions

Topics/learning objectives:

- Operational and technical communication
- Measuring and testing electrical variables
- Designing and testing electric, pneumatic and hydraulic control systems
- Programming mechatronic systems
- Testing and setting functions on mechatronic systems
- Commissioning and operating mechatronic systems
- Maintaining mechatronic systems

The Christiani training lab for control technology offers you the following:

- Theory and practice from a single source
- Motivation to learn and sustainable learning success
- Didactic diversity and practically oriented training media
- Strong partnerships with industry
- Professional consulting – from the planning stage, all the way up to implementation

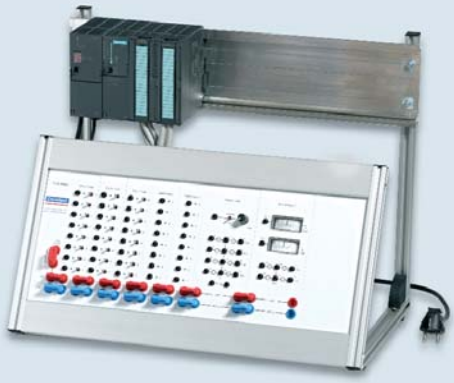
Practically Oriented Training Media

The “Control Technology” training concept from Christiani is presented as a complete, precisely matched system. Technology, vocational training methods and modern media complement one another to create a powerful, practically oriented overall package.

Didactical teaching materials

Software

Training devices



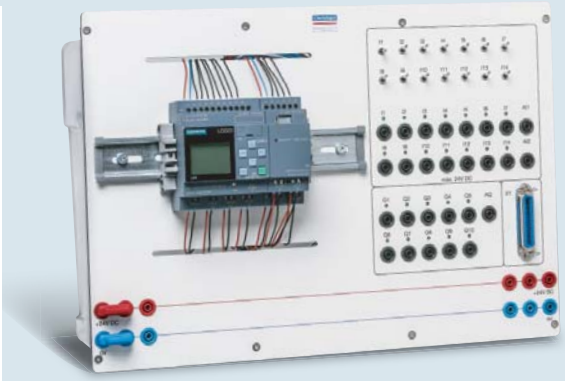
PLC training

Pneumatic Press Logo! 8

Simulation Software

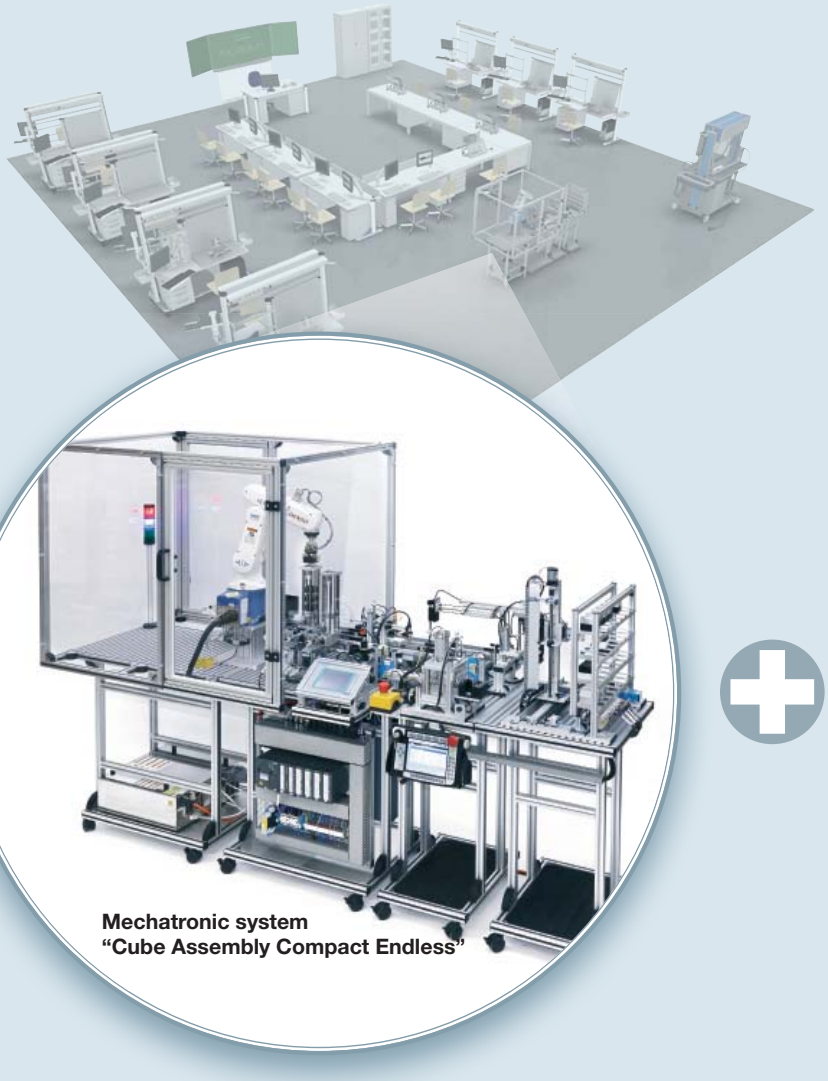
Automation Studio E6
The software solution for training purposes in the specialist areas of pneumatics, hydraulics and automation technologies.

Training Boards



The Christiani training boards are the ideal tools for a quick and easy introduction to using and programming miniature controllers.

Powerful Specialised Lab Components



Mechatronic system
"Cube Assembly Compact Endless"

„Train-the-Trainer"

We train your training staff to the latest standards and show how you can most effectively use our training systems and materials.

Please feel free to get in touch with one of our customer consultants.

"Whether you are looking to expand your existing specialised training lab or are planning something new – we are happy to support you with the necessary advice and expertise. Tell us about your individual requirements. We can then advise you on all questions."

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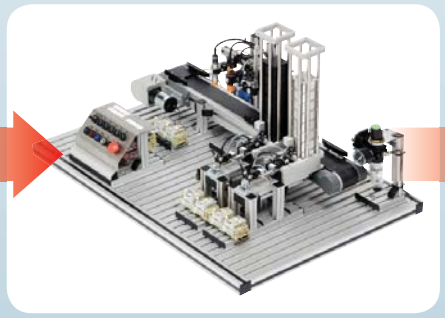
Flexible and practical training in the field of automation technology

The modular Mechatronics System, mMS, is a thorough training concept for automation technology.
It combines didactic demands and modern media with flexible components which are state-of-the-art in terms of automation technology. This will enable you to maintain motivation and learning success from the first year of teaching until completion. The project documentation will help you accompany your trainees through all phases of activity-oriented learning and working.

The functional assemblies and stations of the mMS can be combined and extended to create complex, automated systems and CIM units.
Using this well-designed system, you can impart the technical qualifications and professional decision-making capability in an interesting way. Automated training – make a start!

mMS Mechatronic System – modular, extendable training concept

Fully assembled functional units



Mechatronic station

Complete automated system

Forms of delivery of the mechatronic modules

❶ Manufacturing kit

Unprocessed, semi-finished products

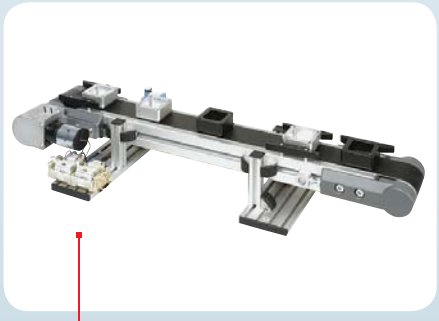
The **manufacturing kit** contains all parts, some completely and some only partially machined.
During the manufacturing process, the trainees attain knowledge and skills in manual and machine manufacturing methods.

❷ Assembly kit

Fully processed and ready for assembly

The **assembly kit** contains all components completely processed and ready for assembly. The trainees assemble, wire, connect hoses, program and commission the functional assemblies.

❸ Fully assembled



Assembled and ready to be used

With the **fully assembled units**, you have the completely mounted functional assembly. All that remains to be done is programming or to be done is connecting the unit to the PLC and write the PLC program.

- The well-designed, didactic training concept
- Ideal for electronics and metalworking professions
- Sophisticated technology, state-of-the-art
- Modular, extendable system
- Technology that grows with the requirements and skills of the trainees

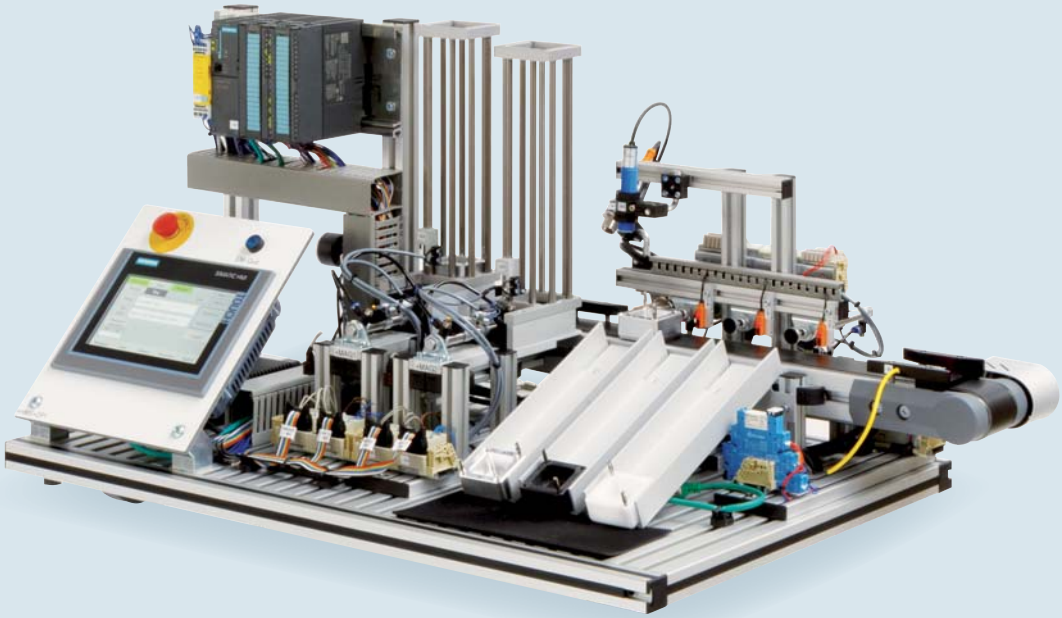
Project workbook for trainers and trainees

The project workbook supports the trainer and trainees at all phases of activity-oriented implementation of the project work.

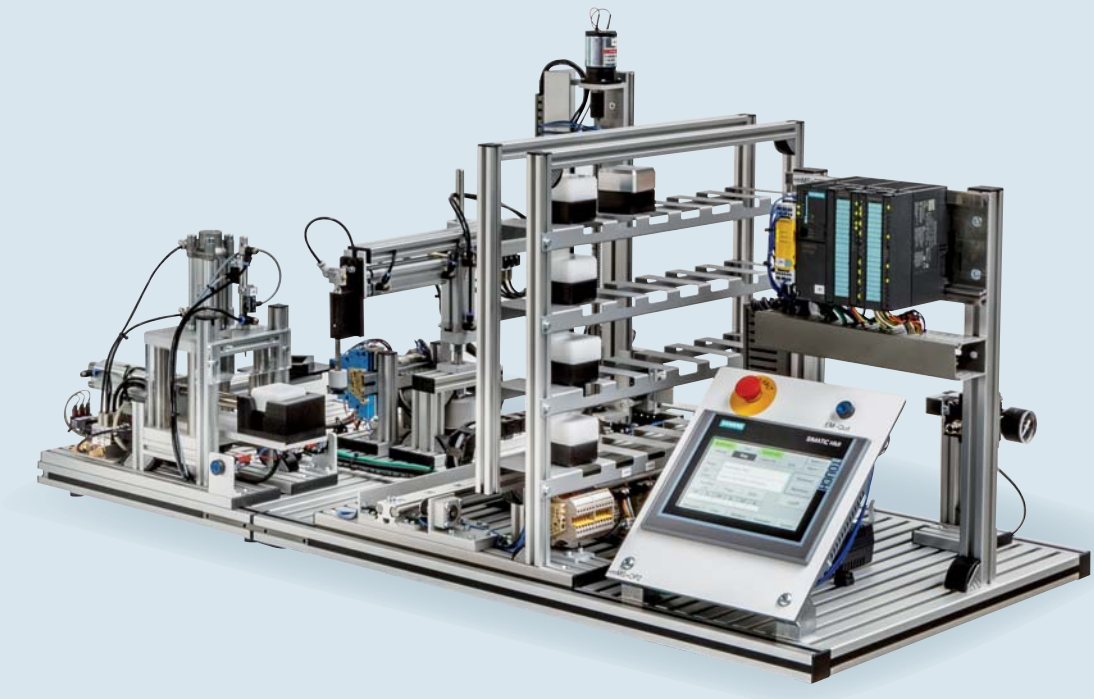
Model of entire process:

Informing > Planning > Deciding > Action > Monitoring > Evaluation

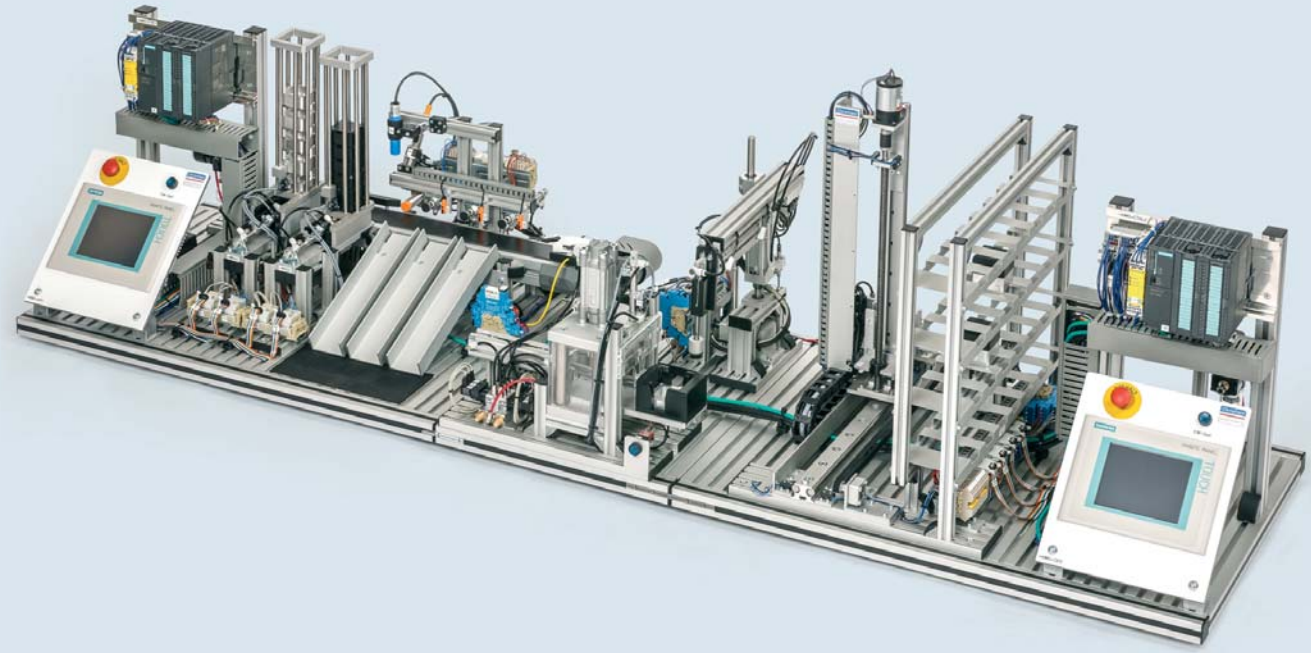
Mechatronic System VerSort314 (with PLC and HMI Touch Panel)



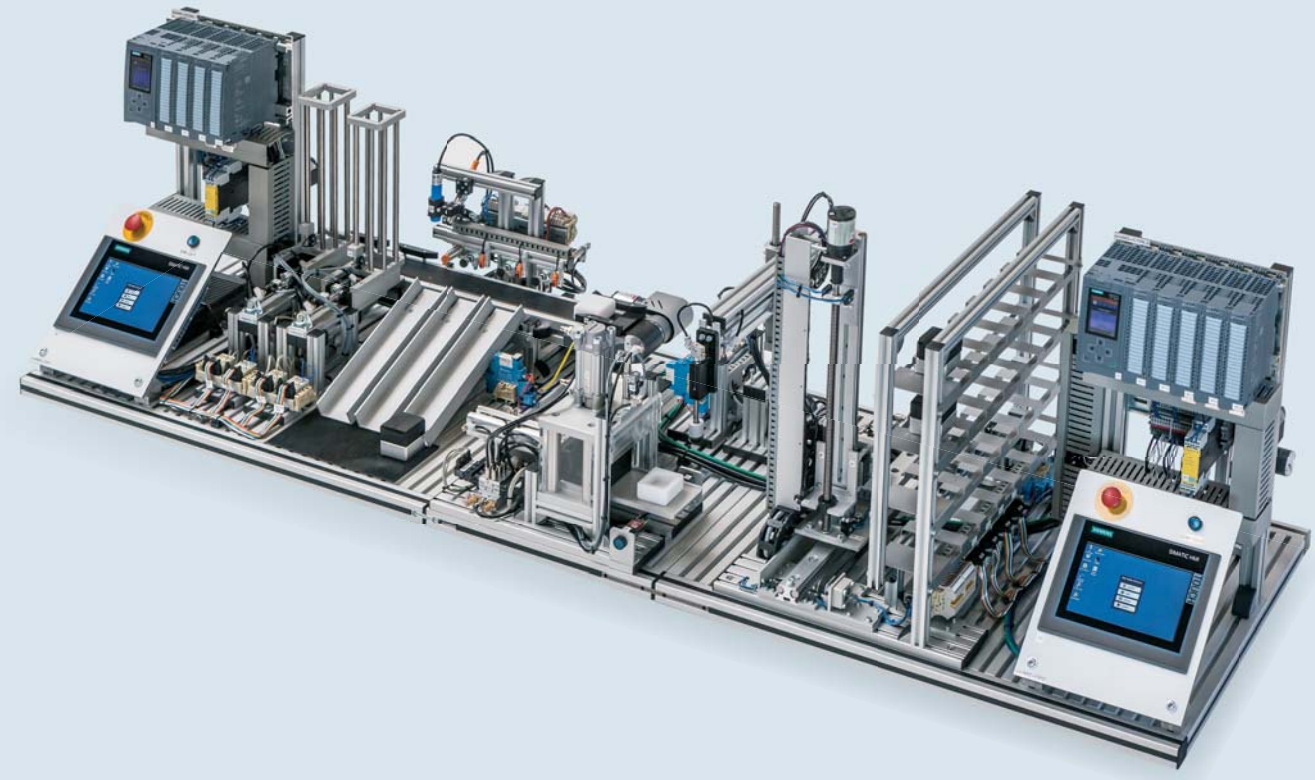
Mechatronic System BeLag314 (with PLC and HMI Touch Panel)



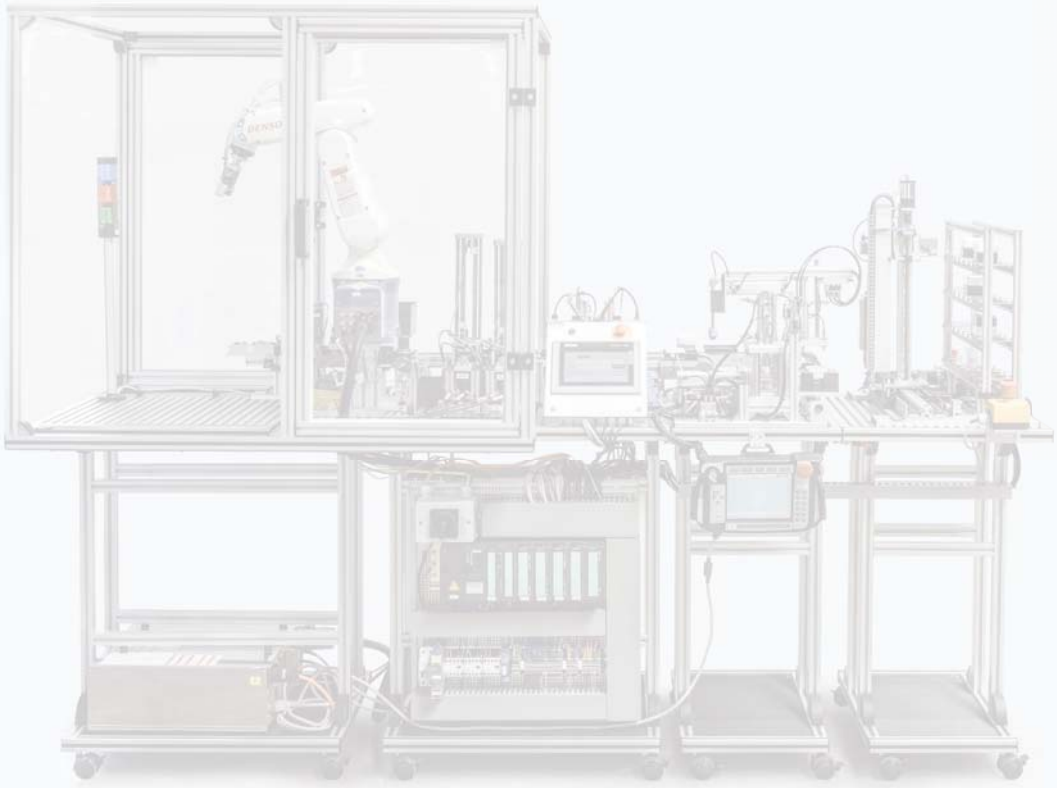
Mechatronic System SSC2P2H



Mechatronic System SSC2P2HV2



Mechatronic System Cube Assembly Compact Endless



ONLINE
VIDEO

Find out about our functions and potential areas of application in our detailed product video.

Video available at:
christiani-international.com/65733

Mechatronic System VARI

Assortment is no longer available

e. New products are coming soon.

Station 1: Material supply and material separation

Station 3: Final sorting and handling

Station 6: Pinning and handling

Station 5: Processing and robotics

Station 2: Preliminary sorting and handling

Station 4: Buffering and handling

Station 7: Admission into storage and warehousing

Stations

Assortment is no longer available

Functional Units

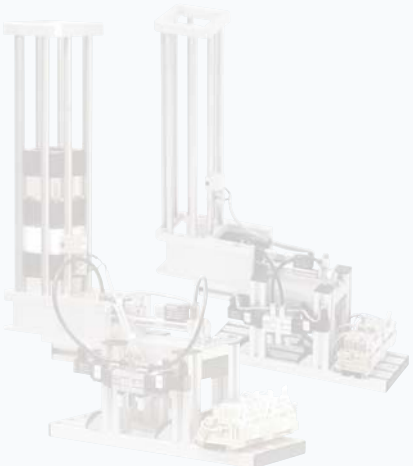
Service Unit

More information:
www.christiani-international.com/64335

Operator Panel

More information:
www.christiani-international.com/64334

Magazine Unit 1/2



More information:
www.christiani-international.com/64324

Conveyor Belt short/long

More information:
www.christiani-international.com/64339

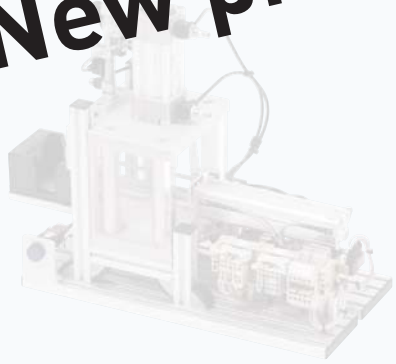
Testing Unit

More information:
www.christiani-international.com/64326

Sorting Unit

More information:
www.christiani-international.com/65709

Pneumatic Press



More information:
www.christiani-international.com/64337

Handling Unit with 2 Axis

More information:
www.christiani-international.com/64336

Swivel Arm

More information:
www.christiani-international.com/65694

Automation Storage & Retrieval System

More information:
www.christiani-international.com/64402

Each unit is available as manufacturing kit, as assembly kit or fully assembled.

Manufacturing / Assembly Kit

To assemble the functional unit the project workbook is required.

Mechatronics which establishes order

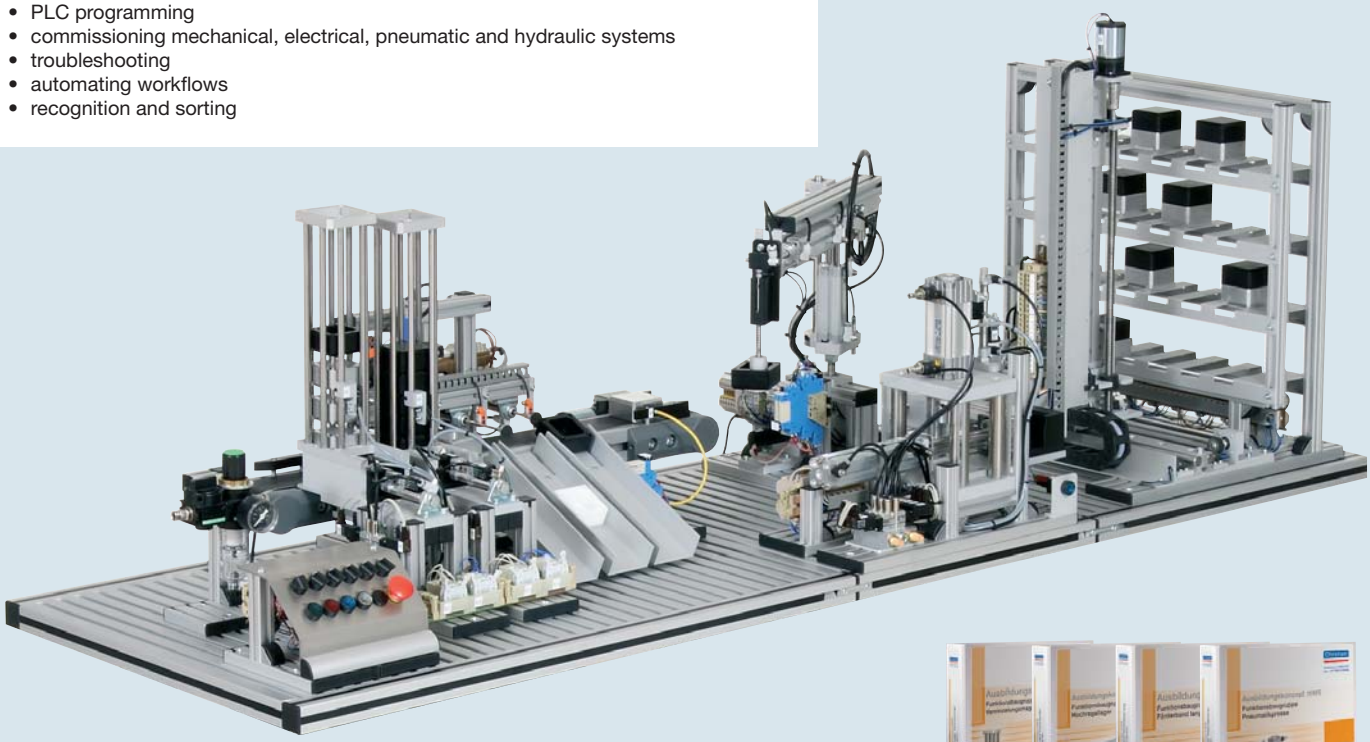
Mechatronic Sorting System Compact

The sorting system compact offers a sorting option in addition to a production process. In addition to separating the workpieces from the magazines onto the conveyor belt, their material characteristics and position are checked. Then, the workpieces can be sorted and ejected via three chutes or conveyed further to the end of the belt.

The sorting system compact implements the following applications: loading, material testing, sorting, transporting, handling, pressing and storing. Aluminium and plastic cube halves are used as workpieces. The system is available as an assembly kit with unprocessed semi-finished products, as a mounting set with completely processed components or as a fully assembled and wired finished device. The project documents support you and your trainees in practically-oriented, hands-on training on this system and foster independent learning and action.

Learning objectives:

- work planning, technical communication, testing, marking and identification, manual and machine cutting, separating and forming
- assembly work, joining
- construction of electrical controllers
- construction of pneumatic controllers
- PLC programming
- commissioning mechanical, electrical, pneumatic and hydraulic systems
- troubleshooting
- automating workflows
- recognition and sorting



Project workbook (students/lecturers)

Mechatronic Sorting System Compact	English	Spanish
	Order-No.	
As manufacturing kit complete material kit with unfinished construction parts	65670	
As assembly kit complete material kit with ready processed machined parts	65671	
Fully assembled - incl. technical documentation	65672	
Project workbook for students	67889	65963
Project workbook for lecturers	67888	65962

Additionally required:

- Power supply 24 VDC/5A
- PLC with 31 DI at least, 1 AI, 53 DQ, 2 fast counter inputs needed
- MCB in a appropriate version as an alternative possibility

Suitable controllers on request.

Find the appropriate accessories online at: www.christiani-international.com

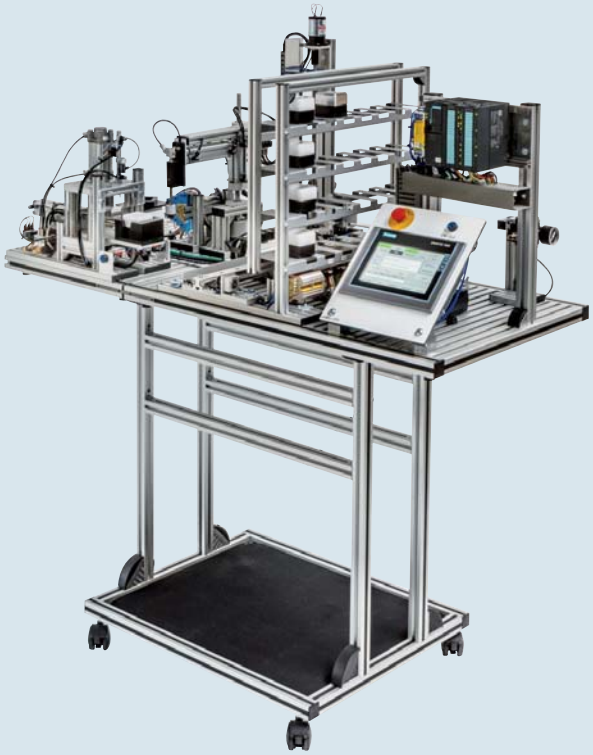
For combined or single usage

Mechatronic System VerSort and BeLag (with PLC and HMI Touch Panel)

The mechatronic systems VerSort and BeLag are each a single part of a complete production line. But both systems can be operated separately. The systems will be delivered ready for use including PLC programme.

Both systems can be composed for the whole production process. They built together the entire system SSC2P2H (Article 69394). Further information on page 178/179.

Mechatronic system VerSort deals with the following processes: Material supply, separation, tansport, testing and sorting. Figure shows system on trolley (optional).



Mechatronic system BeLag includes the processes handling, processing and storage. Figure shows system on trolley (optional). The system complies with the meachtronic system Mini V5, but is equipped with a PLC and and HMI touch panel.

System SSC2P2H consisting of the mechatronic systems VerSort and BeLag

Learning objectives:

- PLC programming
- Commissioning of electromechanic systems
- Troubleshooting
- Automating of work processes

Mechatronic System VerSort	Order-No.
Ready for use system	69564

Learning objectives:

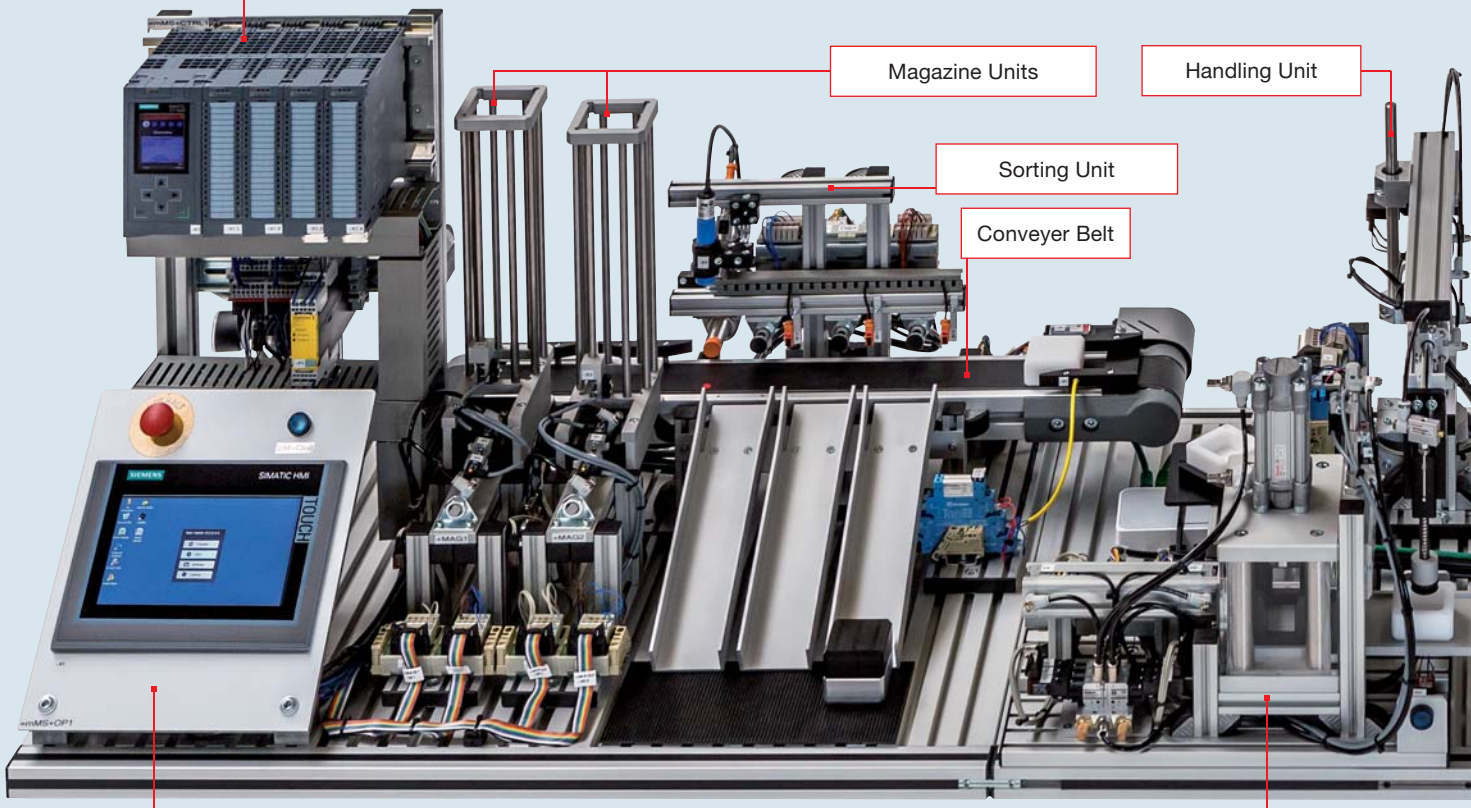
- PLC programming
- Commissioning of electromechanic systems
- Troubleshooting
- Automating of work processes

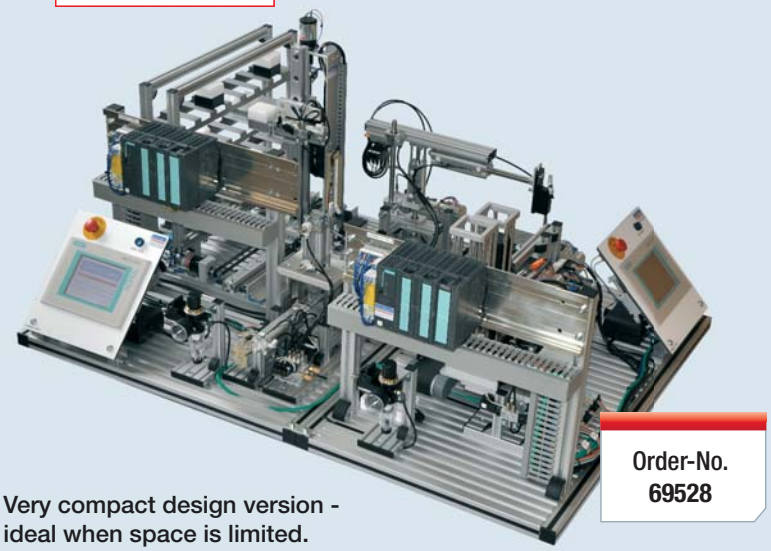
Mechatronic System BeLag	Order-No.
Ready for use system	69565

Complete system with two SPS/HMI

Mechatronic System SSC2P2H

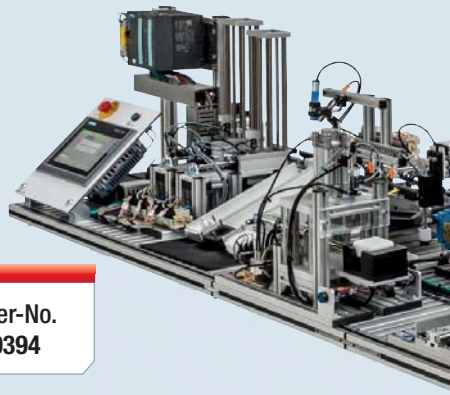
This mechatronic system offers all important automation technologies, such as mechatronics, handling technology, PLC technology, visualisation of processes, in a compact and clear design. The system forms a complete, automatic production process with a sorting option, and is both functionally and technically split into two segments, making it ideal for work in a team.





Order-No. 69528

Very compact design version - ideal when space is limited.



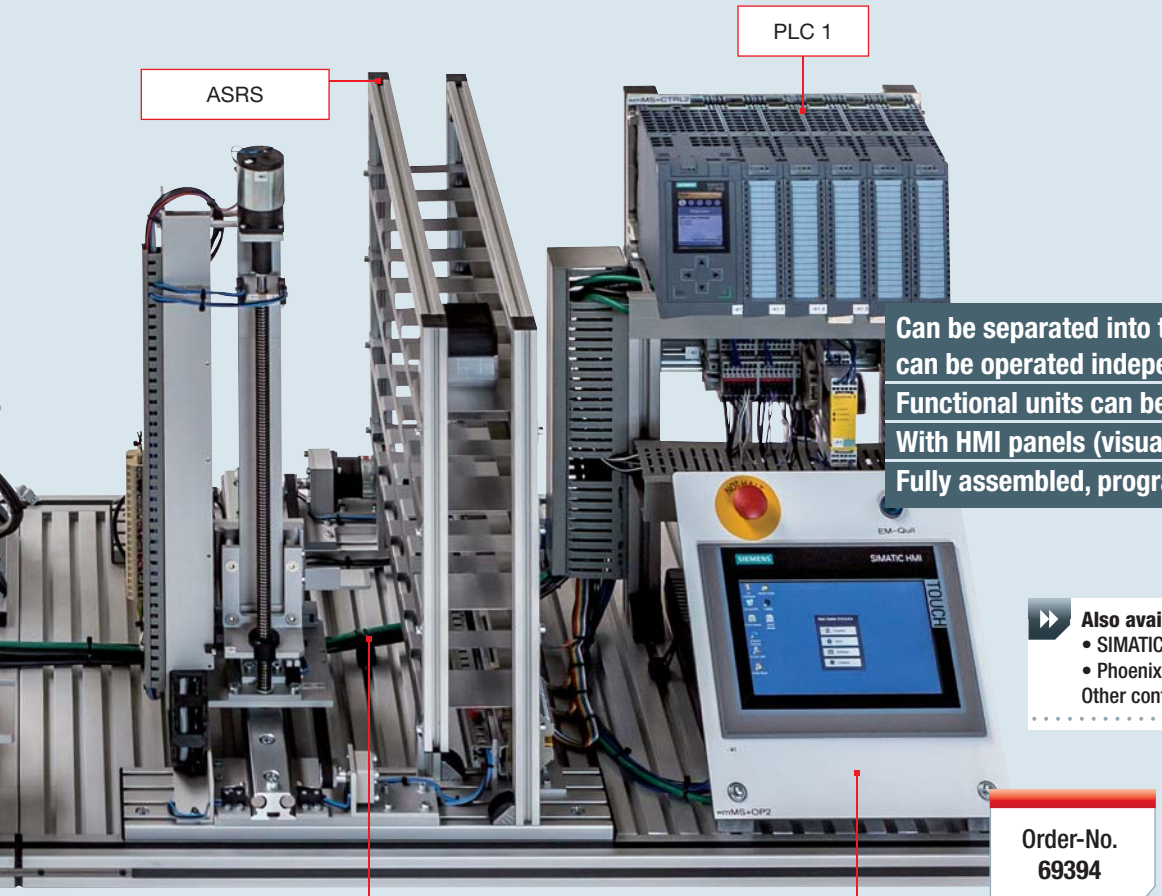
Order-No. 69394

Mechatronic System SSC2P2H

The following sequences are realised:

- ✔ Material supply and separation of workpieces on a belt conveyor
- ✔ Workpiece delivery by means of belt conveyor, handling unit and linear axes
- ✔ Checking of material properties and position with subsequent sorting
- ✔ Processing in the press
- ✔ Storage in the ASRS

Complete assembled, programmed and tested

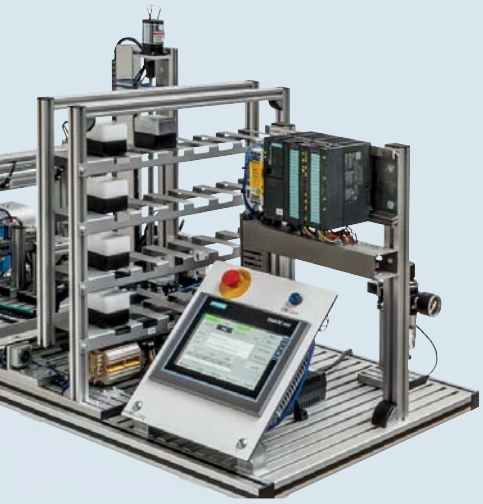


Can be separated into two units – can be operated independently
Functional units can be used individually
With HMI panels (visualisation)
Fully assembled, programmed and tested

Also available with other controllers:
- SIMATIC S7-1200
- Phoenix Contact ILC

Other controllers avaible on request.

Order-No. **69394**



Recommended accessories:

- Trolley **(Order-No. 64222/ 64223)**
- Compressor **(Order-No. 64080)**

Further information at:
www.christiani-international.com

Article	Order-No.
SSC2P2H – ready for use system with S7-314C-2PN/DP	69394
SSC2P2HV1 – ready for use highly compact system with S7-314C-2PN/DP	69528
SSC2P2HV2 – ready for use system with S7-1516-3PN/DP	69558

More information: www.christiani-international.com/69394
www.christiani-international.com/69528
www.christiani-international.com/69558

The complexe mechatronic system with industrial robot

Mechatronic System Cube Assembly Compact Endless

This training system is the ideal solution for preparing your trainees for later deployment in an industrial setting. Despite its low space requirement, the system comprises a complete assembly/disassembly system.
Complete cubes are produced from the cube halves stored in the magazines. These are stored in an ASRS and taken out of storage according to requirements, disassembled and put back into the magazines. This results in a closed material cycle. Assembly and disassembly can be activated/deactivated and controlled independently of each other.
Assembly is carried out using the cube assembly compact system. Disassembly is carried out by an industrial robot. A colour touch panel is used to operate and control the system.
The system is delivered fully assembled, wired, programmed and ready for use.

Assortment is no longer available

Mechatronic System Cube Assembly Compact Endless

e. New products are coming soon.

Scope of delivery:

- Cube Assembly Compact Endless system
- Set up ready for use
- 4 mobile trolleys
- SIMATIC PLC
- System touch screen
- 6-axis articulated robot arm
- Pneumatic 2-finger parallel gripper
- Mobile Teach Pendant
- WINCAPS robot programming software
- PLC and robot program
- Workpiece set (cubes with pins)
- Technical documentation

Learning objectives:

- Operational and technical communication
- Measuring and testing electrical variables
- Designing and testing electric, pneumatic and hydraulic control systems
- Programming mechatronic systems
- Testing and setting functions on mechatronic systems
- Commissioning and operating mechatronic systems
- Maintaining mechatronic systems

Specifications:

Power supply: 230 V AC, 50 Hz
Internal operating voltage: 24 V DC
Dimensions (LxWxH):
2500 x 1000 x 1800 mm

Mechatronic System Cube Assembly Compact Endless	Order-No.
Ready for use system – incl. technical documentation	65733
More information: www.christiani-international.com/65733	

Automation in high-end inclusive industrial robot

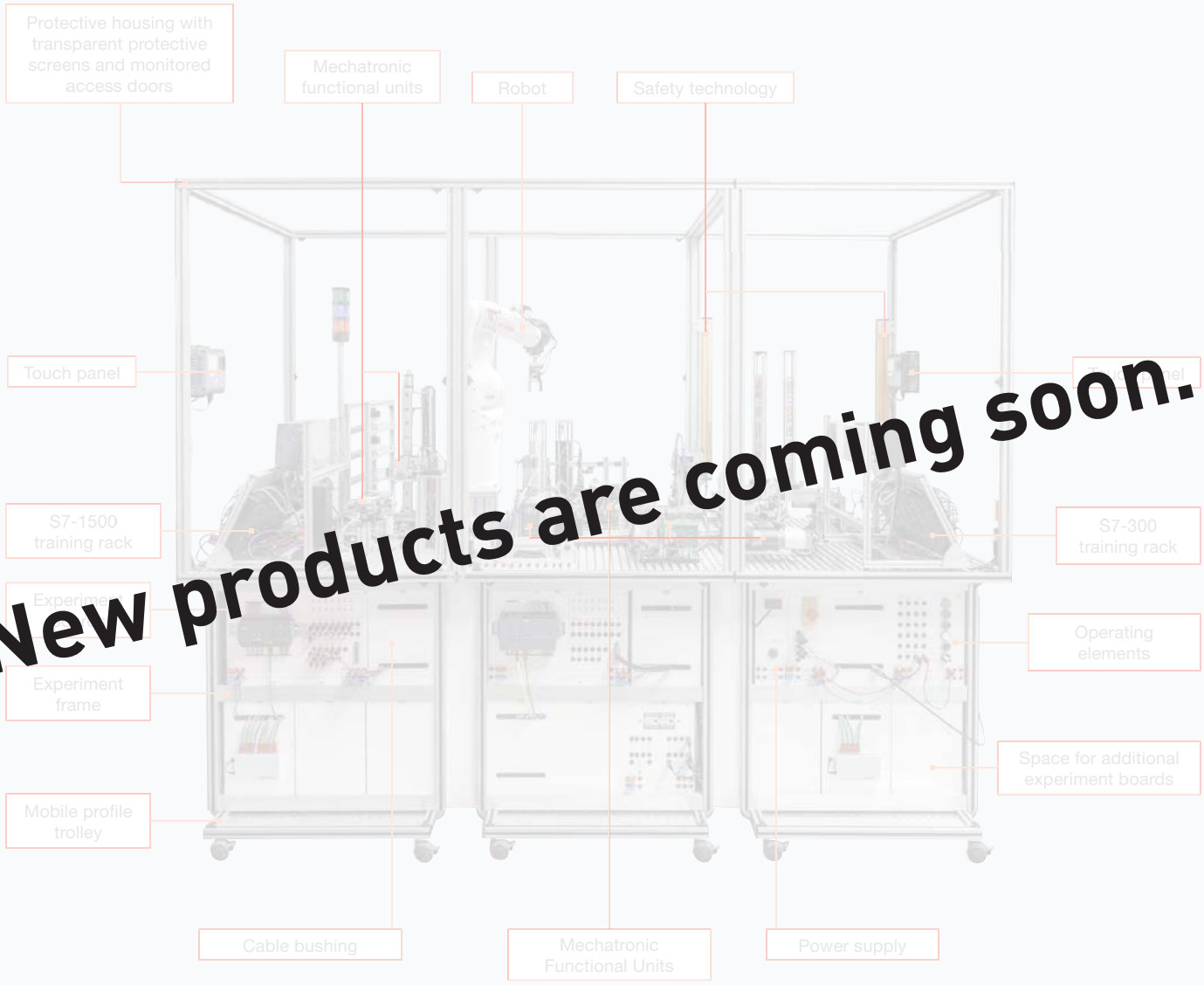
Mechatronic System VARI

The new VARI mMS training system is ideal if you need a highly flexible training solution. Both the mechatronic part of the system and the control and safety-technical part have a modular configuration. The wiring is pluggable, which enables changes at any time, with little effort. Functional units, control systems and other experiment boards can be removed from the overall system at any time, with little effort, and used individually. This eliminates the need for duplicate purchases and makes it easier to learn and understand complex automation systems.

The system can be delivered as shown or can be configured according to your individual requirements. To do this a selection is made from the range of mMS functional units and a process is defined in a meaningful manner. The system can be supplied with or without robots. The use of several robots is also possible.
The following control systems are available for selection: Siemens (LOGO!, S7 series), Phoenix Contact (nLC, ILC), ABB (PM), Eaton (Easy). The machine-safety components come from ABB.

Assortment is no longer available

Mechatronic System VARI



The mechatronic system VARI can be configured individually.
In the version shown above, it comprises:
6 base plates, each 800 x 550 mm, on 6 mobile trolleys,
15 mechatronic functional units, 1 robot,
6 PLC, 1 robot controller, 3 touch screens,
5 monitored doors, 1 light barrier, 1 safety relay, 3 emergency stops,
4 auxiliary contacts, 1 switch panel, 2 Ethernet switches, 4 power supplies.
Network technologies used: PROFINET, PROFIBUS

Specifications:

Power supply: 230 V AC, 50 Hz
Internal operating voltage: 24 V DC
Dimensions (LxWxH):
2500 x 1000 x 1800 mm

Learning objectives:

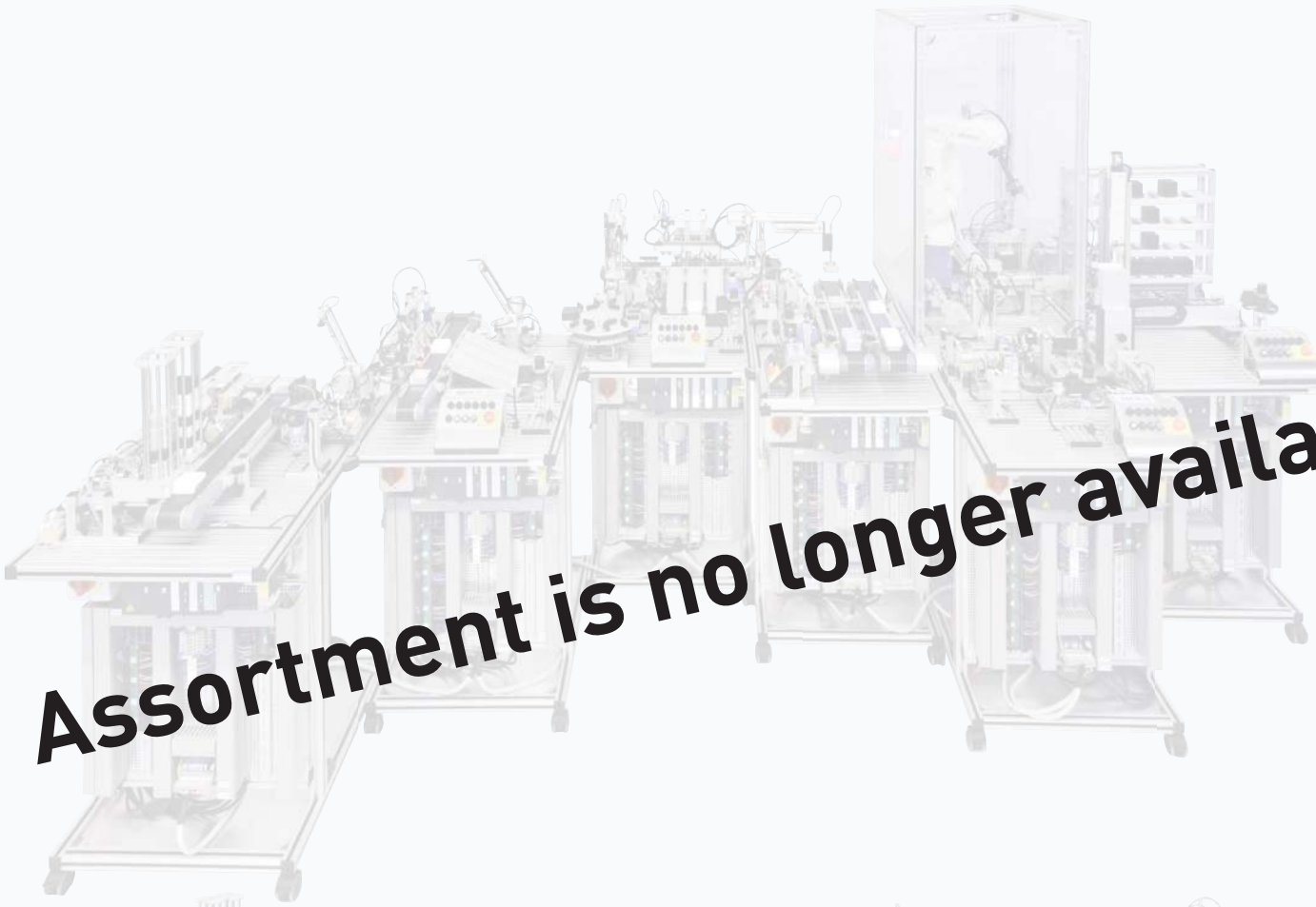
- Operational and technical communication
- Measuring and testing electrical values
- Designing and testing electrical and pneumatic control systems
- Programming mechatronic systems
- Testing and setting functions on mechatronic systems
- Commissioning and operating mechatronic systems
- Maintaining mechatronic systems

Mechatronic System VARI	Order-No.
Ready for use system	69499
More information: www.christiani-international.com/69499	

Mechatronic System WMX

Larger groups of students and trainees can work on this comprehensive mechatronic system at the same time. Teach mechatronics and automation technology with a professional learning system and provide your trainees and students with the best preparation for later use in an industrial environment. The WMX system consists of 7 mobile, individual stations, which form a system when combined. Individually operated, each station takes on a clear sub-process of the system. When combined, this results in a sophisticated and complex overall process. The stations are networked via Profibus DP. The mechatronic functional units of the system are taken from the Christiani mMS (modular Mechatronics System) and are described in detail on the following pages of the catalogue. The robot used is a DENSO VP-6246G robot. The system is controlled by 7 SIMATIC PLCs and a separate DENSO robot controller.
For operation of the system, there are 6 classical operator panels with switches and lights, as well as 2 HMI colour touch screens.

The system is delivered fully assembled, wired, programmed and ready for use.



Station 1: Material supply and material separation

Station 2: Preliminary sorting and handling

Station 3: Final sorting and handling

Station 4: Buffering and handling

Mechatronic System WMX

Upgrade the theory training in

- Mechatronics
- Electrics
- Pneumatics
- Automation technology and
- PLC programming

specialist areas clearly and practically with realistic exercises and experiments. With your trainees, practice commissioning, fault-finding and troubleshooting on industrial production systems.

The WMX system can be optimally adapted to the level of students and trainees. Each station can be operated individually. The process, beginning at station 1, can be extended gradually, station by station. In addition, all functional units can be removed from the system with little effort and, for more detailed observation, operated individually using an external control system.

With the WMX mechatronic system, you are optimally equipped to train prospective mechatronic engineers and automation technology engineers.

Station 1: Colour detection for system control

Learning objectives:

- Operational and technical communication
- Measuring and testing electrical values
- Designing and testing electrical, pneumatic and hydraulic control systems
- Programming mechatronic systems
- Testing and setting functions on mechatronic systems
- Commissioning and operating mechatronic systems
- Maintaining mechatronic systems

Scope of delivery:

- "WMX" mechatronic system
- Set up and ready for operation on 7 mobile profile trolleys
- 7 x SIMATIC S7-300 PLCs
- System touchscreen
- 6-axis articulated robot arm
- Pneumatic 2-finger parallel gripper
- Mobile Teach Pendant
- WINCAPS robot programming software
- PLC and robot program
- Workpieces
- Technical documentation

Mechatronic System WMX	Order-No.
Ready for use system	68389

Station 5: Processing and robotics

Station 6: Pinning and handling

Station 7: Admission into storage and warehousing

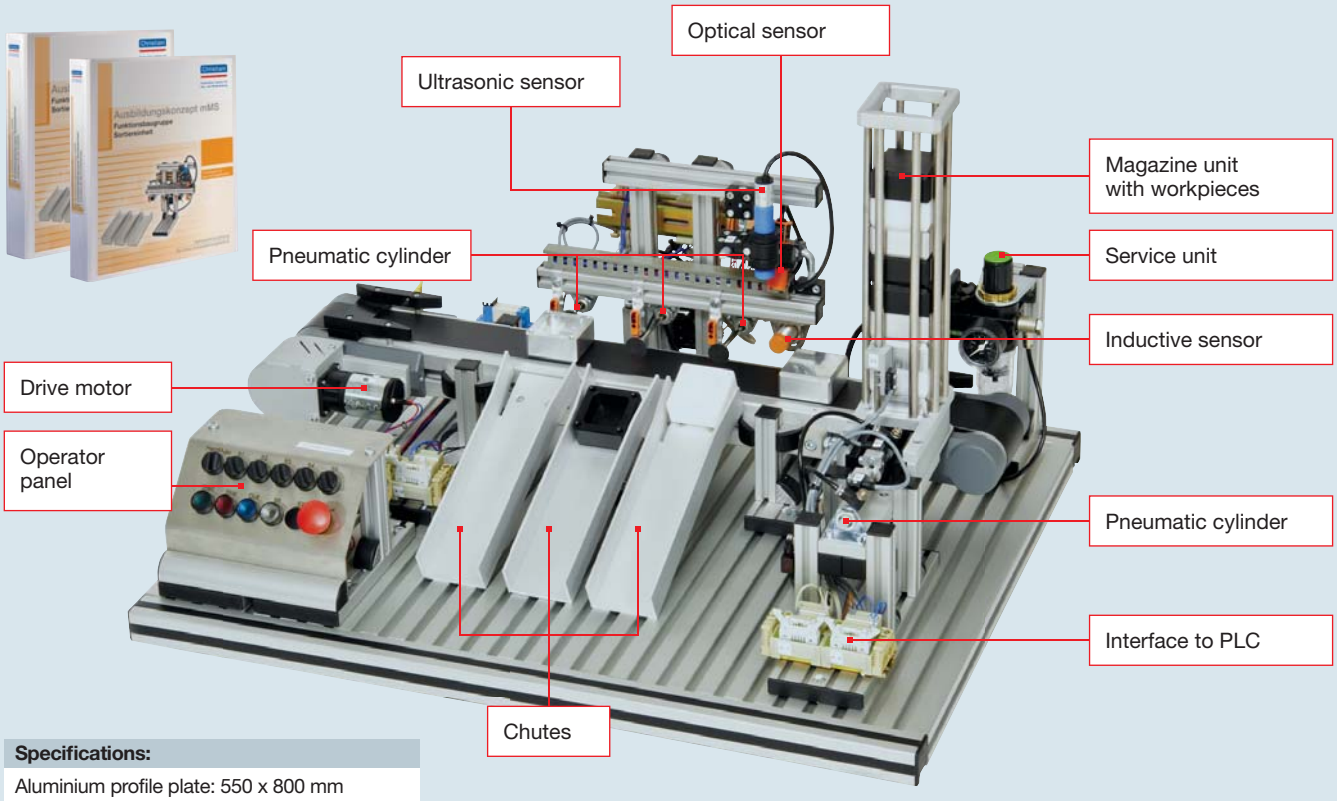
Automation Technology

Separate, transport, check, sort

Sorting Station

One magazine unit can contain up to 10 workpieces, the bottommost of which is ejected onto the belt conveyor in each case. Moving along the belt conveyor section, the workpieces arrive at the inspection station, where their position and material properties are checked.

To this end, one optical sensor, one inductive sensor and one ultrasonic sensor are used. Depending on the test result, the workpieces are either rejected into three chutes via cylinders or are transported to the end of the belt conveyor.



Specifications:

Aluminium profile plate: 550 x 800 mm
Operating voltage: 24 V DC
Belt line: 680 x 50 mm

Sensors:
- 1 inductive sensor
- 1 optical sensor
- 1 ultrasonic sensor
- 8 cylinder limit switches
- 1 microswitch
- 1 M3 light sensors with fibre-optical amplifier

Actuators:
- 1 x 24 V DC geared motor
- Reversing contactor circuit
- 4 x 5/2-way valves
- 4 double-acting pneumatic cylinders

Operator panel:
- Illuminated buttons
- Emergency stop switch

Maintenance unit:
- 3/2-way manual valve

Learning objectives:
- Work planning, Technical communication
- Testing, marking and identification
- Manual and mechanical machining, Separation and reshaping
- Assembly work, joining
- Set-up of pneumatic control systems
- PLC programming
- Commissioning of mechanical, electrical and pneumatic systems
- Fault-finding
- Automation of work processes

AT Technologies applied
- Separation of workpieces
- Motor control
- Conveyor technology
- Sensor technology
- Detection of different workpieces
- Sorting by material
- Optical fibre technology

Additionally required:
- 24 V DC/5 A power supply
- PLC with at least 11 DO, 1 AI, 28 DI

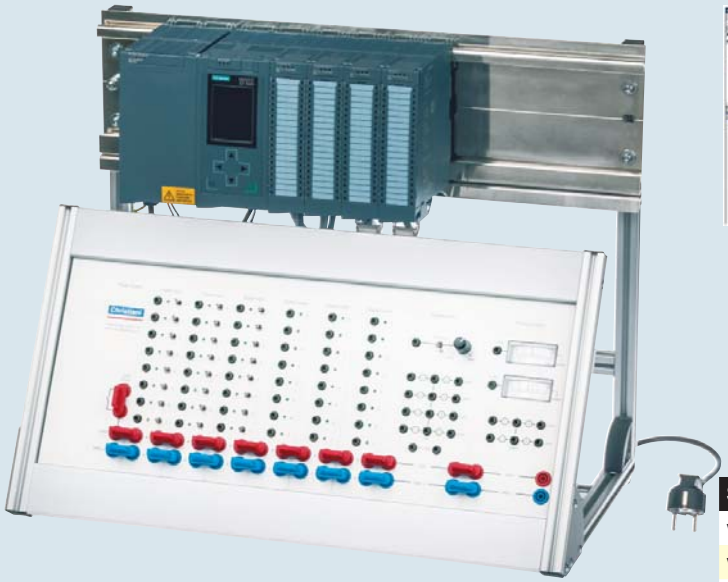
Find the appropriate accessories online at: www.christiani-international.com

Mechatronic System Cube Assembly Compact	English	Spanish
	Order-No.	
As manufacturing kit – complete material kit*	65677	
As assembly kit – complete material kit (processed)*	65678	
Ready for use module – incl. technical documentation*	65679	
Project workbook for the student	65687	68105
Project workbook for the lecturer	65686	68104

*Includes 3 workpieces (black, white, aluminium)

Guide your way from training through to practice with flexibility

PLC Training Racks with S7-1500



S7 PLC Training Racks	Order-No.
with S7-1513-1PN	59607
with S7-1516-3PN/DP	59608
SIMATIC® STEP 7 software for training – single licence (TIA Portal)	54011
SIMATIC® STEP 7 trainer package – 12 licences (TIA Portal)	54012
24 V DC potential distribution	57508
PLC-mMS connection cable	53609

More information: www.christiani-international.com/59607
www.christiani-international.com/59608

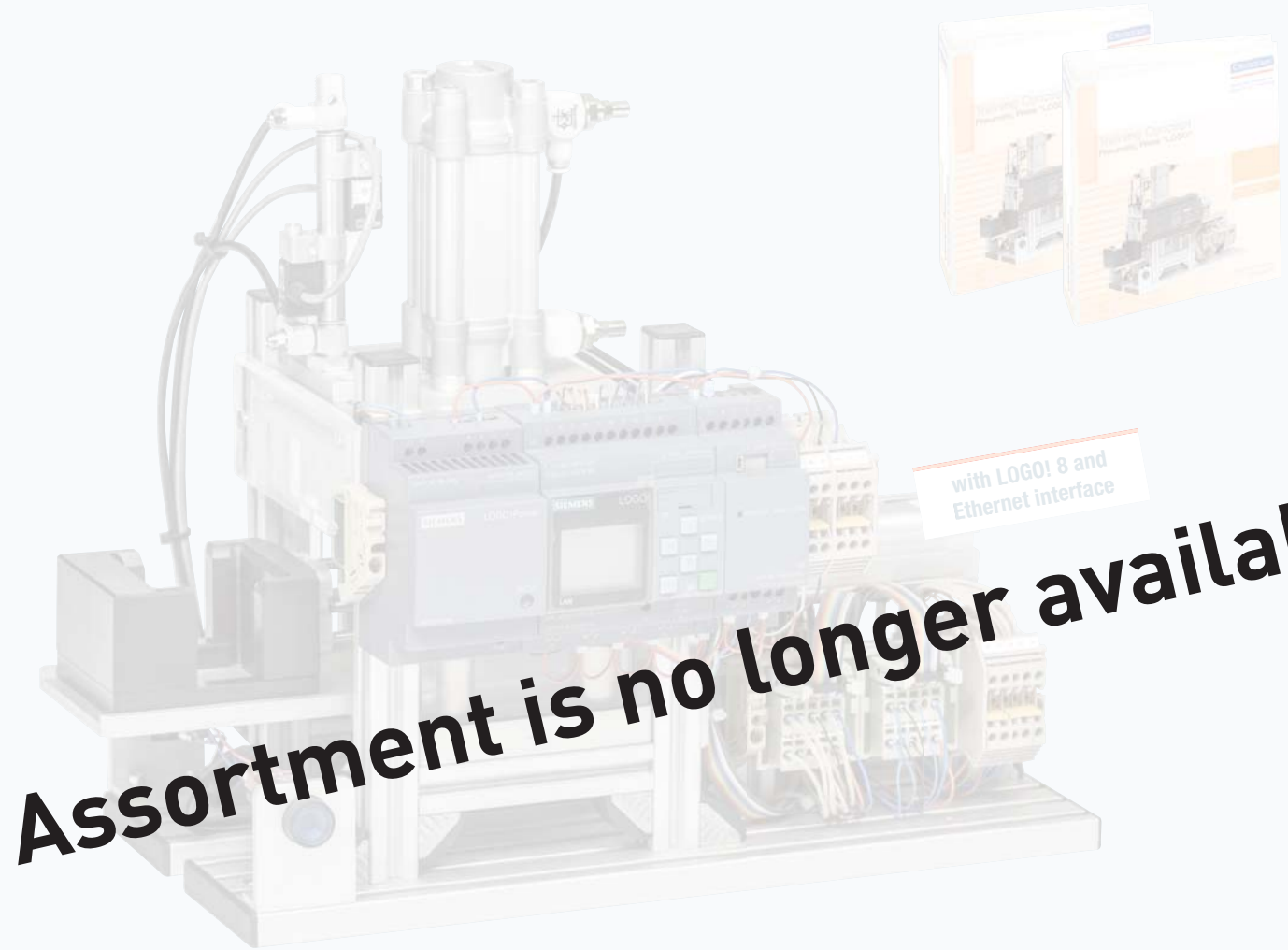
PLC Training Racks with S7-300

S7 PLC Training Racks	Order-No.
with S7-314C-2PN/DP	56780
with S7-315F-2PN/DP	58136
SIMATIC® STEP 7 software for training – single licence (TIA Portal)	54011
SIMATIC® STEP 7 trainer package - 12 licences (TIA Portal)	54012
24 V DC potential distribution	57508
PLC-mMS connection cable	53609

More information: www.christiani-international.com/56780
www.christiani-international.com/58136

LOGO! Pneumatic Press with LOGO! 8

This fully functional pneumatic press grants your trainees an affordable entry into the field of automation technology. All you need to operate the assembly is one pneumatic connection and one 230 VAC connection. All of the press' functions are controlled by the LOGO! compact controller. Your trainees will familiarise themselves with the use of electropneumatics, programming, electricity, sensor technology and commissioning using a mechatronic system. As in the case with a real press, this assembly is equipped with two-hand switching. No further accessories are required in order to operate the press. The compact controller is supplied as a complete system, together with power supply, additional I/O module, programming module and sample program.



Assortment is no longer available

Learning objectives:
- Mechanics
- Assembly
- Pneumatics
- Electrics
- Programming
- Commissioning

Specifications:

Aluminium profile plate: 175 x 265 mm
Operating voltage: 24 VDC
Power supply: 230 V AC

Sensors
- 2 x buttons for two-hand switching
- 4 x cylinder switches

Actuators
- 3 x 5/2-way valves
- 3 x double-acting pneumatic cylinders

Transfer modules
- 2 x 8-bit transfer plugs

Article	Order-No. English	Order-No. Spanish
As manufacturing kit – complete material kit, mechanically unprocessed, incl. LOGO! module 8	69592	
As assembly kit – as 69592 but fully mechanically processed, incl. LOGO! module 8	69591	
Ready for use module – incl. LOGO! module 8 and technical documentation	69590	
Project workbook for the student	64703	65541
Project workbook for the lecturer	64702	65542

Operator Panel

Learning objectives:
- Work planning, technical communication
- Testing, marking and identification
- Manual and mechanical machining, separating and reshaping
- Assembly work, joining
- Setup of electrical control systems
- PLC programming
- Commissioning of mechanical and electrical systems
- Fault-finding

Specifications:
Aluminium profile plate: 180 x 200 mm
Operating voltage: 24 VDC
Equipment:
- 1 emergency stop switch
- 4 illuminated buttons
- 5 toggle switches 0-1
- 1 toggle switch 0-1-2

Transfer modules:
- 3 x 8-pin transfer plugs

Requirements of the PLC:
- 13 digital PLC inputs
- 4 digital PLC outputs

Required connection cable:
- 3 pieces (order no. 53731 or 53609)

The operator panel provides 10 switches and buttons as well as an emergency stop switch for operation of one or more functional units or stations. The functional unit is set up entirely on an assembly platform and can be flexibly mounted on an aluminium profile plate either individually or with other functional units.

	English	Spanish
Article	**Order-No.**	
As manufacturing kit – complete material kit	64314	
As assembly kit – complete material kit (processed)	64263	
Ready for use module - incl. technical documentation	64334	
Project workbook for the student	64408	64707
Project workbook for the lecturer	64409	64706

Service Unit

Learning objectives:
- Work planning, technical communication
- Testing, marking and identification
- Manual and mechanical machining and separation
- Assembly work, joining

Specifications:
Aluminium profile plate: 80 x 80 mm
Operating pressure: max. 16 bar
Pneumatic connection on input side:
6 mm screw connection
Pneumatic connection on output side:
4 mm screw connection
Does not require any connection cables

The service unit consists of a pressure control valve with 3/2-way valve, pressure gauge, adjustment knob (rotatable and lockable) and a water separator. The functional unit is set up entirely on an assembly platform and can be flexibly mounted on an aluminium profile plate either individually or with other functional units.

	English	Spanish
Article	**Order-No.**	
As manufacturing kit – complete material kit	64315	
As assembly kit – complete material kit (processed)	64262	
Ready for use module - incl. technical documentation	64335	
Project workbook for the student	64442	64705
Project workbook for the lecturer	64443	64704

Magazine Unit 1

In the magazine unit, up to 10 stacked workpieces can be accommodated.
A pneumatic cylinder pushes the bottommost workpiece out of the stack. A sensor checks the filling condition of the magazine. The functional unit is set up entirely on an assembly platform and can be flexibly mounted on an aluminium profile plate either individually or with other functional units.

	English	Spanish
Article	**Order-No.**	
As manufacturing kit – complete material kit*	64304	
As assembly kit – complete material kit (processed)*	64264	
Fully assembled module – incl. technical documentation*	64324	
Project workbook for the student	64440	64709
Project workbook for the lecturer	64441	64708

*Includes 3 workpieces (black, white, aluminium)

Learning objectives:

- Work planning, technical communication
- Testing, marking and identification
- Manual and mechanical machining, separating and reshaping
- Assembly work, joining
- Set-up of electrical control systems
- Setup of pneumatic control systems
- PLC programming
- Commissioning of mechanical, electrical and pneumatic systems
- Fault-finding
- Automation of workflows
- Workpiece separation
- Sensor technology

Specifications:

Aluminium profile plate: 80 x 230 mm
Operating voltage: 24 VDC
Sensors:

- 1 fill level sensor (micro-switch)
- 2 cylinder limit switches

Actuators:

- 1 double-acting pneumatic cylinder
- 1 x 5/2-way valve

Transfer modules:

- 2 x 8-bit transfer plugs

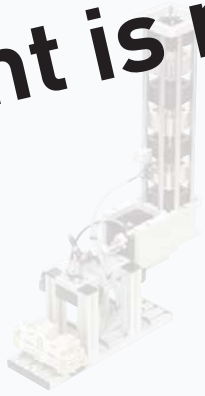
Requirements of the PLC:

- 3 digital PLC inputs
- 2 digital PLC outputs

Required connection cable:

- 2 pieces (Order-No. 53731 or 53609)

Magazine Unit 2



In magazine unit 2, up to 8 stacked workpieces can be accommodated. **In contrast to magazine unit 1, the cube halves, including inserted connection pins, can be accommodated.** This means systems can be put together, in which there is no pin unit.
In conjunction with magazine unit 1, cube halves with pins and without pins can be separated alternately and joined together in the press functional unit.

	English	Spanish
Article	**Order-No.**	
As manufacturing kit – complete material kit*	64285	
As assembly kit – complete material kit (processed)*	64286	
Fully assembled module – incl. technical documentation*	64359	
Project workbook for the student	64783	64735
Project workbook for the lecturer	64782	64734

*Includes 3 workpieces (black, white, aluminium) and 6 spring pins

Learning objectives:

- Work planning, technical communication
- Testing, marking and identification
- Manual and mechanical machining, separating and reshaping
- Assembly work, joining
- Set-up of electrical control systems
- Setup of pneumatic control systems
- PLC programming
- Commissioning of mechanical, electrical and pneumatic systems
- Fault-finding
- Automation of workflows

Specifications:

Aluminium profile plate: 80 x 230 mm
Operating voltage: 24 VDC
Sensors:

- 1 fill level sensor (micro-switch)
- 2 cylinder limit switches

Actuators:

- 1 double-acting pneumatic cylinder
- 1 x 5/2-way valve

Transfer modules:

- 2 x 8 Bit transfer plugs

Requirements of the PLC:

- 3 digital PLC inputs
- 2 digital PLC outputs

Required connection cable:

- 2 pieces (Order-No. 53731 or 53609)

Conveyor Unit, short

The belt conveyor consists of a 405 mm long and 50 mm wide belt line. At the end of the belt conveyor section there is a sensor that starts and stops the belt conveyor as soon as a workpiece is detected. The motor is actuated via a reversing contactor circuit. This means the belt conveyor can be moved in both directions alternately. The functional unit is completely built on two assembly platforms and can be flexibly mounted individually or with other functional assemblies on an aluminium profile plate

Article	Order-No.	
As manufacturing kit – complete material kit*	64319	
As assembly kit – complete material kit (processed)*	64265	
Fully assembled module – incl. technical documentation*	64339	
Project workbook for the student	64198	64712
Project workbook for the lecturer	64197	64711

*Supplied without workpieces

Learning objectives:

- Work planning, technical communication
- Testing, marking and identification
- Manual and mechanical machining, separating and reshaping
- Assembly work, joining
- Set-up of electrical control systems
- PLC programming
- Commissioning of mechanical and electrical systems
- Fault-finding
- Automation of workflows

Specifications:

Conveyor section: 405 mm
Belt width: 50 mm
Aluminium profile plate: 80 x 285 mm
Operating voltage: 24 VDC
Sensors:
- 1 light sensor with fibre
Actuators:
- 1 x 24 V DC motor
- 2 motor relays
Transfer modules:
- 2 x 8-bit transfer plugs

Requirements of the PLC:
- 1 digital PLC input
- 2 digital PLC outputs

Required connection cable:
- 2 pieces (Order-No. 53731 or 53609)

Conveyor Unit, long

The belt conveyor consists of a 680 mm long and 50 mm wide belt line. At the end of the belt conveyor section there is a sensor that starts and stops the belt conveyor as soon as a workpiece is detected. The motor is actuated via a reversing contactor circuit. This means the belt conveyor can be moved in both directions alternately. The functional unit is completely built on two assembly platforms and can be flexibly mounted individually or with other functional assemblies on an aluminium profile plate

Article	Order-No.	
As manufacturing kit – complete material kit*	64305	
As assembly kit – complete material kit (processed)*	64266	
Fully assembled module – incl. technical documentation*	64325	
Project workbook for the student	64417	64714
Project workbook for the lecturer	64418	64713

*Supplied without workpieces

Learning objectives:

- Work planning, technical communication
- Testing, marking and identification
- Manual and mechanical machining, separating and reshaping
- Assembly work, joining
- Set-up of electrical control systems
- PLC programming
- Commissioning of mechanical and electrical systems
- Fault-finding
- Automation of workflows

Specifications:

Conveyor section: 680 mm
Belt width: 50 mm
Aluminium profile plate: 80 x 285 mm
Operating voltage: 24 VDC
Sensors:
- 1 M3 light sensor with fibre optic amplifier

Actuators:
- 1 x 24 V DC motor
- 2 motor relays

Transfer modules:
- 2 x 8-bit transfer plugs

Requirements of the PLC:
- 1 digital PLC input
- 2 digital PLC outputs

Required connection cable:
- 2 pieces (Order-No. 53731 or 53609)

Testing Unit

Learning objectives:

- Work planning, technical communication
- Testing, marking and identification
- Manual and mechanical machining, separating and reshaping
- Assembly work, joining
- Setup of electrical and pneumatic control systems
- Sensors and their application
- PLC programming
- Commissioning of mechanical, electrical and pneumatic systems
- Fault-finding
- Automation of workflows

Technical data and more information at **www.christiani-international.com/64306**

The testing unit consists of four testing stations at which workpieces can be checked for their material properties and outlines. For examination of material characteristics, an optical, a capacitive and an inductive sensor are employed. For examination of the workpiece outline, a pneumatic cylinder is used as a mechanical sensing device. The functional unit is set up entirely on an assembly platform and can be flexibly mounted on an aluminium profile plate either individually or with other functional units.

	English	Spanish
Article	**Order-No.**	
As manufacturing kit – complete material kit	64306	
As assembly kit – complete material kit (processed)	64270	
Fully assembled module – incl. technical documentation	64326	
Project workbook for the student	64432	64716
Project workbook for the lecturer	64433	64715

Sorting Unit

Assortment is no longer available

Learning objectives:

- Work planning, technical communication
- Setup of electrical and pneumatic control systems
- Sensors and their application; ultrasonic technology
- PLC programming
- Commissioning of mechanical, electrical and pneumatic systems
- Fault-finding
- Sorting processes

Technical data and more information at **www.christiani-international.com/65707**

The sorting unit consists of an inspection area and a section for sorting with three cylinders and three chutes. The sorting unit is designed to be attached to the long belt conveyor functional unit. At the inspection area, the workpieces are checked for their material characteristics and outline. To do this, an optical sensor, inductive sensor and ultrasonic sensor are used. After the workpieces have been inspected, the belt conveyor (not supplied) then takes them along to the ejection cylinders. Depending on the material, the cubes are then sorted and pushed into one of three chutes. The functional unit is set up entirely on an assembly platform. Two versions of the fully assembled functional unit are available (left/right), depending on the direction of the material flow. Please note this when placing your enquiry.

	English	Spanish
Article	**Order-No.**	
As manufacturing kit – complete material kit	65707	
As assembly kit – complete material kit (processed)	65708	
Fully assembled module – incl. technical documentation Right-hand sensor unit variant (as shown above)	65709	
Fully assembled module – incl. technical documentation Left-hand sensor unit variant (not shown)	69709	
Project workbook for the student	65714	65664
Project workbook for the lecturer	65713	65663

Handling Unit

Learning objectives:

- Work planning, technical communication
- Testing, marking and identification
- Manual and mechanical machining, separating and reshaping
- Assembly work, joining
- Set-up of electrical control systems
- PLC programming
- Commissioning of mechanical, electrical and pneumatic systems
- Fault-finding
- Automation of workflows

Technical data and more information at
www.christiani-international.com/64316

The handling unit offers three axes of movement – rotation via a geared motor with rotary encoder as well as vertical and horizontal retraction and extension via two anti-twist pneumatic cylinders. With the vacuum gripper, workpieces can be lifted and transported along the turning radius and positioned where desired. To evaluate the rotary encoder signal, a control system with two fast meter inputs is required, e.g. one of the SIMATIC compact CPUs from series 31xC.

Article	Order-No.	
As manufacturing kit – complete material kit	64316	
As assembly kit – complete material kit (processed)	64499	
Fully assembled module – incl. technical documentation	64336	
Project workbook for the student	64404	64723
Project workbook for the lecturer	64405	64722

Swivel Arm

Learning objectives:

- Work planning, technical communication
- Manual and mechanical machining, separating and reshaping
- Assembly work, joining
- Vacuum technology
- Setup of electrical and pneumatic control systems and programmers
- Commissioning of mechanical, electrical and pneum. systems
- Fault-finding

Technical data and more information at
www.christiani-international.com/65692

The swivel arm has the task of lifting workpieces from one position and depositing them again at a second position, rotated by 180°. Both positions must be on a straight line, but can be at different heights. The swivel arm consists of a 185 mm long arm at the end of which there is a vacuum cup. The workpieces are lifted by the suction unit, the arm then swivels around in an arc of max. 180° in the opposite direction and deposits the workpiece there. It is driven by a rotating pneumatic cylinder. The swivel angle can be adjusted with two stops. Both end positions can be queried via the cylinder switch. The swivel arm is mounted on one base plate. The operating pressure is 4 bar.

Article	English Order-No.
As manufacturing kit – complete material kit	65692
As assembly kit – complete material kit (processed)	65693
Fully assembled module – incl. technical documentation	65694
Project workbook for the student	65699
Project workbook for the lecturer	65698

Pneumatic Press

Learning objectives:

- Work planning, technical communication
- Testing, marking and identification
- Manual and mechanical machining, separating and reshaping
- Assembly work, joining
- Setup of electrical, pneumatic control systems
- PLC programming
- Commissioning of mechanical, electrical and pneumatic control systems, Fault-finding
- Automation of workflows

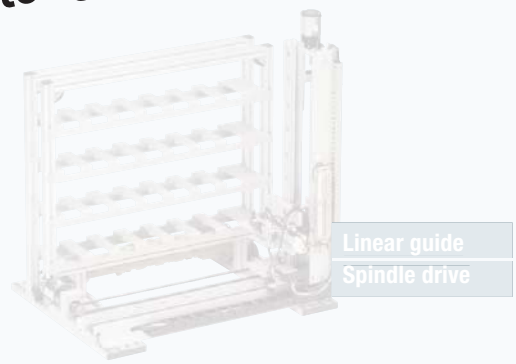
Technical data and more information at
www.christiani-international.com/64317

The pneumatic press can press cube halves. After insertion of the workpieces, the safety door closes and the workpieces are pressed by a pneumatic cylinder. After machining, a pneumatic cylinder pushes the workpieces out through the reopened safety door and into the work area, making them available for onward transport. The press has a work area which is enclosed on all sides. The plexiglas safety walls enable observation of the pressing process. As in the large model, a two-hand safety control is also used here. The functional unit is set up entirely on an assembly platform and can be flexibly mounted on an aluminium profile plate either individually or with other functional units.

	English	Spanish
Article	**Order-No.**	
As manufacturing kit – complete material kit	64317	
As assembly kit – complete material kit (processed)	64272	
Fully assembled module – incl. technical documentation	64337	
Project workbook for the student	64786	64721
Project workbook for the lecturer	64785	

Assortment is no longer available. New products are coming soon.

Automation Storage & Retrieval System



Learning objectives:

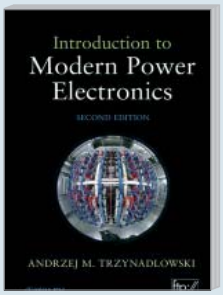
- Work planning, technical communication
- Testing, marking and identification
- Manual and mechanical machining, separating and reshaping
- Assembly work, joining
- Setup of electrical control systems
- Setup of pneumatic control systems
- PLC programming
- Commissioning of mechanical, electrical and pneumatic systems
- Fault-finding
- Automation of work processes

Technical data and more information at
www.christiani-international.com/64403

The automation storage and retrieval system consists of the ASRS VA, ASRS HA and shelving assemblies, which are mounted together on two assembly platforms. The combination of ASRS VA and ASRS HA enables filling of the shelving in two dimensions. Workpieces are accepted and entered in the shelving for storage. In total, there are 28 available storage spaces. The ASRS HA carriage transports the ASRS VA. On the ASRS VA carriage, there is a double-acting pneumatic cylinder with a fork for lifting workpieces. The operating pressure is 4 bar.

	English	Spanish
Article	**Order-No.**	
As manufacturing kit – complete material kit	64403	
As assembly kit – complete material kit (processed)	64279	
Fully assembled module – incl. technical documentation	64402	
Project workbook for the student	64778	64733
Project workbook for the lecturer	64777	64732

Specialised Books

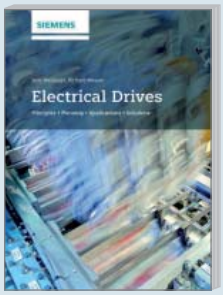


Modern Power Electronics

Second Edition 2010, 436 pages

This updated edition of this book provides comprehensive coverage of modern power electronics, addressing all the latest trends and hot-button issues--from PWM rectifiers to renewable energy systems to electromagnetic interference. It features an overview of advanced control methods used in today's power electronic converters, numerous SPICE files of typical power conversion circuits, and an Instructor's Manual with solutions to all problems. An extensive body of examples, exercises, computer assignments, and simulations make it highly suitable as a textbook for undergraduate/graduate students of engineering in electrical engineering, industrial engineering or renewable energy, and practicing engineers.

Order-No.
74386



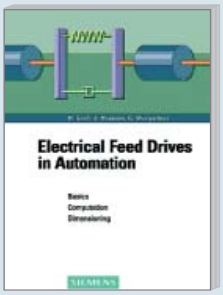
Electrical Drives

Principles, Planning, Applications, Solutions

1. edition 2014, 397 pages

From the point of view of a user this book covers all aspects of modern electrical drives. It is aimed at both users, who wish to understand, design, use, and maintain electrical drives, as well as specialists, technicians, engineers, and students, who wish to gain a comprehensive overview of electrical drives.

Order-No.
97148

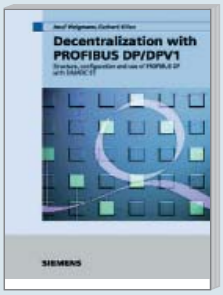


Electrical Feed Drives in Automation

1. edition 2001, 336 pages

This book provides a comprehensive introduction into the fundamental physics and basic technical principles of automatic control and drive technology. It pays particular attention to the design and dimensioning of electrical feed drives in automation technology.

Order-No.
74468



Decentralization with PROFIBUS DP/DPV1

2003, 251 pages

In addition to providing basic knowledge of PROFIBUS, the book concentrates on configuring PROFIBUS DP with STEP 7, explains various methods of data interchange with user programs and provides useful advice on commissioning and troubleshooting. A range of practical examples on the basis of SIMATIC programmable logic controllers help users make the transition from theory to practice.

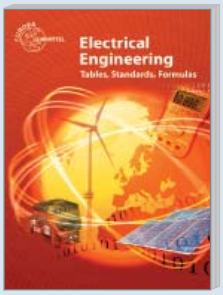
Order-No.
74473

Automating with Profinet

Second edition 2008, 462 pages

PROFINET is the first integrated Industrial Ethernet Standard for automation, and utilizes the advantages of Ethernet and TCP/IP for open communication from the corporate management level to the process itself.

Order-No.
74472



Electrical Engineering

Tables, Standards, Formulas

2. edition 2015, approx. 540 pages, 15,2 x 21,5 cm, paperback

Europa-Technical Book Series for the electrotechnical, electronic and information technology trades.

Order-No.
83017

Pneumatic Hose Set for mMS Functional Units

6 mm pneumatic hose for connection of the pneumatic service unit to a compressor. On one side with pneumatic quick connector coupling. **Length: 3 m.**

Pneumatic Hose (meter goods)

Prices per meter. Please specify the length when placing an order.

Article	Order-No.
(d=4 mm)	60502
(d=6 mm)	60535

Connecting Cable

10-pin round cable, AWG 22 (0.34 mm²), length 3 m, colour-coded, with 10-pin female connector on one side.

Order-No.
53731

For more cables in different designs and cross-sections, see **www.christiani-international.com**

Hose Cutter

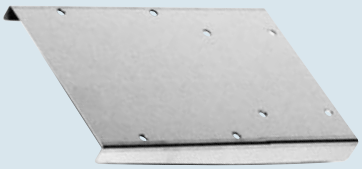
For easy and neat shortening of pneumatic hoses.
Plastic clamp.

Hose Puller

For hoses with a diameter of 4 mm or 6 mm, one-handed use possible.

Holding Plate for the Functional Unit Operator Panel

The holding plate is used to secure the operator panel outside the T-groove plate, in case there is not sufficient space there due to the allocation of other functional units.



Order-No.
64486

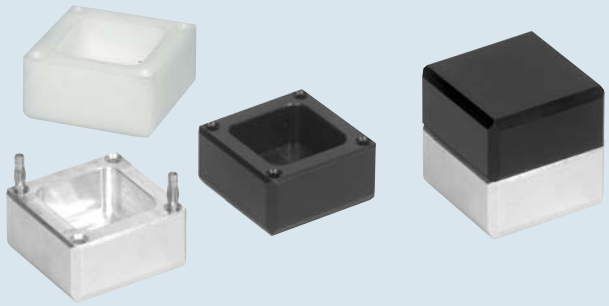
Grooving Plate Connector Set

Enables a simple and stable connection of the base plates of the mMS stations when several stations are arranged next to each other. Scope of delivery: 2 clamping clasps, 2 aluminium profile connectors, fastening material.

Order-No.
53441

Workpieces and Spring Pins

Appropiate cube for processing in the mMS-system. Three different types of cube halves are available. In addition, spring pins are required, to process the cube halves in the functional units pin station and press. For a complete cube 2 cube halves + 2 spring pins are required. All parts are completely processed.



Article	Order-No.
Cube half aluminium 50x50x25mm (SU = 4)	53320
Cube half POM black 50x50x25mm (SU = 4)	53321
Cube half POM white 50x50x25mm (SU = 4)	53322
Spring pins for cube halves (SU=10)	53331
Cube set (1 x aluminium cube half, 1 x POM black cube half, 2 x spring pins)	53485
Cube set (1 x aluminium cube half, 1 x POM black cube half, 1 x POM white cube half, 2 spring pins)	54099

Compressors Low-noise

Portable low-noise compressor, suitable for use in classrooms. 0.34 kW, 230 V AC, 23 kg, W/D/H 370x370x520 mm, tank 15 ltr., 50 l/min, 40 dB(A)

Low noise, therefore ideal for use in enclosed spaces and classrooms.

Order-No.
69444

Portable piston compressor, fully automated operation, 0.34 kW, 230 VAC, 21 kg, W/D/H 360 x 360 x 430 mm, tank 9 l., 50 l/min, 33 dB(A), filter pressure reducer for regulated compressed air cleaned from condensate, dirt and oil. Working almost noiselessly, Therefore directly deployable in training rooms or at the workplace.

Order-No.
64080

Trolleys

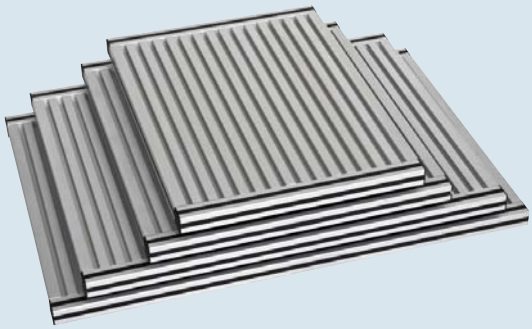
Profile trolleys for base plates, without slotted plates, fully processed, dismantled prior to shipment.

- Stable 30 mm aluminium profile
- For attaching the slotted plates
- Lockable plastic rollers
- Slot 8
- Slot spacing 25 mm

Profile Trolley 355 x 550 x 800 mm	Order-No.
Assembly kit	64299
Ready for use	64223

Profile Trolley 655 x 550 x 800 mm	Order-No.
Assembly kit	64232
Ready for use	64222

Base Plates (T-slotted plates)



made of 30 mm aluminium profile

Base plate (slotted plate), 400 x 550	Order-No.
Manufacturing kit	84018
Assembly kit	84057
Ready for use	84051

Base plate (slotted plate), 500 x 550	Order-No..
Manufacturing kit	84050
Assembly kit	84056
Ready for use	84052

Base plate (slotted plate), 700 x 550	Order-No.
Manufacturing kit	84001
Assembly kit	84055
Ready for use	84053

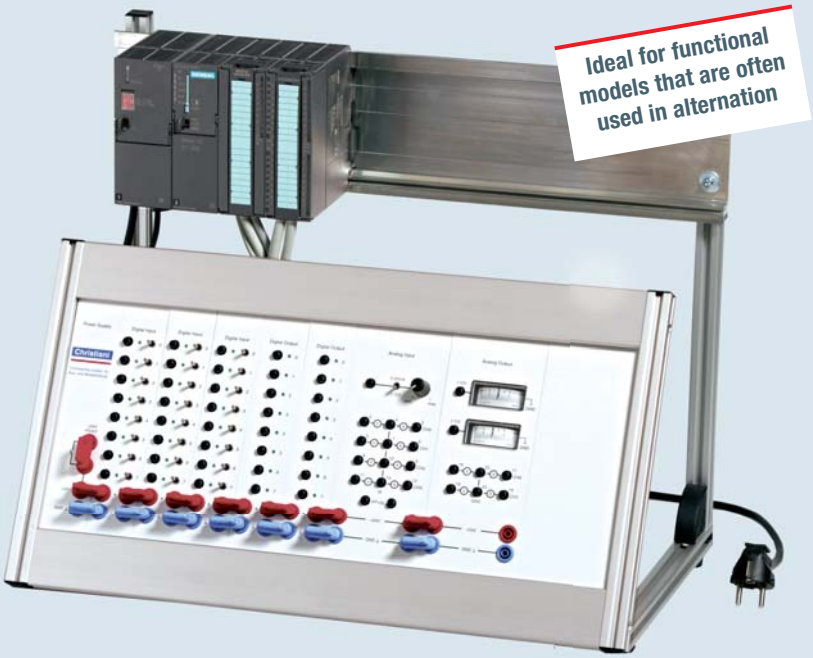
Base plate (slotted plate), 800 x 550	Order-No.
Manufacturing kit	84031
Assembly kit	84054
Ready for use	84049

For more information and accessories, go to **www.christiani-international.com**

Control systems for individual use

Control systems can be just as diverse as the mechatronic systems they control. We therefore offer the right controller for every potential application – in terms of both performance and design.

PLC Training Racks



PLC Training Racks are ideal when different functional models are to be used in alternation. The 4 mm laboratory sockets enable **quick and easy wiring.** All inputs and outputs have status LEDs, while all inputs have additional flip/latch switches for simulating input signals. The standard models have up to 24 digital inputs, 16 digital outputs, up to 2 analogue inputs and 4 analogue outputs, as well as an MPI, ProfiBus and ProfiNet interface.

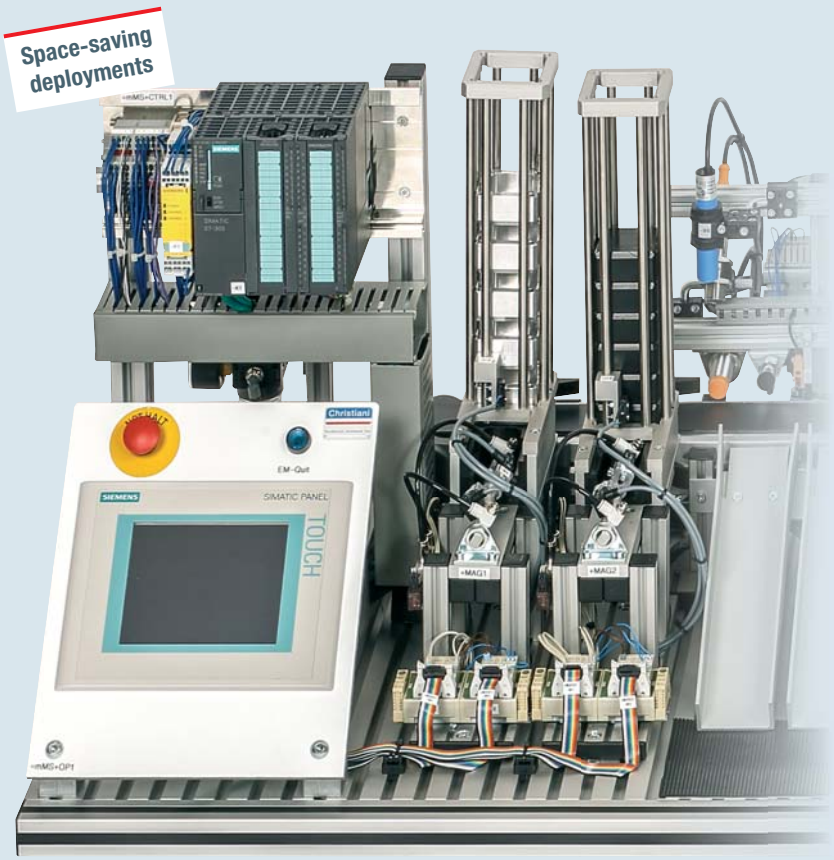
The Christiani PLC Training Racks are available in many different configurations. Let us know what you need and we will be happy to draw up an individual offer.

You can find more information and versions at:
www.christiani-international.com

TABLE-TOP PLC

When working with compact control systems, it can often make sense to fit them above the slotted plate. This particularly **ergonomic arrangement** simplifies access, for example when taking measurements, and also improves visibility. As such, the status displays are always in the operator's field of vision and at eye level when working on the system. TABLE-TOP control systems **focus on what is technically necessary.** Mechatronic systems with TABLE-TOP control systems also do not require trolleys, which makes the systems **more compact and mobile** overall. In addition to this, all control systems can be ideally equipped with modern touchscreen displays as user interface (HMIs). Christiani's TABLE-TOP control systems allow you to relax, safe in the knowledge that you are using state-of-the-art systems.

We would also be happy to draw up an individual offer based on the specific mechatronic system you require.



The “industrial” controller for your mechatronic system

Mechatronic Control Board (MCB)

For even more efficient and practical training, we have developed the perfect control system for training with Christiani’s mMS mechatronic systems in the fields of mechatronics, automation technology, control technology and PLC programming. This enables you to prepare your trainees optimally for their later professional practice.

Learning objectives:

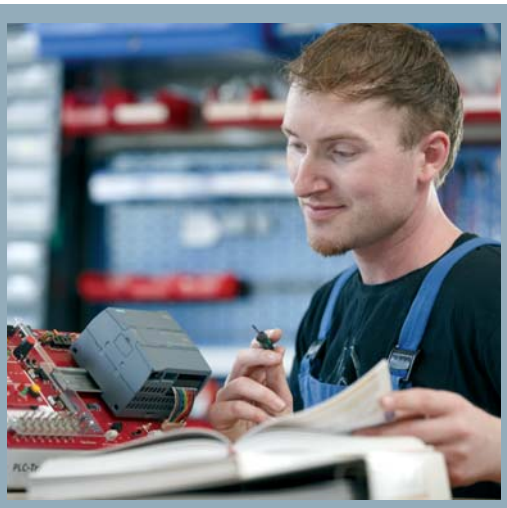
Mechanics:
- Reading and understanding technical drawings
- Basics of mechanical processing
- Establishing mechanical connections, installation/assembly work

Electrics:
- Reading circuit diagrams and wiring plans
- Control system and control cabinet engineering
- Assembling and connecting electrical components
- Wiring technology
- Safeguarding electrical systems
- Protection engineering
- Emergency stop switching devices, emergency stop circuits
- PLC technology, setup of p… logic controllers

Control…
- …uring and programming control systems
- Documenting and archiving programs
- Basics of 3-phase AC technology
- Asynchronous motors
- Frequency inverter technology, installing parametrising and commissioning frequency inverters
- Drive technology, using motors with frequency inverters
- Analysing control circuits
- Testing and commissioning automation systems
- Tracing signals and testing via interfaces
- Troubleshooting in electrical control systems
- Applying and testing protective measures

More information at:
www.christiani-international.com

Assortment is no longer available. New products are coming soon.



Control systems and software from reputable manufacturers – unmodified or refined for training

- Siemens SIMATIC (LOGO!, S7-1200, S7-300, S7-1500)
- Phoenix Contact (nanoLine, PLC logic, Inline Controller ILC, Axiocontrol)
- ABB (PM series)
- Eaton (EASY)
- Beckhoff
- WAGO
- other providers

At Christiani, you will always find the right PLC hardware and software, whether you need it for mechatronic systems or for use in schools, (inter-)company training centres or universities.

The following pages contain information about a few selected products from our extensive range of industrial control technology products. More products and detailed product information can be found at www.christiani-international.com.

Control Systems

At Christiani, you can find control systems from most manufacturers. Often, special educational packages for training purposes are offered at particularly attractive prices.

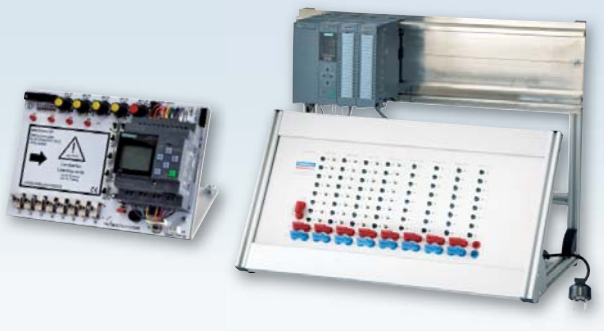
Software

At Christiani, you can find the right software for all the control systems we offer. Some packages already include the programming software, often at particularly favourable prices.

Training Boards

The control systems mounted on training boards fit in the current experiment frame systems of a range of manufacturers. They are also ideal for use as desk-top devices thanks to the inclined housings.

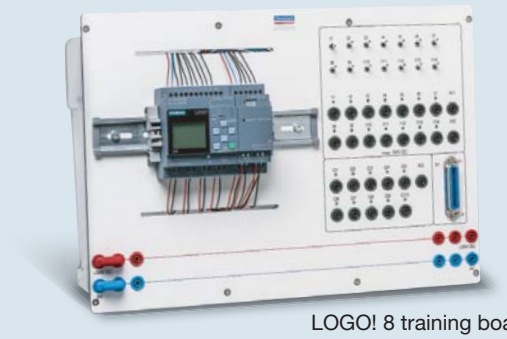
PLC Training Racks



Didactic training devices are available for many control systems. They can be equipped with a range of control systems and can thus be adapted to individual requirements.

Can't find the control system you are looking for? Simply let us know what you need and we will be happy to help.
We would be delighted to make you an individual offer with the hardware and software you are looking for.
All control systems can also be combined with the mMS mechatronic system, as well as with other mechatronic systems.
We would be pleased to help you develop an individual control concept.

Flexible training boards for most common controllers

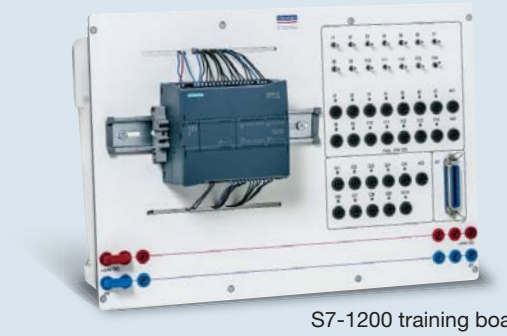


LOGO! 8 training board

LOGO! 8 training board

LOGO! training board with LOGO! module version 8 and DM8 12/24R add-on. 12 digital inputs, 8 digital outputs. To be attached to the experiment frame or for use as a desk-top device.
Operating voltage: 24 V DC; dimensions: 420 x 200 x 240 mm
Including LOGO! SoftComfort programming software.

Article	Order-No.
LOGO! 8 training board	59817
More information: www.christiani-international.com/59817	



S7-1200 training board

S7-1200 training board

Training board with SIMATIC S7-1214C DC/DC/DC. 14 digital inputs, 10 digital outputs. To be attached to the experiment frame or for use as a desk-top device.
Operating voltage: 24 V DC; dimensions: 420 x 200 x 240 mm

Article	Order-No.
S7-1200 training board	59493
More information: www.christiani-international.com/59493	

nanoLine training board

Phoenix Contact nanoLine training board

Training board with Phoenix Contact nanoLine. 12 digital inputs, 8 digital outputs. To be attached to the experiment frame or for use as a desk-top device.
Operating voltage: 24 V DC; dimensions: 420 x 200 x 240 mm

The nanoLine Navigator programming software can be downloaded free of charge from the Internet.

Article	Order-No.
Phoenix Contact nanoLine training board	59530
More information: www.christiani-international.com/59530	

nanoLine individual modules are available at www.christiani-international.com or on request

ILC training board

Phoenix Contact ILC training board

Training board with Phoenix Contact ILC. 14 digital inputs, 10 digital outputs, 2 analogue inputs, 1 analogue output. To be attached to the experiment frame or for use as a desk-top device.
Operating voltage: 24 V DC; dimensions: 420 x 200 x 240 mm

The PC Worx Express programming software can be downloaded free of charge from the Internet.

Article	Order-No.
Phoenix Contact ILC training board	59529
More information: www.christiani-international.com/59529	

Accessories

Connecting cable

"mMS functional unit" training board connecting cable
10-wire, 4 mm safety lab socket on one side,
10-pin socket strip on other side.

Depending on the functional unit to be connected,
1 - 4 connecting cables are required.

Order-No.
53609

LOGO!Learn – Advanced and Basic

The LOGO!Learn Basic and LOGO!Learn Advanced training devices provide you with optimal support in imparting knowledge on all aspects of the innovative logic module SIMATIC LOGO!
Both variants are set up on a robust aluminium bracket. Flip/latch switches are integrated for signal input, and potentiometers are built-in for analogue value input. External simulators can be connected via the 24-pin interface connector. Signal output (status) is indicated via LED. By means of sliding switches, digital inputs 7+8 are switched over to analogue inputs (0 - 10 V). Cover cards with handy exercises for different levels support the lesson and reduce the amount of preparation required by the teacher. The logic module LOGO! is mounted on both training boards in accordance with the industrial standard. It can be mounted or removed at any time using a screwdriver.

Scope of delivery:

- 1 Training device LOGO!Learn Advanced
- 1 IR remote control (without batteries)
- 1 Power supply AC 230V / DC 12V 300 mA
- 34 Learning cards (practical examples with solutions) on CD-ROM (English/Spanish/German)

Technical data:

Dimensions: (LxWxH): 215 x 145 x 100 mm (Basic)
215 x 145 x 100 mm (Advanced)
Weight: approx. 0.73 kg

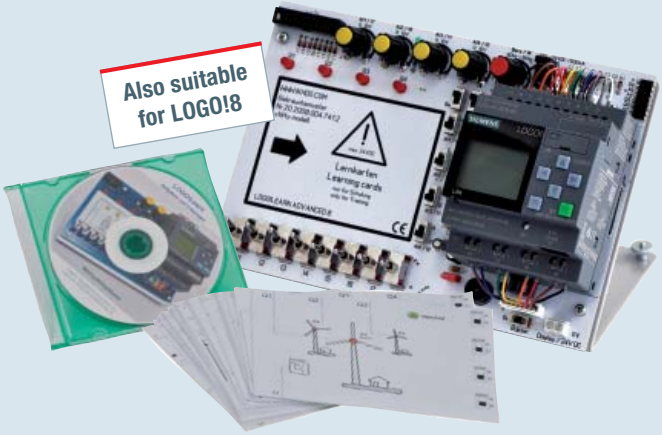
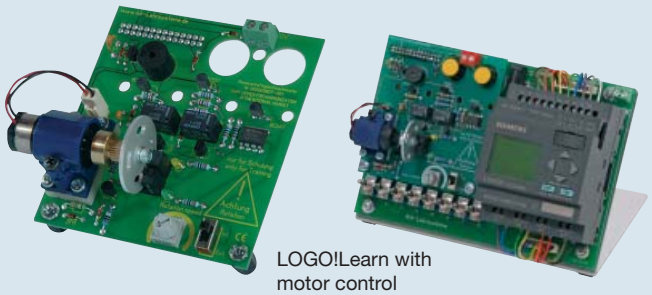


Figure displays LOGO!Learn Advanced, Order-No. 56037 and LOGO! logic module, Order-No. 55475

Article	Order-No.
LOGO!Learn Advanced	58037
LOGO!Learn Basic	58036

Expansion Module Motor Control



LOGO!Learn with motor control

A DC motor is installed on the LOGO!Learn Motor module with shafts that hold a disk with holes. The disk runs through two fork light barriers. This allows the direction of rotation and the speed to be evaluated. The speed can be adjusted using a potentiometer. Alternatively, the speed can also be controlled externally, e.g. using the LOGO!Learn Advanced training unit with plugged-in AM2 AQ expansion module or any desired 0-10V DC voltage source. The movement of the motor is displayed by 2 light-emitting diodes on the board. Clockwise/anticlockwise operation of the motor is also possible.

The following programming examples are included (on CD):

- Inching/continuous operation of a DC motor
- Reversing contactor circuit with direct switching
- Reversing contactor circuit switching via OFF
- Control of a reverse drive
- Mixer with 2 speeds (analog output)
- Surface grinding machine
- Reversing a motor
- Rotation detection of a low-speed shaft
- Centrifuge control with ramp (analog)

Order-No.
58039

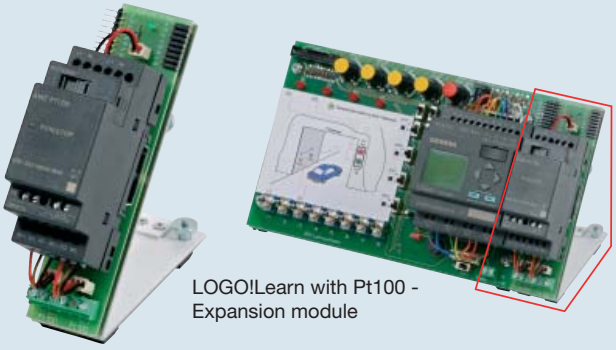
Two-point Controller Module

With this module, a control section with a 2-point controller is illustrated.

Compatible with LOGO!Learn Advanced, only in conjunction with expansion module Pt100 (item no. 58038) – with LOGO! AM2 RTD (item no. 57634).

Order-No.
59956

Expansion Module Pt100

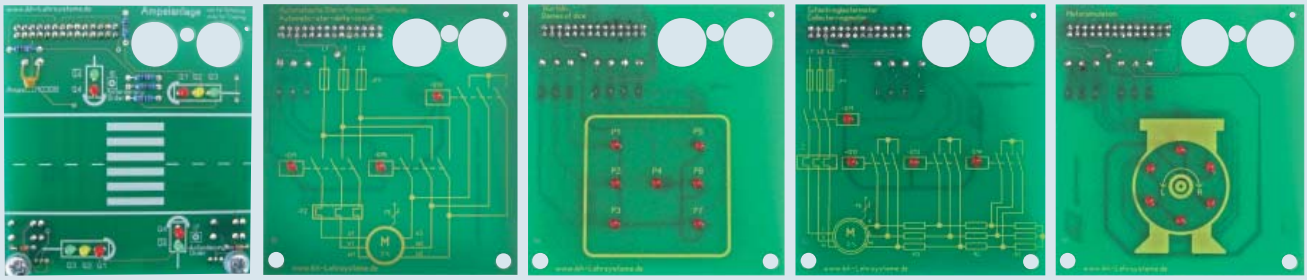


LOGO!Learn with Pt100 - Expansion module

The LOGO!Learn Pt100 expansion module can be attached to the side of the LOGO!Learn Advanced training unit. In conjunction with a LOGO! PT100 module (order no. 57634), it enables temperature measurement and monitoring.

Article	Order-No.
LOGO!Learn Pt100 expansion module	58038
Pt100 sensor	58300
LOGO! AM2 Pt100 module	57634

LOGO!Learn - Expansions



With these expansion modules for attachment to LOGO!Learn BASIC and LOGO! Learn ADVANCED, we offer you new, illustrative exercises for the logic module LOGO!.
The operating voltage is 12/24 V DC. The scope of delivery includes, in addition to the respective expansion module, the task description(s) with solution(s) on CD-ROM (in German).

Article	Order-No.
Traffic light control	58040
Automatic star-delta circuit	58309
Dice	58308
Slip ring motor	58310
LED motor	58307

Expansion Module 2AA

(without LOGO! AM2 AQ)

LOGO!Learn 2AO expansion module for coupling to the side of the LOGO!Learn Advanced. This makes 2 0-10V analogue outputs available for the LOGO!Learn Advanced, which can be used for more challenging exercises.

Article	Order-No.
Expansion module 2AA	58303
also requires LOGO! AM2 AQ	58301

Expansion Module AS-i

without LOGO! AS-i module

LOGO! Learn expansion module AS-i for lateral connection with LOGO!Learn Advanced. Four virtual inputs and outputs, interface between AS interface and the LOGO! system. With the help of this module, 4 data-bits can be transferred from the LOGO! to the AS interface system and/or vice versa.

Article	Order-No.
Expansion module AS-I (without LOGO! AS-I)	58304
also requires LOGO! AS-i module	57203

Expansion Module EIB

LOGO! Learn expansion module EIB for lateral connection to LOGO!Learn Advanced. Interface between EIB and LOGO! system. Further expansion modules can be connected to this functional unit.

Article	Order-No.
Expansion module EIB	58305
also requires LOGO! CM EIB/KNX module	57459

Expansion Module DM8

LOGO! Learn expansion module DM8 for lateral connection to LOGO!Learn Advanced. Expansion of the LOGO! Learn Advanced with four digital inputs and four digital outputs.

Article	Order-No.
Expansion module DM8	58306
also requires LOGO! DM8 24 module	58302

Remote Control for LOGO!Learn Advanced

For triggering switching operations with the LOGO!Learn Advanced. Evaluation of the transmission signals via a high-speed LOGO! counter input. Uses the RC5 code. Incl. batteries.

Order-No.
58112

Universal Power Pack

Universal power supply unit with eight adapters for power supply of all current microconsumers.
The output voltage can be adjusted in 1 volt increments via a jumper. 12 - 24 V/DC output voltage, adjustment of the output voltage via connector for greater security, for consumers up to max. 1.9 A, 40 W power.

Order-No.
54100

LOGO! Starter Boxes

With LOGO! 8, the successful Siemens logic module is moving into the next generation. The new module meets almost all customer wishes for simplified handling, with new display and full communication between the LOGO! logic module and S7-300 PLCs via Ethernet. In addition, the LOGO! module can also be networked with the BASIC Touch Panels.

LOGO! 8 Starter Box	Order-No.
with LOGO! 8, 12/24 V	55469
with LOGO! 8, 230 V	55470

Scope of delivery and details at:
www.christiani-international.com/55469 or 55470

LOGO! TDE Starter Box

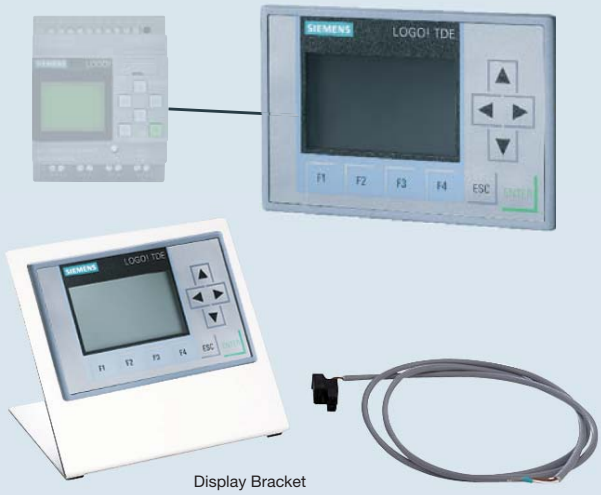
The LOGO! TDE is a cost-effective operator interface for compact controllers with the logic module LOGO!. The processes of modification and troubleshooting are easy to execute with the LOGO! TDE and its integrated operator and diagnostics functions.

Features: controllable background lighting, multilanguage character sets, 12/16 standard character per line, display of up to 50 messages, switching between 2 monitors, scrolling of up to 32 characters, display of up to 4 bars.

Article	Order-No.
LOGO! TDE Starter Box with LOGO! 8	55471

Scope of delivery and details at:
www.christiani-international.com/55471

LOGO! TDE Text Display and Display Bracket



Display Bracket

Scope of delivery and details at:
www.christiani-international.com/55472 or 58319 or 59902

LOGO! TDE text display

Individual, for connection to existing LOGO! modules. You can easily upgrade your existing LOGO! control system to this handy display and control unit.

Article	Order-No.
LOGO! TDE text display for LOGO! 8	55472

LOGO! Learn display bracket

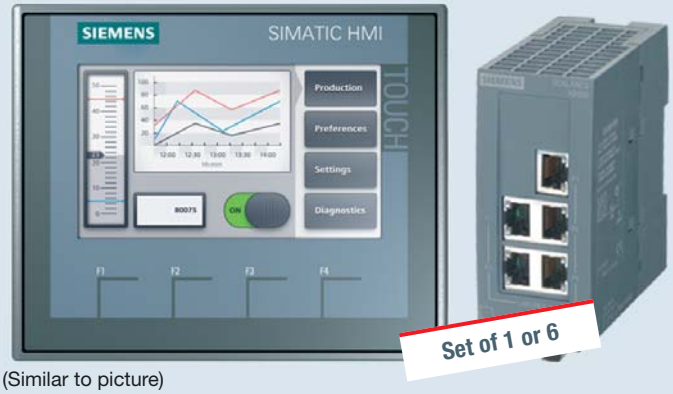
Handy display bracket to hold the LOGO! TDE text display. Ideal for experiment set-ups and for using the LOGO! TDE in lessons. For selfassembly.

Article	Order-No.
LOGO! Learn display bracket without LOGO! TDE	58319

LOGO! TDE text display and display bracket in set

Article	Order-No.
LOGO! Learn Display (LOGO! TDE and display bracket in set)	59902

SCE Trainer Package KTP 400 for LOGO! [1)]



(Similar to picture)

With the KTP 400 Trainer Package, you can upgrade your LOGO! logic module with a contemporary graphical user concept.
This set is the ideal addition to the LOGO! trainer packages from 0BA7. Configuration is carried out using the included TIA Portal Basic software.

Scope of delivery:

Depending on the package
- 1x/6x KTP 400 Basic Color PN
  (4“ widescreen colour TFT with touch/keyboard operation)
- 1x/6x LOGO! 4-Port switch XB005
- 2x/12x Ethernet cable, 6 m
- 1x/6x WinCC Basic (TIA Portal)

Article	Order-No.
Trainer Package KTP 400 - Set of 1	54090
Trainer Package KTP 400 - Set of 6	54091

LOGO! Trainer Packages with LOGO! 8 [1)]

Tailored to the training, these new trainer packages are available for LOGO! 8. In addition to six logic modules of the latest generation, they also include the current version of the LOGO! SoftComfort programming software.

Scope of delivery:

Depending on the package
- 6x LOGO! 12/24 RCE or 6x LOGO! 230 RCE
- 6x LOGO! DM8 12/24R or 6x LOGO! DM8 230R
- 6x LOGO! Soft Comfort

The different lengths of Ethernet cables suitable for the trainer packages can be found under „Accessories“ at www.christiani-international.com/55473 or 55474

Article	Order-No.
LOGO! Trainer Package 12/24V (LOGO! 8)	55473
LOGO! Trainer Package 230V (LOGO! 8)	55474

LOGO! Trainer Packages with LOGO! 0BA6 [1)]

USB

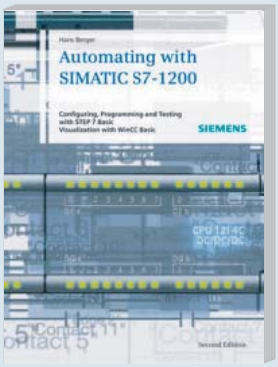
If you do not wish to network your control systems, these unbeatably cost-effective trainer packages for LOGO! 0BA6 are your first choice for training. The package includes a programming cable. The optionally available trainer package PC cable acts as an extension, if a separate programming cable is to be available for each LOGO! module.

Scope of delivery:
- 5 x LOGO! 0BA6 logic module (12/24 RC or 230 RC)
- 5 x LOGO! SoftComfort (6 languages DE/EN/FR/IT/ES/CN)
- 1 x USB programming cable

Article	Order-No.
LOGO! Trainer Package 12/24 RC (0BA6)	56540
LOGO! Trainer Package 230 RC (0BA6)	56541
LOGO! PC cable Trainer Package with 4 x USB cables for LOGO! modules up to version 0BA6	57514

1) Please note that special licence rules apply to these products. Please download the licensing agreement for the respective product from www.christiani-international.com, sign and stamp it and then submit it together with your order. No sales to private individuals.

Teachware



Automating with SIMATIC S7-1200

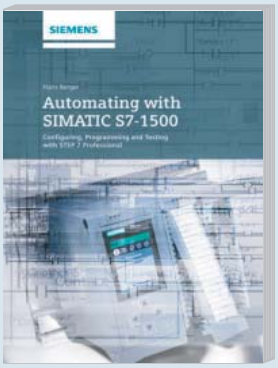
Configuring, Programming and Testing with STEP 7 Basic. Visualization with WinCC Basic

2. edition 2013, 575 pag

The SIMATIC S7-1200 PLC offers a modular design concept with similar functionality as the well-known S7-300 series. Being the follow-up generation of the SIMATIC S7-200 the controllers can be used in a versatile manner for small machines and small automation systems. Simple motion control functionalities are both an integral part of the micro PLC and an inte-grated PROFINET interface for programming, HMI link and CPU-CPU communication.

Beginners learn the basics of automation with SIMATIC S7-1200 and advanced users of S7-200 and S7-300 receive the knowledge required to work with the new PLC.

Order-No.
93429



Automating with SIMATIC S7-1500

Configuring, Programming and Testing with STEP 7 Professional

1. edition 2014, 831 pag

With many innovations, the SIMATIC S7-1500 programmable logic controller (PLC) sets new standards in productivity and effi ciency in control technology. By its outstanding system performance and with PROFINET as the standard interface, it ensures extremely short system response times and the highest control quality with a maximum of flexibility for most demanding automation tasks.

The engineering software STEP 7 Professional operates inside TIA Portal, a user interface that is designed for intuitive operation. Functionality includes all aspects of Automation: from the configuration of the controllers via the programming in the IEC languages LAD, FBD, STL, and SCL up to the program test.

Order-No.
99871

Practical Samples with LOGO!

Teachware, approx. 140 pages,
numerous pictures. 1st Edition 2010-08-13

The teachware includes 34 practical examples and solutions. The technology schemes with extensive description are being printed in the form of learning cards. The content is based on the principle „From easy to demanding“ and is very well suited for independent study. The solutions can be found on the accompanying DVD as ladder diagram or functional plan.

All programs were created with the software LOGO! Soft Comfort and tested with LOGO!Learn training devices of IKHDS. Of course all exercises can be used with other commercially available PLCs.

Article	Order-No.
A4 Folder	54137
Content on CD	54139

PLC-Examples with SIMATIC S7-1200

Teachware, approx. 170 pages,
numerous pictures, 1st Edition 2010-08-13

This teachware provides a quick and practical introduction to modern programming the S7-1200 with TIA portal. The technology schemes with extensive description are being printed in the form of learning cards. The content is based on the principle „From easy to demanding“ and is very well suited for independent study. The solutions can be found on the accompanying DVD. Of course all exercises can be used with other commercially available PLCs.

All programs were created with the software Simatic S7 Basic for S7-1200 from Siemens and tested with the training device PLC-Trainer 1200 of IKHDS.

Article	Order-No.
A4 Folder	54140
Content on CD	54141

SIMATIC® S7-1200 / S7-300 / S7-1500

Convey the new dimension of automation technology to your trainees. The solving of automation tasks will become as easy as child´s play with the innovative SIMATIC S7-1200 and S7-1500 controllers and the seamless integrated programming interface TIA-Portal. Alternatively we offer to you practice-oriented teaching equipment with the proven S7-300 controllers. The new SIMATIC touch panels of the KTP series will make your visualisation to an optical adventure. In combination with the mechatronics systems you will teach automation technology with state-of-the-art technology.

S7-1200 with TIA Portal
Starter sets and Trainer Packages

S7-1200 Starter Boxes

SIMATIC S7-1200, the modular, compact control system, is perfectly geared towards a wide range of applications and is the heart of our offering for integral and comprehensive automation solutions. Together with the powerful SIMATIC S7-1200 control system, a seamless range of SIMATIC HMI Basic Panels and the convincing functions of the fully integrated SIMATIC STEP 7 basic engineering software, you will achieve an unequalled level of efficiency in simple, but ultra-precise, automation tasks.
Discover the SIMATIC S7-1200 – simpler than ever before! With the three different SIMATIC S7-1200 starter kits, you can start working with your automation solution at once.

- 1212C AC/DC/RLY CPU
- STEP 7 Basic V13 (TIA Portal)
- SIM 1274 digital input simulator
- Industrial Ethernet cable
- Systainer
- Documentation on CD

Order-No.
58613

Similar to as shown

- 1212C AC/DC/RLY CPU
- KTP400 Basic touch screen
- STEP 7 Basic V13 (TIA Portal)
- SIM 1274 digital input simulator
- Industrial Ethernet cable
- Systainer
- Documentation on CD

Order-No.
58614

Similar to as shown

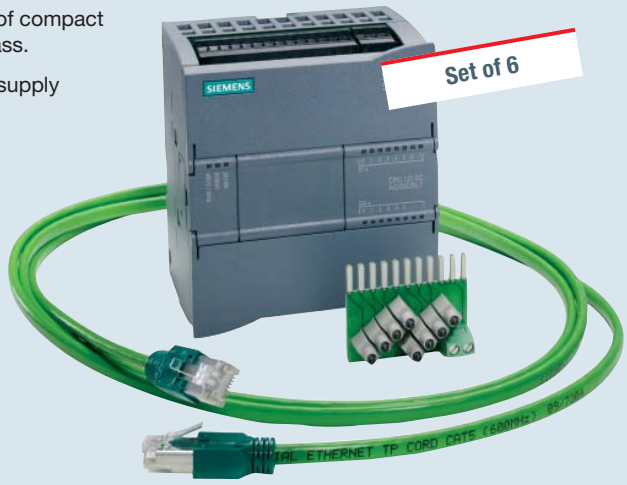
- 1212C AC/DC/RLY CPU
- KTP700 Basic touch screen
- STEP 7 Basic V13 (TIA Portal)
- SIM 1274 digital input simulator
- Industrial Ethernet cable
- Systainer
- Documentation on CD

Order-No.
58615

S7-1200 Compact CPU 1214C, Sets of 6, with On-Board I/O (Trainer Packages) [1)]

Let yourself and your trainees be impressed by the SIMATIC S7-1200 control system and experience the world of the innovative STEP 7 BASIC V13 project planning software. Create control projects, and then network, test and observe. All this is made possible by the STEP 7 BASIC V13 project platform. One application for all your requirements in the field of compact PLCs. A unique, integrated automation solution in the compact control system class.

- 6 x 1214C DC/DC/DC CPU, 14 DI, 24 V DC, 10 DO, 24 V DC, 230 V DC power supply
  or
  6 x 1214C AC/DC/RLY CPU, 14 DI, 24 V DC, 10 RO, 230 V AC power supply
- 6 x STEP 7 Basic V13 (TIA Portal)
- 6 x SIM 1274 digital input simulators (for 8 DI)
- 6 x SB 1232 analogue outputs, 1 AO, +/-10 V DC or 0 - 20 mA (11 Bit)
- 6 x industrial Ethernet cables



Article	Order-No.
Set of 6 x S7-1214C (DC/DC/DC)	**58588** [1)]
Set of 6 x S7-1214C (AC/DC/RLY)	**58589** [1)]
6 x SIMATIC S7 TIA Basic Portal Upgrade to TIA Portal version 13 For all company training centres in which SIMATIC S7 TIA Basic Portal is already available in an earlier software version.	**54092** [1)]

[1)]Note: Special licensing restrictions apply. Please download the licensing agreement for the respective product from www.christiani-international.com, sign and stamp it and then submit it together with your order. No sales to private individuals.

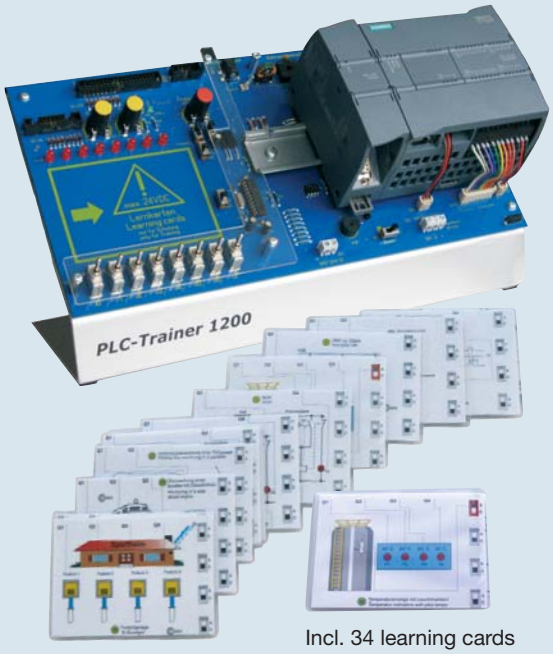
SIMATIC 7" KTP700 Basic Colour Touchscreen [1)]

Depending on the package, contains:
- 1x/6x SIMATIC 7" KTP700 BASIC colour touchscreen with PROFINET interface
- 1x/6x SCALANCE XB005 industrial Ethernet switches
- 2x/12x SIMATIC NET industrial Ethernet cables, l=6 m

IMPORTANT NOTE:
WINCC Basic V13 (included in STEP7 Basic V13/STEP7 Professional V13) is required for the project.
The KTP700 can be used with SIMATIC S7-1200/S7-1500.

Article	Order-No.
KTP700 pack of 1 [1)]	**54088**
KTP700 pack of 6 [1)]	**54089**

S7-1200 Training Rack and Accessories



Incl. 34 learning cards

The ideal tool for getting to know the S7-1200 control system or gaining in-depth knowledge.
- PLC training rack 1200 for the S7 1214C DC/DC/DC CPU
- On aluminium bracket
- Flip/latch switch for signal input
- Potentiometer for analogue value input
- LEDs for status display at the outputs
- Frequency generator and IR receiver on board
- Learning card field with 34 practical exercises (learning cards)
- Tasks and solutions on CD
- Incl. power supply
- Can be extended with motor control unit, traffic lights, etc.
- Also requires an S7-1200 1214C CPU (DC/DC/DC)

Order-No.
58591 (without S7-1200)

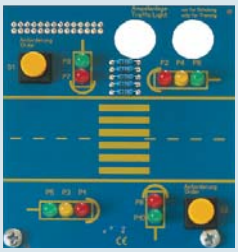
Matching CPUs:
- CPU 1214C, compact CPU, DC/DC/DC, 14DI, 10DO, 2AI **Order-No. 59521**
- SCE S7-1200 Training Package DC/DC/DC **Order-No. 58588**

Motor Control

- To be plugged into the S7-1200 training rack
- with exercises and solutions on CD
- Jog/continuous mode of a DC motor
- Recognition of the rotating direction of a motor
- Reversing contactor circuit
- Surface-grinding machine
- Control of a discharge drive

Order-No.
58617

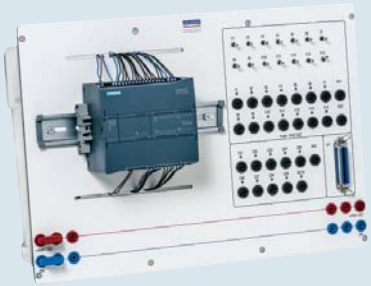
Traffic Light Control



- To be plugged into the S7-1200 training rack
- For realisation of various switching statuses (auto/pedestrian traffic lights)
- With pedestrian push-button on the rear

Order-No.
58616

S7-1200 Training Board



For more information, see **page 201**

Order-No.
59493

Guide your way from training through to practice with flexibility

SIMATIC® S7-300 and S7-1500 PLC Training Racks

With the SIMATIC® S7-300 and the new SIMATIC® S7-1500, Siemens has set milestones in programmable logic control. Accordingly, training on how to use the control systems requires a high degree of technical expertise as well as high-quality training equipment, which enable preparation for industrial reality through appropriate training.

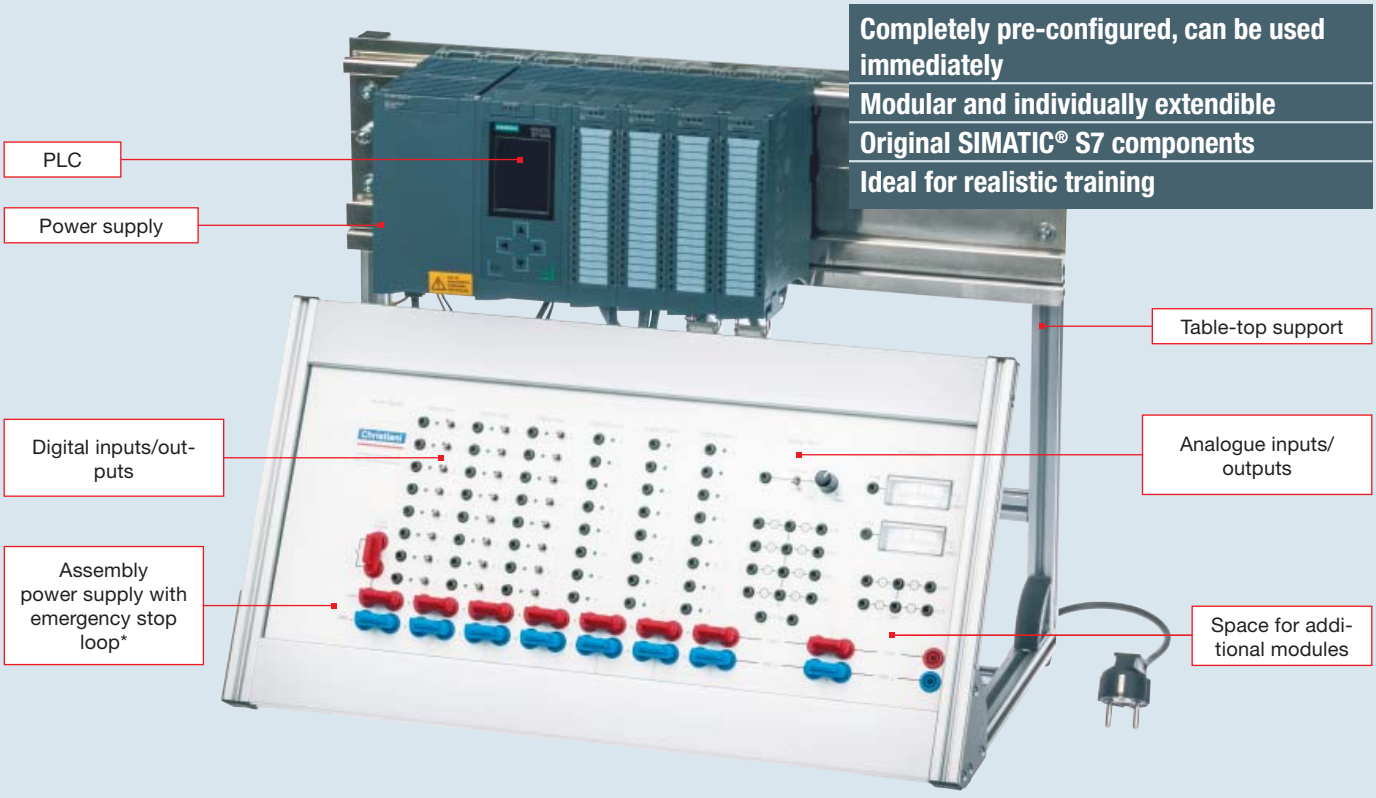
The SIMATIC® PLC Training Racks from Christiani offer the ideal conditions for practical training: The trainee or student learns how to configure and program SIMATIC® S7 control systems. This is done using genuine S7 components and signal modules suitable for educational purposes.

The PLC Training Racks are modular and very flexible: They can be expanded with additional modules and adapted flexibly to individual requirements.

Thanks to the modular configuration, the user can quickly dismantle the PLC Training Rack into its individual components and, just as quickly, can put it together again in a different configuration – without any time-consuming wiring.

The basic desk-top support can be equipped with SIMATIC® S7-300 and S7-1500 assemblies. All connections are designed with 4-mm safety technology.

Completely pre-configured, can be used immediately
Modular and individually extendible
Original SIMATIC® S7 components
Ideal for realistic training



* On request, PLC Training Racks can be provided with every CPU S7-300/1500.

Learning objectives:

- Design and configuration of SIMATIC® S7
- PLC programming
- Configuration and programming of networks and bus systems

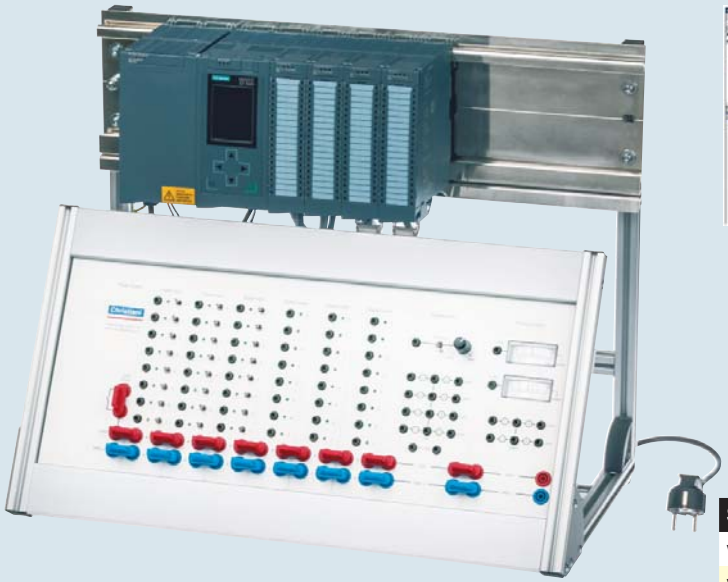
*** Extra practicality:**

The user establishes the power supply to the assemblies using bridge connectors and, in doing so, learns to always take this important basis into consideration in reality too. The assemblies can also be supplied with power in various potentials.

Extra flexibility:

Without wiring, modules can be exchanged and the PLC training rack can be reconfigured for different applications.

PLC Training Racks with S7-1500



S7 PLC Training Racks	Order-No.
with S7-1513-1PN	59607
with S7-1516-3PN/DP	59608
SIMATIC® STEP 7 software for training – single licence (TIA Portal)	54011
SIMATIC® STEP 7 trainer package – 12 licences (TIA Portal)	54012
24 V DC potential distribution	57508
PLC-mMS connection cable	53609

More information: www.christiani-international.com/59607
www.christiani-international.com/59608

PLC Training Racks with S7-300

S7 PLC Training Racks	Order-No.
with S7-314C-2PN/DP	56780
with S7-315F-2PN/DP	58136
SIMATIC® STEP 7 software for training – single licence (TIA Portal)	54011
SIMATIC® STEP 7 trainer package - 12 licences (TIA Portal)	54012
24 V DC potential distribution	57508
PLC-mMS connection cable	53609

More information: www.christiani-international.com/56780
www.christiani-international.com/58136

SIMATIC Trainer Packages

SIMATIC S7-1516F-3 PN/DP Trainer Package

Trainer package with CPU 1516F-3 PN/DP and other components for entry into the world of the new, innovative S7-1500 PLC series. For standard uses and failsafe applications. Can be used as PROFINET IO Controller or as a decentralised PROFINET I device. The CPU offers extensive control functionalities and the possibility of connecting drives via standardised PLC-open modules.

Scope of delivery:

- SIMATIC PM 1507 24 V/8 A
- SIMATIC CPU 1516F-3 PN/DP
- SIMATIC Module DI 32 (24 V DC)
- SIMATIC Module DQ 32 (24 V DC/0.5 A)
- SIMATIC Module AI 8 (U/I/RTD/TC)
- SIMATIC Module AQ 4 (U/I)
- SIMATIC DIN rail 482 mm
- SIMATIC 24 MByte memory card for S7-1xxx
- SIMATIC front plug S7-1500 (40-pin, screw)
- SIMATIC Ind. Ethernet TP XP cable RJ45/RJ45, crossed, 6 m

Article	Order-No.
S7-1516F-3 PN/DP trainer package	59597

The ideal addition to items 59596, 59597 and 59773:

TIA Portal V13 and STEP 7 Professional 2010 (STEP 7 V5.5) as combo licence

Article	Order-No.
SIMATIC STEP 7, software for training	54011

SIMATIC S7-1513-1 PN Trainer Package

Trainer package with CPU 1513-1 PN and other components for cost-effective entry into the S7-1500 PLC series. Can be used as PROFINET IO Controller or as a decentralised PROFINET I device.

Scope of delivery:

- SIMATIC PM 1507 24 V/8 A
- SIMATIC CPU 1516F-3 PN/DP
- SIMATIC Module DI 32 (24 V DC)
- SIMATIC Module DQ 32 (24 V DC/0.5 A)
- SIMATIC DIN rail 482 mm
- SIMATIC 24 MByte memory card for S7-1xxx
- SIMATIC front plug S7-1500 (40-pin, screw)
- SIMATIC Ind. Ethernet TP XP cable RJ45/RJ45, crossed, 6 m

Article	Order-No.
S7-1513-1 PN trainer package	59596

SIMATIC S7-1516-3 PN/DP Trainer Package

Trainer package with 1516-3 PN/DP CPU

Scope of delivery as for item 59597, but with standard CPU (not failsafe).

Article	Order-No.
Trainer package S7-1516-3 PN/DP	59773

Trainer package with 1516-3 PN/DP CPU

Scope of delivery as for item 59597, but with standard CPU (not failsafe). Also contains one STEP 7 professional licence (software for training).
Only available for non-company training centres (state schools, universities).

Article	Order-No.
Trainer package S7-1516-3 PN/DP	59774

314C-2 PN/DP CPU Trainer Package

The 314C-2 PN/DP compact CPU is particularly well suited to tasks that require fast counting/measurement with direct access to the hardware counters. Equipped with three interfaces – MPI, PROFIBUS and PROFINET – this CPU is ideal for timely completion of networking duties. Integrated technology functions provide support to help secure efficient implementation of tasks such as counting, positioning and controlling.

Properties:

- 24 digital inputs, 4 of which are fast counters
- 16 digital outputs, 4 of which are fast outputs
- 4 analogue inputs
- 2 analogue outputs
- Combined MPI/PROFIBUS DP interface on-board
- 2 PROFINET ports for line structures

Scope of delivery:

- 1 x 314C-2PN/DP CPU
- 1 x 512 KByte micro memory card
- 1 x PS307 power supply, 120/230VAC, 24 VDC, 5A
- 1 x SM374 simulator assembly
- 2 x 40-pole front plugs
- 1 x DIN rail, L=480 mm
- 1 x USB-MPI adapter, including 5 m connection cable

The ideal addition to items 59714, 59715 and 54033:

TIA Portal V13 and STEP 7 Professional 2010 (STEP 7 V5.5) as combo licence

Article	Order-No.
SIMATIC STEP 7, software for training	54011

Article	Order-No.
314C-2 PN/DP CPU trainer package	59714

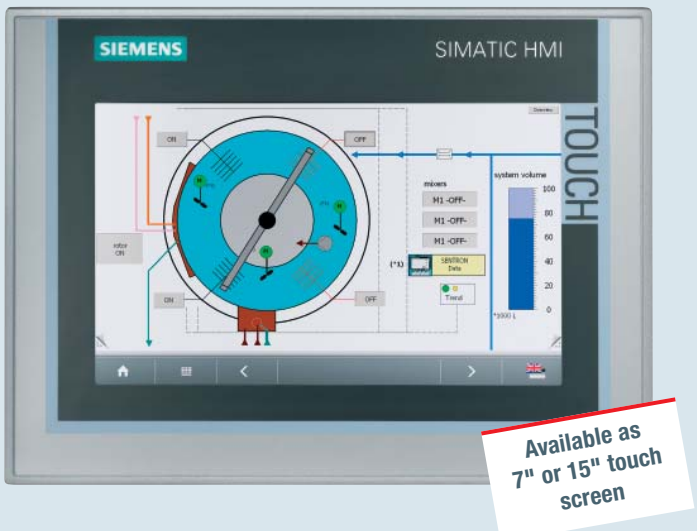
S7-315T-2DP Trainer Package

Scope of delivery:

1 x DIN rail L=480mm
1 x PS 307/5A power supply
1 x CPU 315T-2 DP
1 x 8 MByte micro memory card
1 x digital assembly SM 323, 16 DI and 16 DQ
1 x interface module IM174
3 x 40-pin front plugs
1 x PROFIBUS 3 m plug-in cable
1 x S7 technology CD, floating license

Article	Order-No.
S7-315T-2DP trainer package	54033

Touch Screen Trainer Package TP 700 Comfort and TP 1500 Comfort [1)]



The SCE trainer packages either consist of:

- A 7" widescreen colour touch screen (TFT) or
- A 15" widescreen colour touch screen (TFT)

both with PROFINET, PROFIBUS and MPI interface. 16 million colours, 12 MB configuration memory, Windows CE 6.0, configurable from WinCC Comfort V12 onwards

as well as

- 1 x licence for the WinCC Advanced V13 engineering software
- 1 x licence for the WinCC Advanced V13 optional/runtime software
- 1 RJ45/RJ45, CAT 6 Ethernet cable, crossed, 6 m

IMPORTANT NOTE:
The TP 700 and TP 1500 can only be programmed and configured using WinCC Comfort, Advanced or Professional, version 12 or higher (TIA Portal)

Touch screen panel trainer package	Order-No.
TP700 Comfort [1)]	54030
TP1500 Comfort [1)]	54093

Leading PLC software at unbeatable prices

Ensure that your trainees and students are well prepared for the challenges of automation technology. At Christiani, you will receive the worldwide leading PLC software from your SCE partner at an unbeatable price. PLC training has never been so affordable.

Overview of SCE software (TIA Portal)

For corporate and vocational training centres	For vocational training centres only
	Trainer package (Order-No. 54012)
Software for training (Order-No. 54011)	Software for students (Order-No. 54014)
	Upgrade to current version from previous version (Order-No. 54013)

For vocational and commercial training
SIMATIC STEP 7 Software for Training – Single Licence (TIA Portal) [1)]

We offer this package with extremely favourable conditions for use in company and vocational training centres. It contains a complete STEP 7 Professional software package with STEP 7, KOP, AWL, FUP, S7-SCL high-level language, S7-GRAPH and S7-PLCSIM offline/online test tool.

SIMATIC STEP 7 software for training (TIA Portal) comprising:

1 combination licence for exchangeable use of

SIMATIC STEP 7 Professional V13 (KOP, FUP, AWL), S7-GRAPH, S7-SCL, S7-PLCSIM, SINAMICS Startdrive

OR

SIMATIC STEP 7 Professional 2010 (Classic) comprising:
STEP 7 Prof. V5.5 (KOP, FUP, AWL), S7-GRAPH, S7-SCL, S7-PLCSIM, SIMATIC S7-Distributed Safety, SIMATIC S7-IMAP, SIMATIC S7-Technology

The software has exactly the same functionality as the industrial version. Authorisation is via licence data, which is supplied on a USB stick.

Order-No.
54011
Upgrades on request

SIMATIC STEP 7 Trainer Package (TIA Portal) [1)]

The ideal tool for all vocational training centres.

The trainer package contains:
- 12 x software for training (TIA Portal) – For a detailed description, see opposite (article 54011)
- 3 x software for students (TIA Portal) (= 60 licences) – For a detailed description, see below (article 54014)

Order-No.
54012

Only for use in schools and non-commercial training centres

SIMATIC STEP 7 Trainer Package UPGRADE (TIA Portal) [1)]

For all vocational training centres in which a SIMATIC STEP®7 trainer package with a previous software version is already available.

The UPGRADE trainer package (TIA portal) contains:
- 12 x software for training (TIA portal) – For a detailed description, see opposite (article 64-54011)
- 3 x software for students (TIA portal) (= 60 licences) – For a detailed description, see below (article 64-54014)

Order-No.
54013

Only for use in schools and non-commercial training centres

SIMATIC STEP 7 Software for Students (TIA Portal) [1)] – 20 Licences

SIMATIC STEP 7 software for students (TIA Portal) comprising:

20 combination licences for exchangeable use of

SIMATIC STEP 7 Professional 13 (TIA Portal) (KOP, FUP, AWL), S7-GRAPH, S7-SCL, S7-PLCSIM

OR

SIMATIC STEP 7 Professional 2010 (Classic) comprising STEP 7 Prof. (KOP, FUP, AWL), S7-GRAPH, S7-SCL, S7-PLCSIM
The package also includes: 10 x SIMATIC STEP 7 Professional 2010 DVDs
10 x SIMATIC STEP 7 Professional V13 DVDs with timelimited use (365 days).

The software has the same functionality as the industrial version. Authorisation is via licence data, which is supplied on a USB stick.

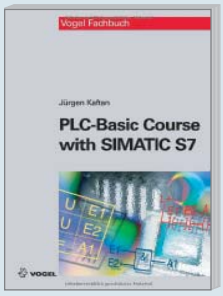
The "software for students" can also be reordered (only by schools) after the 365 day period for the 60 licenses included in the STEP 7 trainer package has expired. It may not be used for the lessons in the school but only by the students at home.

Order-No.
54014 *

*Prerequisite for the purchase: One STEP 7 trainer package is available at the school

1) Note: Special licensing restrictions apply. Please download the licensing agreement for the respective product from www.christiani-international.com, sign and stamp it and then submit it together with your order. No sales to private individuals.You can find a list of system requirements for the respective product at: www.christiani-international.com.

Specialised Books

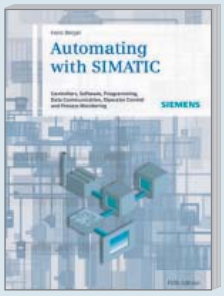


Modern Power Electronics

1. edition 2011, 386 pages

This PLC-basic course explains the logic control with SIMATIC S7-300. For all programming examples from the practice, also a solution is provided. This book is suitable for trade schools, technical colleges and others, as well as for private study. It contains: arrangement and functioning of a PLC program processing and programming Logic operations, an program input, momentary impulses, timing functions, clock generators, comparators, practical examples with simulators sequence control system, ssafety regulations Appendix with solutions.

Order-No.
99878



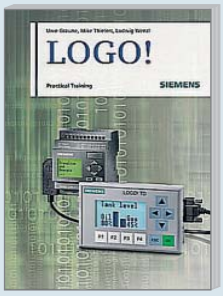
Automation with SIMATIC

Controllers, Software, Programming, Data Communication, Operator Control and Process Monitoring

5. edition 2012, 284 pages, 140 illustrations, hardcover

Totally Integrated Automation is the concept by means of which SIMATIC controls machines, manufacturing systems and technical processes. Taking the example of the SIMATIC S7 programmable controller, this book provides a comprehensive introduction to the architecture and operation of a state-of-the-art automation system. It also gives an insight into configuration and parameter setting for the controller and the distributed I/O. Communication via network connections is explained, along with a description of the available scope for operator control and monitoring of a plant.

Order-No.
74470

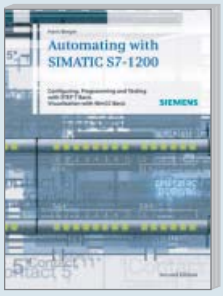


LOGO! Practical Training

First edition 2009, 112 pages, 248 illustrations, CD-ROM

With LOGO! a wide range of control tasks can be implemented easily and flexibly – from applications in building and installation technology to tasks in control cabinet construction and in mechanical and instrument engineering. Distributed local control of machines and processes is possible by connecting up a communication module such as AS-Interface. Many switching devices can be replaced with the eight basic and 28 special functions in the logic module for Micro Automation. This practical book describes in a lively manner how programs are developed and hardware is chosen. It explains the standard situations of control technology on the basis of a guide, but also with many practical project tasks.

Order-No.
83436



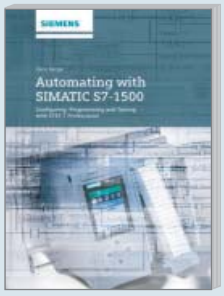
Automating with SIMATIC S7-1200

Configuring, Programming and Testing with STEP 7 Basic. Visualization with WinCC Basic

2. edition 2013, 575 pages

The SIMATIC S7-1200 PLC offers a modular design concept with similar functionality as the well-known S7-300 series. Being the follow-up generation of the SIMATIC S7-200 the controllers can be used in a versatile manner for small machines and small automation systems. Simple motion control functionalities are both an integral part of the micro PLC and an integrated PROFINET interface for programming, HMI link and CPU-CPU communication.

Order-No.
93429



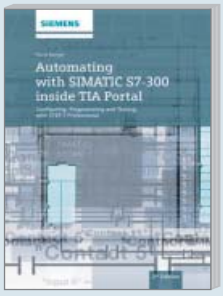
Automating with SIMATIC S7-1500

Configuring, Programming and Testing with STEP 7 Professional

1. edition 2014, 831 pages

With many innovations, the SIMATIC S7-1500 programmable logic controller (PLC) sets new standards in productivity and efficiency in control technology. By its outstanding system performance and with PROFINET as the standard interface, it ensures extremely short system response times and the highest control quality with a maximum of flexibility for most demanding automation tasks.

Order-No.
99871



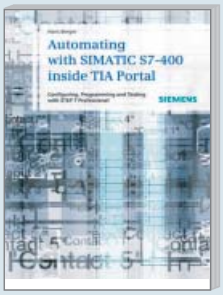
Automating with SIMATIC S7-300 inside TIA Portal

2. edition 2014, 725 pages

SIMATIC S7-300 has been specially designed for innovative system solutions in the manufacturing industry, and with a diverse range of controllers it offers the optimal solution for applications in centralized and distributed configurations. Alongside standard automation safety technology and motion control can also be integrated. The TIA Portal user interface is tuned to intuitive operation and encompasses all the requirements of automation within its range of functions: from configuring the controller, through programming in the different languages, all the way to the program test and simulation. For beginners engineering is easy to learn and for professionals it is fast and efficient.

Order-No.
95525

Specialised Books



Automating with SIMATIC S7-400 inside TIA Portal

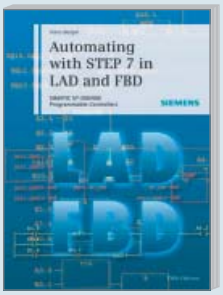
Configuring, Programming and Testing with STEP 7 Professional

1. edition 2013, 746 pages

This book presents a comprehensive description of the configuration of devices and network for the S7-400 components inside the engineering framework TIA Portal. You learn how to formulate and test a control program with the programming languages LAD, FBD, STL, and SCL. The book is rounded off by configuring the distributed I/O with PROFIBUS DP and PROFINET IO using SIMATIC S7-400 and data exchange via Industrial Ethernet.

SIMATIC is the globally established automation system for implementing industrial controllers for machines, production plants and processes. SIMATIC S7-400 is the most powerful automation system within SIMATIC. This process controller is ideal for data-intensive tasks that are especially typical for the process industry.

Order-No.
99870



Automating with STEP 7 in LAD and FBD

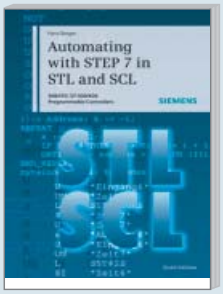
SIMATIC S7-300/400 Programmable Controllers

5. edition 2012, 451 pages, hardcover

SIMATIC is the worldwide established automation system for implementing industrial control systems for machines, manufacturing plants and industrial processes. Relevant open-loop and closed-loop control tasks are formulated in various programming languages with the engineering software STEP 7.

Ladder diagram (LAD) and function block diagram (FBD) use graphic symbols to display the monitoring and control functions similar those used in schematic circuit diagrams or electronic switching systems. Now in its fifth edition, this book describes these graphic-oriented programming languages combined with the engineering software STEP 7 V5.5 for use with both SIMATIC S7-300 and SIMATIC S7-400 automation systems.

Order-No.
74466



Automating with STEP 7 in STL and SCL

SIMATIC S7-300/400 Programmable Controllers

6. edition 2012, 553 pages

SIMATIC is the worldwide established automation system for implementing industrial control systems for machines, manufacturing plants and industrial processes. Relevant open-loop and closed-loop control tasks are formulated in various programming languages with the programming software STEP 7.

Now in its sixth edition, this book gives an introduction into the latest version of engineering software STEP 7 (basic version) . It describes elements and applications of text-oriented programming languages statement list (STL) and structured control language (SCL) for use with both SIMATIC S7-300 and SIMATIC S7-400, including the new applications with PROFINET and for communication over industrial Ethernet. It is aimed at all users of SIMATIC S7 controllers.

Order-No.
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AUTOMATION STUDIO™ E6
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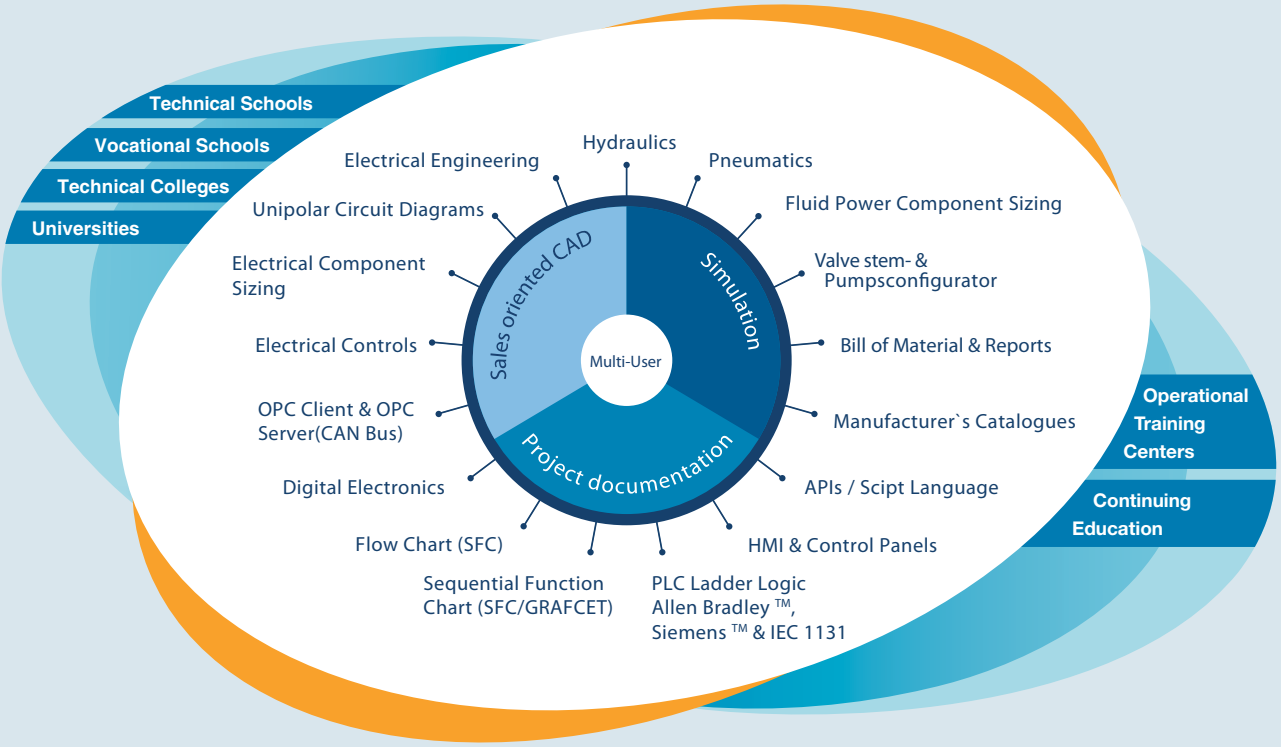
If you teach subjects related to hydraulic, pneumatic, electrical and control technologies, the illustration of concepts and the behaviour of systems are no doubt at the heart of your requirements. Developed for professional training, and used successfully in educational institutions thousands of times over, Automation Studio is a unique solution that combines the powerful functions for design, simulation, animation and investigation of electrical and fluid technology systems in an intuitive and user-friendly application.
Automation Studio clarifies and accelerates the transfer of knowledge about complex, technical processes.

Over 40,000 licences sold.

Automation Studio E6



Extensive catalogue of manufacturer components

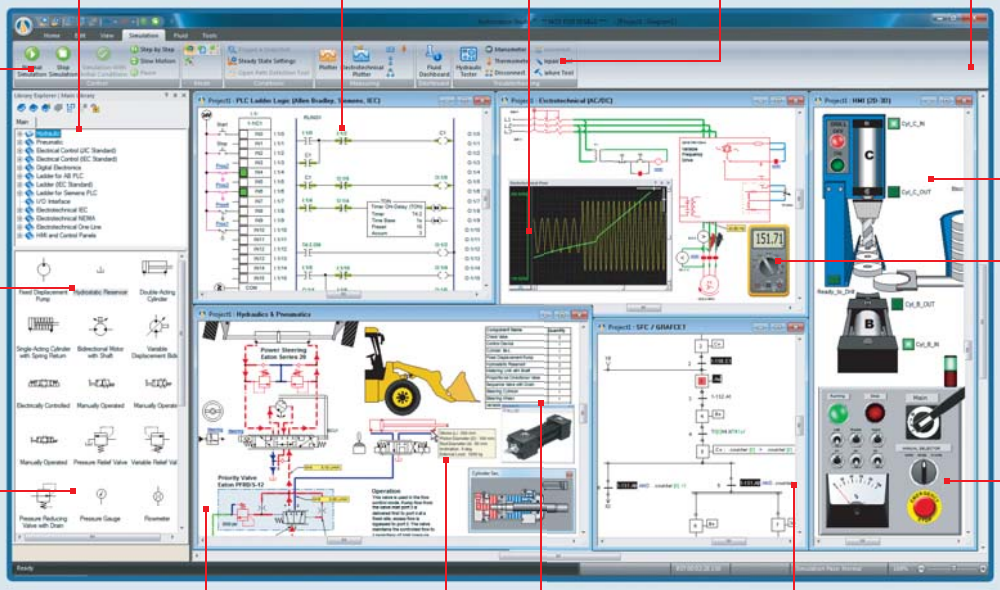
Many configurable simulation phenomena

Record signal curves graphically, perform measurements, find faults, analyse system behaviour

Multi-user capability

Can be connected to LMS, PDM, CAD

Clear menu bars



Realistic and dynamic simulations

Extensive component libraries are individually extendible

Measured values dynamic indicators

Standardized components, own components can be created

Realistic control panel

Create, simulate and test comprehensive technological systems

Individual parametrisation of components

Create bills of material and reports

Create control-independent processes (SFC/GRAFCET)

Robots for practical training

Modern production systems with industrial robots mean technicians, specialist personnel and master engineers are faced with increasingly complex demands. You can lay the foundations for mastering these demands early during initial training – with robotics teaching systems from Christiani. With these, trainees and employees learn how to handle robotic and mechatronic systems using genuine robots under real conditions.

How learning works in industry today

Thanks to selected industrial partnerships, we are able to create practical conditions for training employees to become fully qualified. Tomorrow's experts learn and hone their skills using genuine industry components during training. These are the same industry components that they will later use in everyday professional life. In addition, the technology always complies with the current industry standard. This is a crucial factor for the quality of basic and advanced training.

In cooperation with our industry partners, we have developed two teaching systems for training in robotics: The Robot Training System and the mechatronic system mMS, with integrated robot. Both facilitate learning under real conditions. The high technical demands and, not least of all, the motivating factor of “learning by doing” guarantee learning success and ensure the development of competence in the handling of industrial robots.

Accordingly, our teaching materials, technical documentation and software are entirely up-to-date. The user gets to know all aspects of robotics, from the handling unit to safety aspects through to robot programming.

Together with DENSO, we offer you high-tech professional training and advanced training in the fields of automation and robotics:

- Perfect technology that is fun and guarantees learning success
- Learning and training on ultra-precise genuine robots
- Absolute practicality for basic and advanced training

Training on the mMS mechatronic system with integrated robot

Robotik Training System RTS1D

The RTS1 Robotic Training System allows you to safely and clearly impart knowledge about the principles of robotics and, specifically, the use and programming of modern industrial robots.
The RTS1 forms a compact robot cell, which like its industrial predecessors, is completely enclosed. The protective, transparent panels provide an optimal view of all processes in the robot cell.

At the same time, they guarantee safe operation for the operator/pupils. The safety concept includes emergency stop switches and a monitored protective enclosure with doors. The cell is equipped with a 6-axis articulated arm robot from DENSO (RTS1D). The basic equipment also includes a pneumatic 2-finger parallel gripper and workpieces (cubes). The robot is operated via a colour touchscreen.

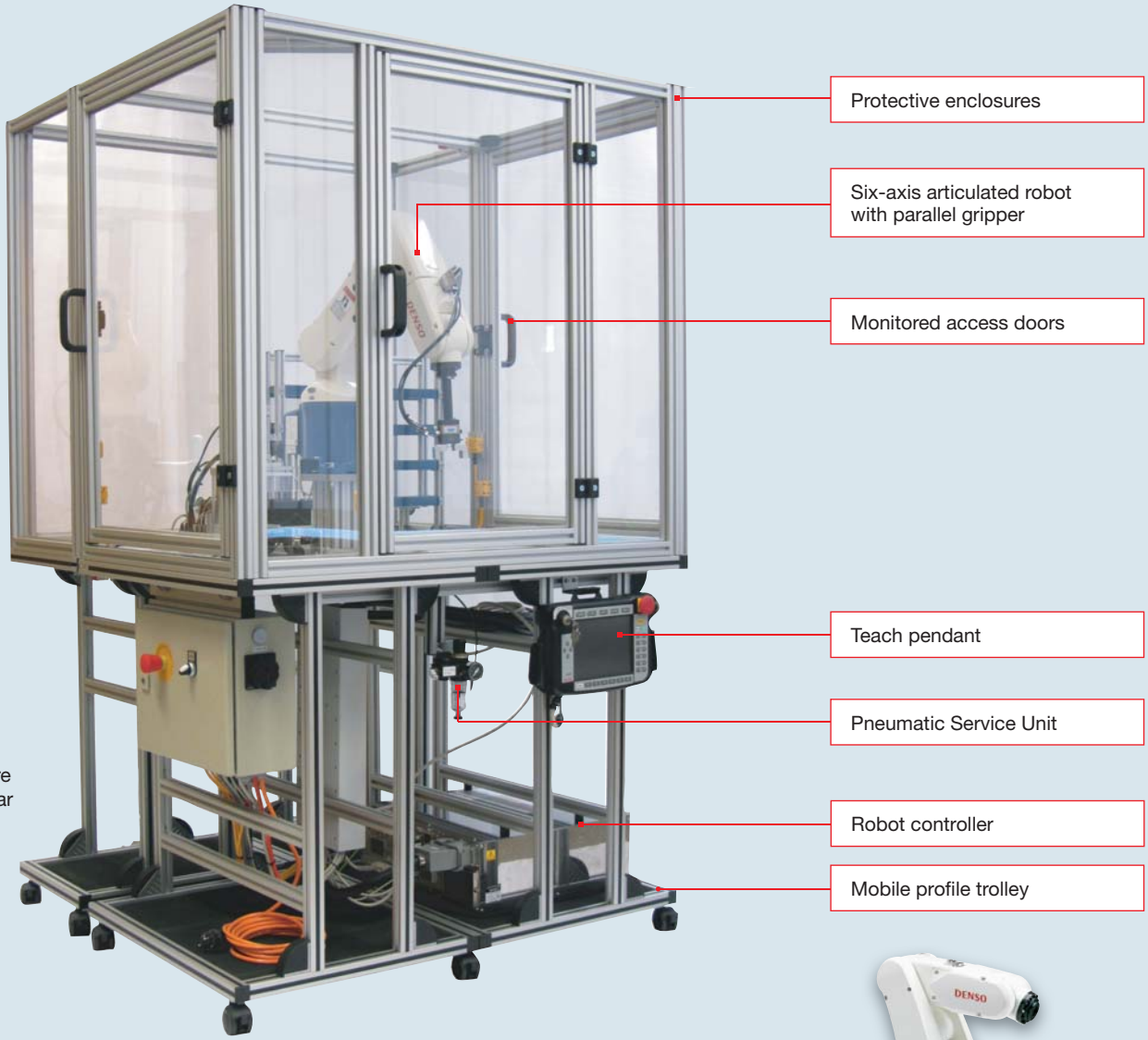
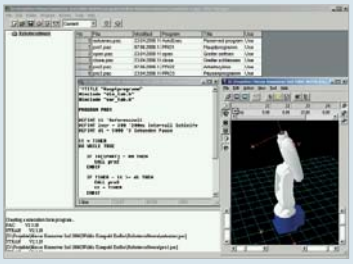


Figure similar



WINCAPS programming software for DENSO robots

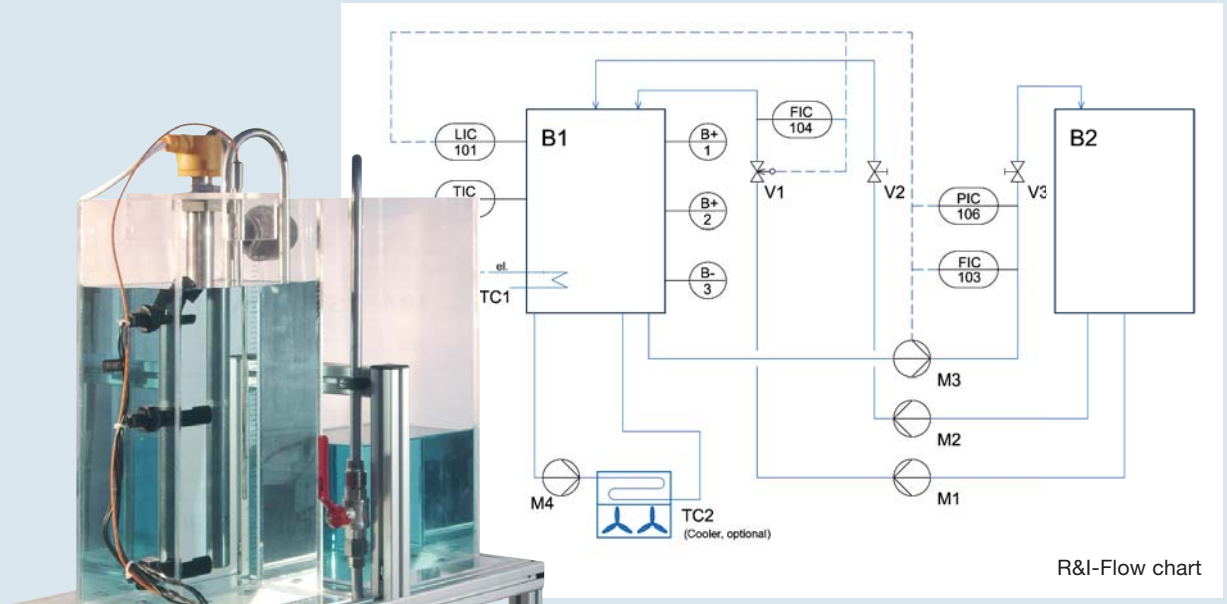
DENSO

As an established market leader in the field of small, industrial assembly robots, DENSO Robotics sets the standard in terms of reliability, flexibility and functionality. With more than 60,000 DENSO robots installed worldwide, the company has high levels of expertise and technical skill.

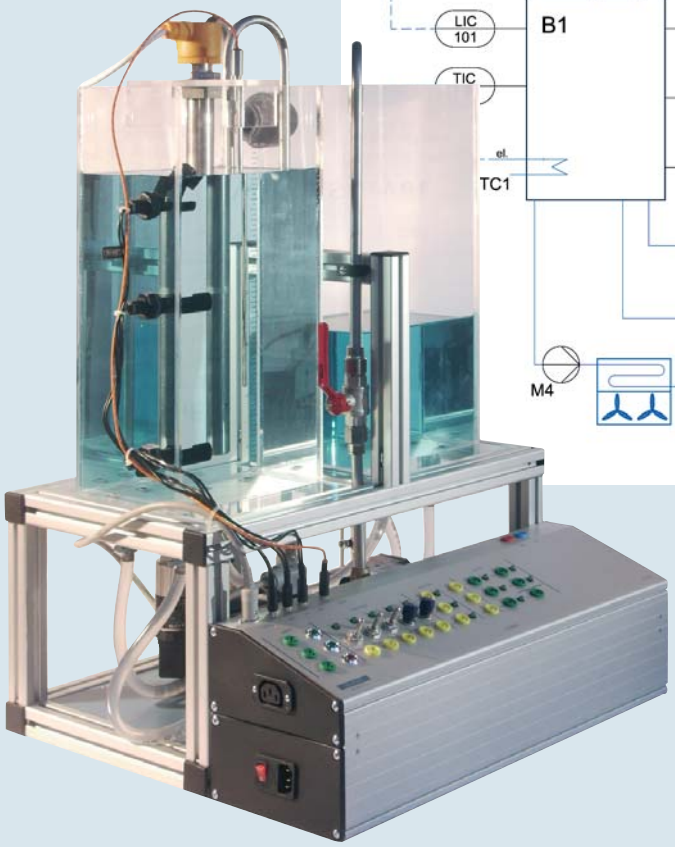
Control and Feedback Control Technology / Process Automation Workstations

The workstations offer you a wide selection of training options ranging from simple control system tasks through to PID feedback control of various controlled systems and provide optimum support for your lessons on control and feedback control systems. The systems are available in a range of variants and can thus be customised according to your requirements. All signals (0/2 - 10 V DC and 24 V DC) are available via 4 mm test sockets on the operator panel of the systems. The fill level is recorded using a float switch or a pressure switch. The fill level is changed by controlling the three pumps and/or valves.

The switches and buttons on the control panel can be used in a flexible way to operate the system. Signal lights allow faults and process statuses to be displayed. The workstations can be operated using commercially available control/feedback control systems, provided they have the appropriate inputs and outputs. In combination with the process automation training course, you obtain a complete process control system with visualisation. The documentation contains several tasks with sample solutions.



R&I-Flow chart



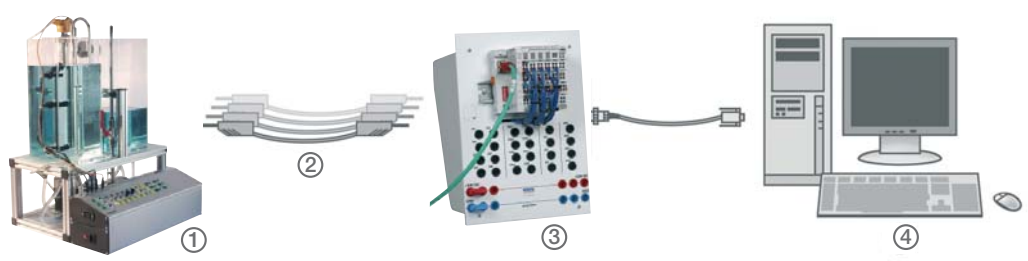
Extensions to the basic model
(for feedback control technology experiments):

- **Option M:** Pressure transducer for **fill level measurement/fill level control** (in conjunction with controllable pump P3 and/or controllable valve V1)
- **Option P3:** Controllable pump with frequency converter (instead of a non-controllable pump in the PAB variant) for **fill level control** (in conjunction with pressure transducer M) and/or **flow rate control** (in conjunction with flow sensor D3)
- **Option V1:** controllable control valve with actuating unit for **fill level/flow rate control** (replaces one of the manual valves in the PAB version; in conjunction with flow rate sensor D1)
- **Option D1/D3:** Flow rate sensor for **flow rate measurement/ flow rate control** (in conjunction with controllable pump and/or controllable valve)
- **Option DR:** Sensor, hand valve and pressure gauge for **measuring and controlling the pressure** in the drain (with controllable pump)
- **Option H:** Heating rod, PT100 temperature sensor and additional circulation pump for **temperature control**
- **Option K:** Radiator with 2 fans for extension of option H (heating) and to speed up the cooling processes

Article		Order-No.
Control workstation PAB (basic model)		57874
Option M	(pressure transducer)	92976
Option P3	(controllable pump)	92977
Option V1	(controllable valve)	92978
Option D1	(flow rate sensor for controllable valve)	92979
Option D3	(flow rate sensor for controllable pump)	92980
Option DR	(pressure control with controllable pump)	59970
Option H	(heating)	58043
Option K	(cooling)	58042

For detailed information about the products for process automation, go to **www.christiani-international.com**

Workstation connection diagram:



1. Workstation
2. Measuring lines
3. I/O interface box
4. PC with process automation workstation (or other suitable control/feedback control soft-ware), see next page

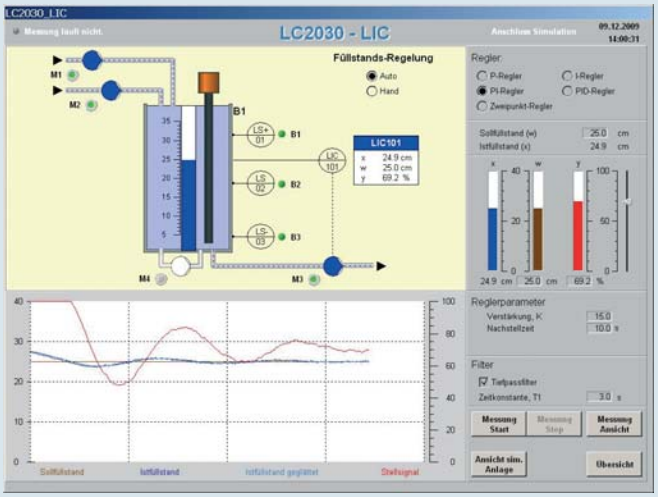
Process Automation Training Course

The process automation training course is designed for activity-based lessons on control and feedback control technology.
In a didactically pragmatic way, it allows you to:

- Create and test GRAFCET/logic plans (based on simulation/the real system)
- Work with a simulated system
- Perform control/feedback control on the actual workstation
- Control fill levels, flow rates and temperature
- Choose the regulator (2-point, P,I, PI, PID)
- Freely configure regulator/regulator parameters
- Choose the control loop
- Perform inspections of the control loop, disturbance behaviour and control behaviour
- Optimise feedback control
- Produce graphical drawings and evaluations

The training course not only includes the software, but also teaching material with tasks for control and feedback control technology as well as an introduction to GRAFCET.

Article	Order-No.
Process automation training course corresponding to the workstations	**58689**



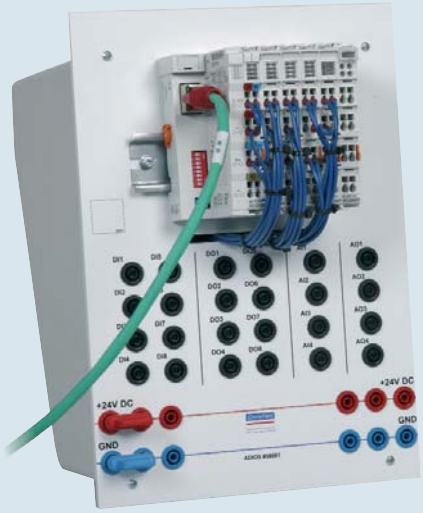
All feedback control technology experiments and all control systems with GRAFCET or the logic plans can be implemented either with the actual system or with the integrated, simulated system.

I/O Box ADIOS with TCP/IP Interface

Ideal for connecting the process signals to the PC

The ADIOS I/O box establishes the signal connection between the workstation and the control/feedback control software running on the PC. Signal connection: 4 mm safety sockets. Ethernet port (TCP/IP) required on PC. Without Ethernet cable. Also requires the process automation training course, the WinErs laboratory version or the GRAFCET laboratory version.
Operating voltage: 24 V DC
Number of signals: 8 Dig. IN, 8 Dig. OUT, 4 Analogue IN, 4 Analogue OUT
Can be used as desk-top device or for attachment to training board frame; format: A4 (height x width)

Article	Order-No.
I/O box ADIOS with TCP/IP interface	**58081**



Measurement cable kit

For connecting the workstation to the I/O box. 4 mm silicon measurement cables.
Length 1.5 m. 22 x black, 1 x red, 1 x blue.

Article	Order-No.
Measurement cable kit	**59512**

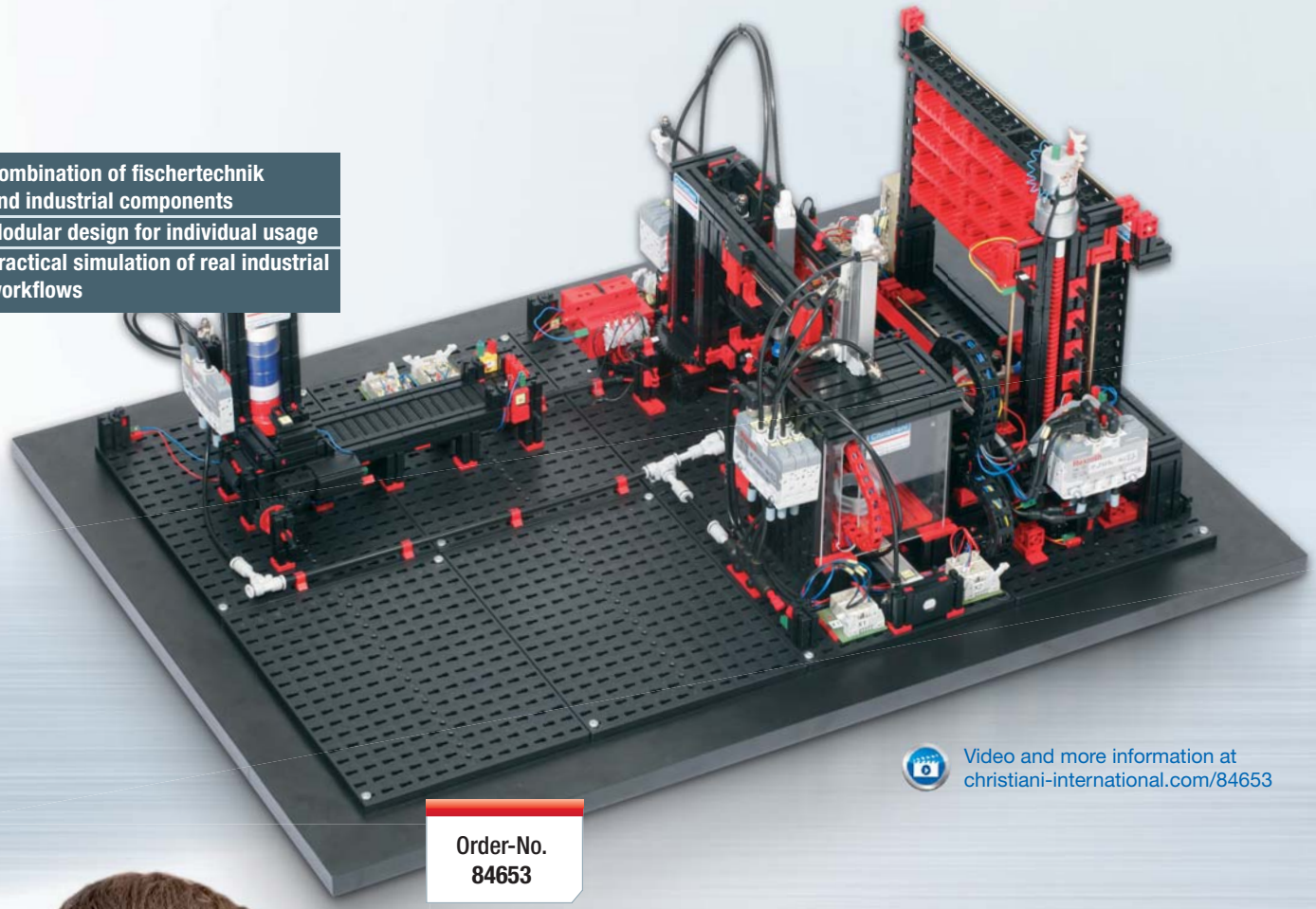
fischertechnik DIDACTIC AVENTICS

modular Mechatronics System junior

The perfect introduction to mechatronics. First of all, students and trainees are effortlessly made familiar with the key elements of a mechatronics system: electric motors, gears, pneumatic valves, pneumatic cylinders, photoelectric barriers, solenoid switches. In later advanced stages, they learn about electronic control technology.

At the same time they acquire knowledge of mechanics, electrical engineering, electronics, magnetism, pneumatics and information technology. These parts together form interconnected modules, which together constitute the essential elements of a modern factory.

- Combination of fischertechnik and industrial components
- Modular design for individual usage
- Practical simulation of real industrial workflows



Video and more information at christiani-international.com/84653

Order-No. 84653

Use the mMS junior assembly kit to teach:

- Mechanical engineering
- Electronics
- Digital signal processing
- Robotics
- Programming
- Electrical engineering
- Communication technology

Automotive Technology

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Training equipment and teaching methods

In the field of automotive we work closely together with all german car manufacturers. Using the original components we developed training stands, vehicles and engines. High quality cutaway models, software and of course the teaching documents are completing our range. Trainers and trainees find a complete solution for their state-of-the-art training in car mechanics or mechatronics.

Whether for vocational institutes, colleges and universities or for small and medium-sized companies and major corporations: We offer to our customers guidance, conception, planning and execution as well as train the trainer courses.

As a single-source provider for technical training, our portfolio covers both the hardware for the training labs and the teaching materials prepared for the lessons. This conclusive overall concept contributes to a lasting learning success!

Training Vehicles

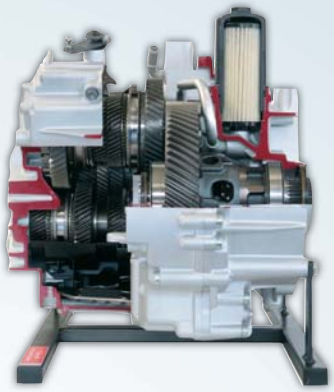
Training Stands

Training Cases

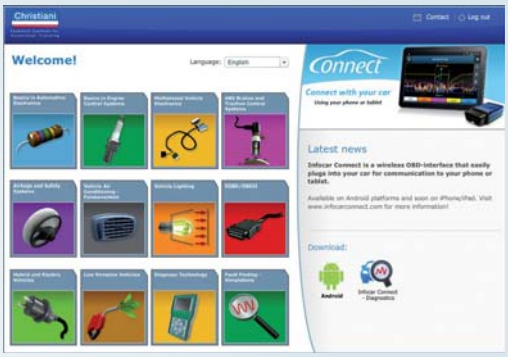
Christiani materials are available in many different languages. Visit:

christiani-tvet.com

You can directly access the online shops and the contacts for the respective regions.

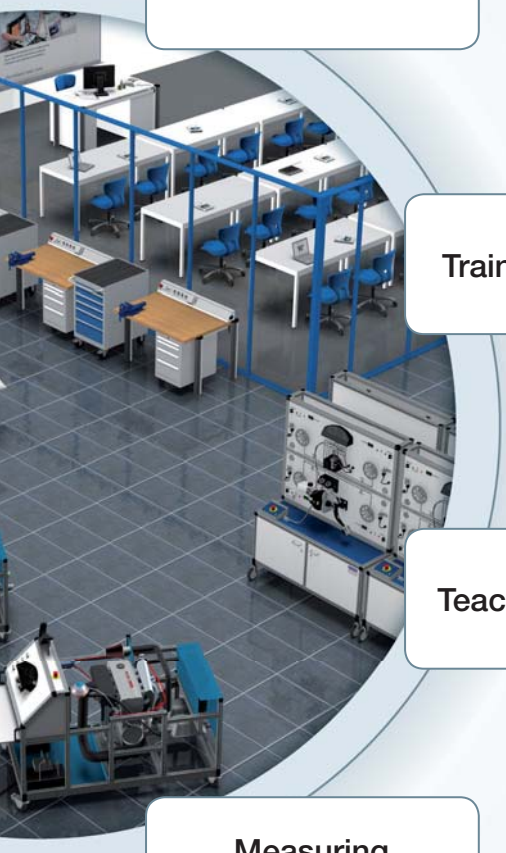


Cutaway Models



Training Software

Teaching Manuals



Measuring Instruments

Troubleshooting and diagnosis in automotive electrics/ electronics and engine management systems

This training lab combines theoretical lessons and action-based technical training of automotive mechatronics. While using training systems and specialised training vehicles, this technical training lab implements theory and practical exercises in measuring, trouble-shooting and diagnosis with modern automotive training equipment.

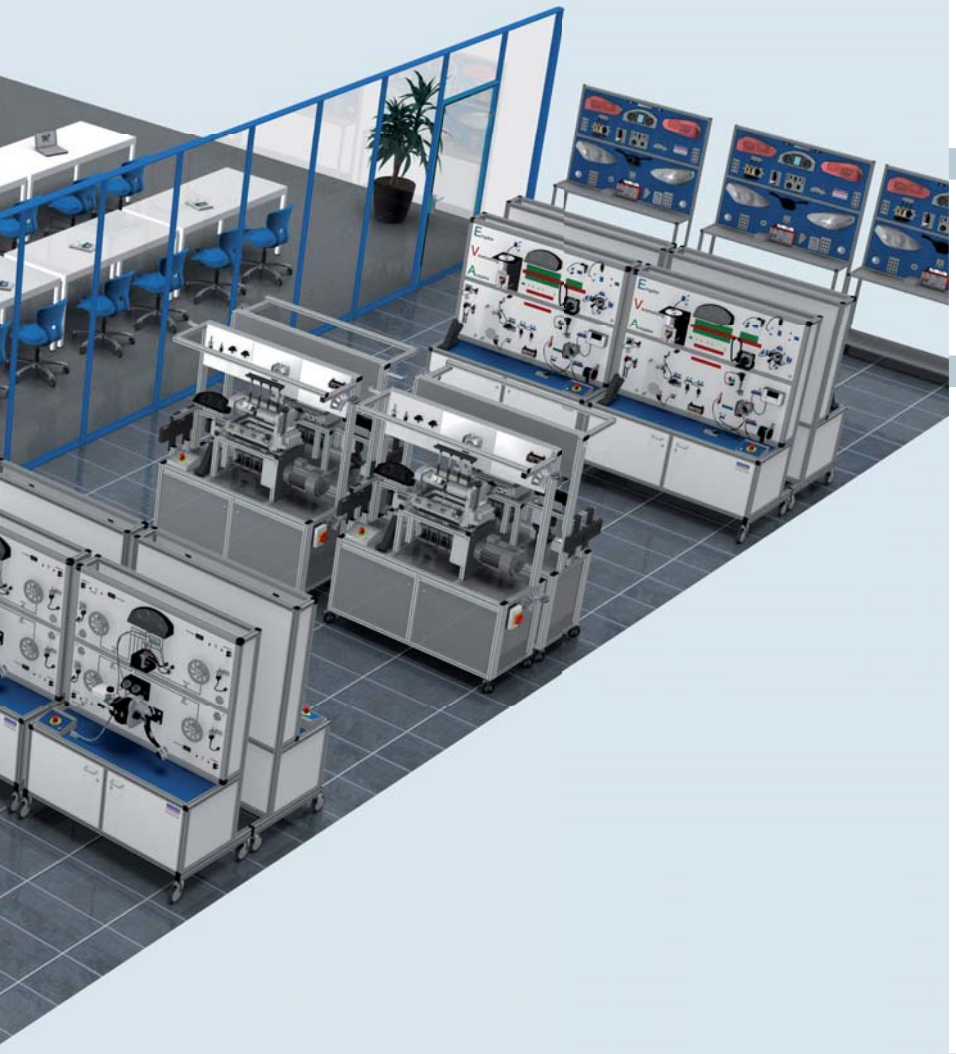
Our modules

- Requirements analysis
- Planning and consultation
- Conceptual design
- Implementation
- Train-the-trainer

VIRTUAL TOUR

Experience the Christiani Training Labs now online in 3D.

More information:
www.christiani-training-lab.com



COMPACT INFO

Technical Training Lab for Automotive Technology

Equipment options:

- Training Stands Sensors/Actuators
- Basic electrical equipment, Comfort systems and CAN/LIN Bus data systems
- Training Stands Common-Rail Injection Systems with Solenoid or Piezo Valve Injectors
- Training Stands Direct Petrol Injection Systems FSI/TSI
- Training Stands Functional Petrol or Diesel Engines
- Vehicle with Integrated Fault Circuit
- Student working stations
- Measuring and Diagnosis Equipment

Suitable for:

- Automotive technician with focus on passenger car technology
- Automotive mechatronic engineer with a focus on passenger car technology
- Service technician

Topics/learning objectives:

- Working with maintenance schedules, wiring diagrams, symbols, terminal designations, wires and wiring connections
- Naming mechanical, electrical and electronic components, assembly groups and systems
- Checking and repairing mechanical, electrical and electronic circuits and systems
- Selecting and using mechanical and electrical measuring and testing equipment
- Measuring and evaluating electrical variables and signals
- Documenting work results and evaluating by comparing with calculated variables and manufacturer specifications
- Making use of the possibilities offered by commonly used workshop diagnosis testers
- Making use of problem resolution strategies and/or alternatives during diagnosis
- Documenting, analysing and evaluating measured values, signals and error protocols
- Presenting results of fault localisation and identifying suitable repair strategies and measures

The Christiani training lab for automotive technology offers you the following:

- Theory and practice from a single source
- Motivation to learn and sustainable learning success
- Didactic diversity and practically oriented training media
- Strong partnerships with industry
- Professional consulting – from the planning stage, all the way up to implementation

Training Lab for Automotive Technology
Teaching Methods and Practice from a Single Source

Practically Oriented Training Media

At Christiani, technical training lab equipment and didactic training materials are precisely matched to one another. With this uniform holistic concept, you can offer state-of-the-art training, as well as conveying practically oriented specialist knowledge and the necessary personal skills. In developing our innovative products, we work closely with strong partners from the industrial sector.

Overhead functional models

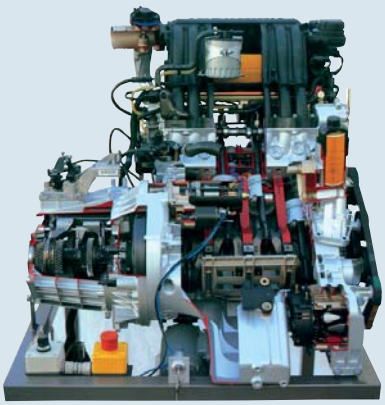
Specialised books

Interactive learning

Training Case

Every workshop will soon be forced to work on a significant number of hybrid and electrical vehicles.

Cutaway Models



Our cutaway models are all made of original components of the particular vehicle type, the components are moveable and functions are working.

Powerful Specialised Lab Components

„Train-the-Trainer“

We train your training staff to the latest standards and show how you can most effectively use our training systems and materials.

Please feel free to get in touch with one of our customer consultants.

“Whether you are looking to expand your existing specialised training lab or are planning something new – we are happy to support you with the necessary advice and expertise. Tell us about your individual requirements. We can then advise you on all questions.”

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Teach the learning content of automotive technology in a modern and easily remembered format

learn 4 automotive.com

Make use of all modern didactic possibilities for successful training

With Learn-4-Automotive, you can view up-to-date knowledge on all aspects of automotive technology on your computer monitor, laptop or tablet at any time, irrespective of location. All contents are clearly structured into learning modules. With just a few clicks of the mouse or taps on the touchscreen, your trainees can navigate their way through the extensive contents, view animated content, complete exercises and perform their own learning assessment.

Available in several Languages

12 modules with up-to-date automotive technology:

- Basic principles of electrotechnology
- Basic knowledge of automotive electronics/electrical engineering
- Basic knowledge of engine management systems
- Basic and advanced knowledge in the assembly group modules
- Diagnosis procedures and fault detection
- Alternative drive systems and fuel
- General and partly vehicle-specific technical information
- Integrated learning programme with constantly changing sequence of questions in each module

Your trainees will enjoy the learning experience and you will benefit from fast and enduring communication of the competencies required.

Example from the chapter on thermal efficiency

- Thermal efficiency
- Conversion of chemical energy into work
- Vehicle efficiency

Example from the chapter on drives

- Serial drive
- Parallel drive
- Combined drive
- Practical example

Example from the chapter on engine management systems

- Injection systems/general information
- Intermittent injection systems
- Continuous injection systems

Presented with animated graphics and detailed function descriptions.

Topic Modules

Basic knowledge of vehicle electronics

Basic knowledge of engine management systems

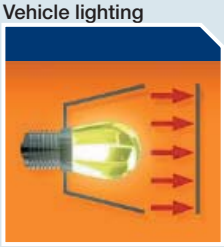
Multiplex vehicle electronics

ABS braking and traction control systems

Airbags and safety systems

Basic principles of vehicle climate control

Vehicle lighting



EOBD/OBD II

Hybrid/electric vehicles

Low-emissions vehicles

Diagnostics technology

Troubleshooting - simulation

Your advantages:

- Duration 1 year
- Straightforward enablement of access to learning platform (access data via e-mail)
- Always up-to-date, as easy to be revised by the provider (e.g. updates and new topics)
- Various languages available (some current modules are available in 13 languages)
- Accessible anywhere (Internet) 24 hours a day, 365 days a year
- Low costs
- Fixed costs allow calculated annual planning
- Staggered prices for companies (price advantage for subscribers of larger volumes, depending on the number of licences)
- Classroom licences

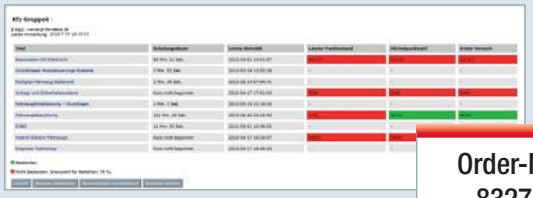
Extremely straightforward operation, ready for immediate start

- Straightforward operation (e.g. drag & drop)
- Modular structure arranged by basic knowledge/assembly groups/technologies
- Audio-visual learning (graphics, illustrations and animations with language support)
- Learning success assessment after each chapter with randomly selected questions about each topic which always change in the correct sequence
- Learning success assessment by the trainer possible (with company licences and classroom licences) – Learning Management System (LMS), statistical evaluation of time required, percentage achieved in each chapter and exercises with correct and incorrect answers.

Learning objectives check by the trainer with the LMS supplementary program.

Learning management system

(optional for use of multiple-station and school licenses)



Order-No. 83274

As administrator, the teacher/trainer has the option to assign each pupil/trainee unique access data. This makes it possible to track success that has been made and detect any problems in completing the test tasks.

The learning management system only needs to be purchased once. It can then be used for the entire duration and is automatically extended if the annual licence is renewed.

Statistical evaluation of:

- Start time and completion time
- Time required per task/chapter
- Points score per chapter
- Completion percentage of a chapter (min. 75%)

E-Learning and Mobile Learning
Platform Automotive Technology

Mobile learning with a netbook, tablet or smartphone is a great topic in our modern, media-oriented society.

For some years now, one of Christiani's projects has been collaboration with international partners in developing new learning media. The objective here is to develop learning programmes which can be run on the various operating systems and platforms on the market. A high level of flexibility, well-prepared content and a wide range of applications are the decisive challenges in developing mobile learning applications.

New technologies and applications enable new paths to learning and the transmission of specialist knowledge. The Christiani E-learning platform for vehicle technology is ideal for this purpose. Available round the clock, so that you can learn when it suits you, whether on the road, on your way to work, school or in your free time.

The Christiani E-learning platform for vehicle technology can be run on all devices with Windows® or Android® operating systems. A solution for iOS®-based devices is in development.

Automotive Dictionary: Ge-En

The English-German/German-English vehicle technology dictionary for iPhone and Android smartphones, with over 8100 terms relating to vehicle technology and flashcards for practising, is a good introduction to vehicle terminology.

The applications contain functions for learning, self-testing and varied quiz tasks, selected at random, which you can use to test your knowledge.

Go to your application provider and search for „Automotive Dictionary: Ge-En“

Available on the App Store

Get it on Google play

Self-study

Test questions

App for iOS or Android
Over 8100 terms
With exercises and quiz tasks

Knowledge test

Dictionary

Your training is in safe hands with the AVL DiTEST HV-Safety 2000 training case

Every workshop will soon be forced to work on a significant number of hybrid and electrical vehicles. Various studies suggest that approximately 5% of all newly registered vehicles in 2015 will be equipped with high-voltage systems.

To reduce the heightened safety risk during maintenance, the AVL DiTEST HV-Safety 2000 training case has been developed to guarantee the highest possible level of safety for your trainees and course participants, as well as practical testing options throughout the training. Guaranteeing the safety and reliability of high-voltage systems is one of the most important tasks that all workshops will face in future. Testing the isolation from supply and insulation resistance of these systems are basic checks that need to be performed during all maintenance and repair work.

Developed specifically for educational establishments, the AVL DiTEST HV-Safety 2000 training case complies with all safety standards applicable to practical training operations.

An overview of all innovations:

- Menu-driven measurement of isolation from supply with end-to-end documentation.
- Active insulation resistance measurement using the integrated test voltage generator
- Integrate voltmeter up to 1000 V
- Potential equalisation measurement as per UNECE R100
- Standard multimeter functions
- Menu-driven diagnostics and measurement procedure
- Power supply via USB interface
- Can be calibrated for reproducible accuracy.

The AVL DiTEST HV-Safety 2000 Training Case

Active insulation resistance measurement using the integrated test voltage generator

To test the installation resistance of a vehicle, an external test voltage must be applied. This voltage must be within the range of the electric vehicle's battery voltage. HV Safety 2000 generates the necessary voltage automatically and safely without presenting any risk to the user. The entire test is also made available in the test report.

Potential equalisation measurement with four-wire measurement technology – as per unece R100

After completing the work – e.g. replacing a part – the high voltage needs to be re-established without any issues. The UNECE R100 standard defines inspection of the potential equalisation resistance to verify the safety of the HV vehicle. HV Safety 2000 supports this measurement with the prescribed testing current of 1 A.

Standard Multimeterfunctions:

HV Safety 2000 offers all the functions of a digital voltmeter: diode, resistance, capacitance and voltage measurement. The measured values are displayed in easily legible form on the screen of your PC or laptop. This saves the workshop having to invest in various different measurement devices.

Power supply via usa Interface

No additional power supply or battery is necessary. The device is always ready for operation, including generating high voltage for the isolation resistance test and the 1 A current for taking measurements in line with UNECE R100.

Possible uses:

- Working with wiring diagrams, symbols, terminal designations, wires and wiring connections
- Activating HV systems, taking into account all requisite safety precautions
- Measurement of isolation from supply and general voltage measurement
- High-voltage insulation resistance measurement (with deactivated HV system)
- Insulation resistance measurement as per SAE J1766 measurement, ECE R100, ISO6469 (with deactivated HV system)
- Potential equalisation conductor measurement

Learning objectives:

- Naming electrical and electronic components, functional units and systems
- Selecting and using suitable measurement and testing equipment
- Testing electrical and electronic circuits, taking into account the requisite safety precautions
- Taking the most important measurements and using the most important measurement methods on HV systems with the requisite safety equipment
- Documenting work results and performing evaluations through comparison with manufacturer specifications

Scope of delivery:

- AVL DiTEST HV Safety 2000 with accompanying software
- 1000 V red test probe with safety sensor, requires safety gloves to be worn
- 1000 V black test probe with safety sensor, requires safety gloves to be worn
- HV demonstrator with all test voltages relevant for taking measurements on hybrid and electric vehicles
- Transport case with connection socket for 12 V power supply unit (power supply)
- Graphic DIN A0 with hazard warnings and safety regulations

Specifications:

Dimensions: L x W x H 500 x 400 x 250 mm
Weight: approx. 8 kg
Electrical connection: 110 V/240 V mains connection

Order-No.
95880

VW 1.4 TSI and 1.6 TDI

The training stand facilitates practical training on fully functional original engines from Volkswagen's current range of vehicles. It comes as standard with two original VW test boxes with 105 PIN and 2 mm measuring sockets, the accompanying control equipment adapter, as well as one fault circuit box with 20 practical faults.

This makes it possible to present, localise and eliminate realistic malfunctions and faults. A component simulator can be used to manipulate the signals of various sensors as a way of generating defective operating statuses and demonstrating emergency running properties. The original circuit diagrams, repair guides and installation instructions, containing all necessary data, are supplied with each engine. All maintenance, service and repair work that needs to be performed in the real world can therefore be practically demonstrated. All programming and diagnostic work can be performed using a standard workshop diagnostic device (OBD 2-compatible). A multimeter and/or an oscilloscope are required for the measurement exercises. The apparatus includes a hinged storage fought for measurement or diagnostic devices, an OBD connection and an emergency-off switch.

Since a combustion engine is NOT emissions-free, it may only be used outdoors or in areas that offer the necessary extraction to comply with legal stipulations.

20-fold fault circuit

Laptop not included in the scope of delivery

Standard series equipment:

- Fully functional and ready-to-use working engine
- Two original VW test boxes with control equipment adapter
- Twenty-fold fault circuit
- Five-fold component simulator
- Operating manual
- Technical documentation and circuit diagrams

Learning objectives:

- Working with maintenance schedules, wiring diagrams, symbols, terminal designations, wires and wiring connections
- Naming mechanical, electrical and electronic components, assembly groups and systems
- Checking and repairing mechanical, electrical and electronic circuits and systems
- Selecting and using mechanical and electrical measuring and testing equipment
- Measuring and evaluating electrical variables and signals
- Documenting work results and evaluating by comparing with calculated variables and manufacturer specifications
- Making use of the possibilities offered by commonly used workshop diagnosis testers

Scope of delivery:

Ready-to-use and movable functioning engine, including fault circuit, component simulator, break-out boxes for engine management system, circuit diagrams and operating instructions

VW 1.4 TSI and 1.6 TDI

Specifications TSI:	
Engine classification code	CAVD
Design	Inline 4-cylinder engine
Displacement	1.390 cm³
Bore	76,5 mm
Stroke	75,6 mm
Valves per cylinder	4
Compression ratio	10:1
Max. output	118 kW at 5900 rpm
Max. torque	240 Nm at 1500 and 4500 rpm
Engine management system	Bosch Motronic MED 17.5.5
Fuel	Super unleaded with 95 RON
Exhaust gas after-treatment	Three-way catalytic converter, One wide-band Lambda oxygen sensor upstream and one discrete-level oxygen sensor downstream of the catalytic converter
Emissions standard	EU5
Dimensions: L x W x H	1500 x 600 x 1960 mm
Weight:	approximately 300 Kg

Technical features:

- Homogenous operation (oxygen sensor 1)
- Layer high-pressure start
- Exhaust gas turbocharger with waste gate
- Switchable mechanical supercharger boosting
- Air/charge air cooling
- Two-circuit cooling system
- Regulated duo-centric oil pump
- Requirement-regulated fuel system
- High-pressure electric fuel pump with integrated pressure limiting valve

Specifications TDI-CR:	
Engine classification code	CAYC
Design	Inline 4-cylinder engine
Displacement	1598 cm³
Bore	79,5 mm
Stroke	80,5 mm
Valves per cylinder	4
Compression ratio	16,5:1
Max. output	77 kW at 4400 rpm
Max. torque	250 Nm at 1500 and 2500 rpm
Engine management system	Simos PCR 2.1
Fuel	Diesel as per DIN EN590
Exhaust gas after-treatment	Exhaust gas recirculation, oxidation catalytic converter and diesel particulate filter
Emissions standard	EU5
Dimensions: L x W x H	1500 x 600 x 1960 mm
Weight:	approximately 300 Kg

Technical features:

- Continental PCR 2 common-rail injection system with piezo injection valves
- Exhaust gas recirculation module with exhaust-gas recirculation valve and cooler for exhaust gas recirculation
- Plastic intake manifold without swirl valve adjustment
- Spur gear drive of the camshafts without backlash compensation
- High-pressure pump with gearwheel pre-supply pump
- Electric fuel pump for pre-supply in the fuel tank

Article	Order.-No.
Training Stand/Functioning Engine: VW 1.4 TSI with Supercharger and Turbocharger	**82745**

Article	Order.-No.
Training Stand/Functioning Engine: VW 1.6 TDI with 4-Valve Technology	**82746**

Recommended Accessories (optional)

Digital storage oscilloscope

This combination of one digital Two-channel /20 MHz storage oscilloscope and one true RMS multimeter represents the ideal solution for any measurement task. The creative shortcut design simplifies operation, the high-resolution 3.8“ TFT colour display (640 x 480 pixels - 65,535 colours) makes it easy to observe the curves, while the long service life of the lithium-ion battery guarantees continuous operation. The device is therefore ideal for use in modern testing/ measurement environments and for taking on-site measurements.

Order-No.
58053

VCDS pro basic kit

The VCDS pro basic kit is the most universal system from the HEX series and supports all communication lines and diagnostic protocols used in the VAG Group. This diagnostic system is therefore suitable for all* diagnostics-capable VAG models from 1992 to the current model series. The system can be extended through the licence dongle function of the HEX hardware. (*in some cases with vehicle-specific adapter)

Order-No.
82251

VW test box, engine compartment, 14-pin

The box is used as a junction/test box between the engine cable harness and body cable harness. It can be used to isolate all sensors and actuators connected to the engine wiring harness, which can then be measured using the digital multimeter and/ or oscilloscope. It can be used with diesel and petrol engines in training vehicles and on engine training stands. The PIN-assignment corresponds to the original VW circuit diagram of the respective engine type.

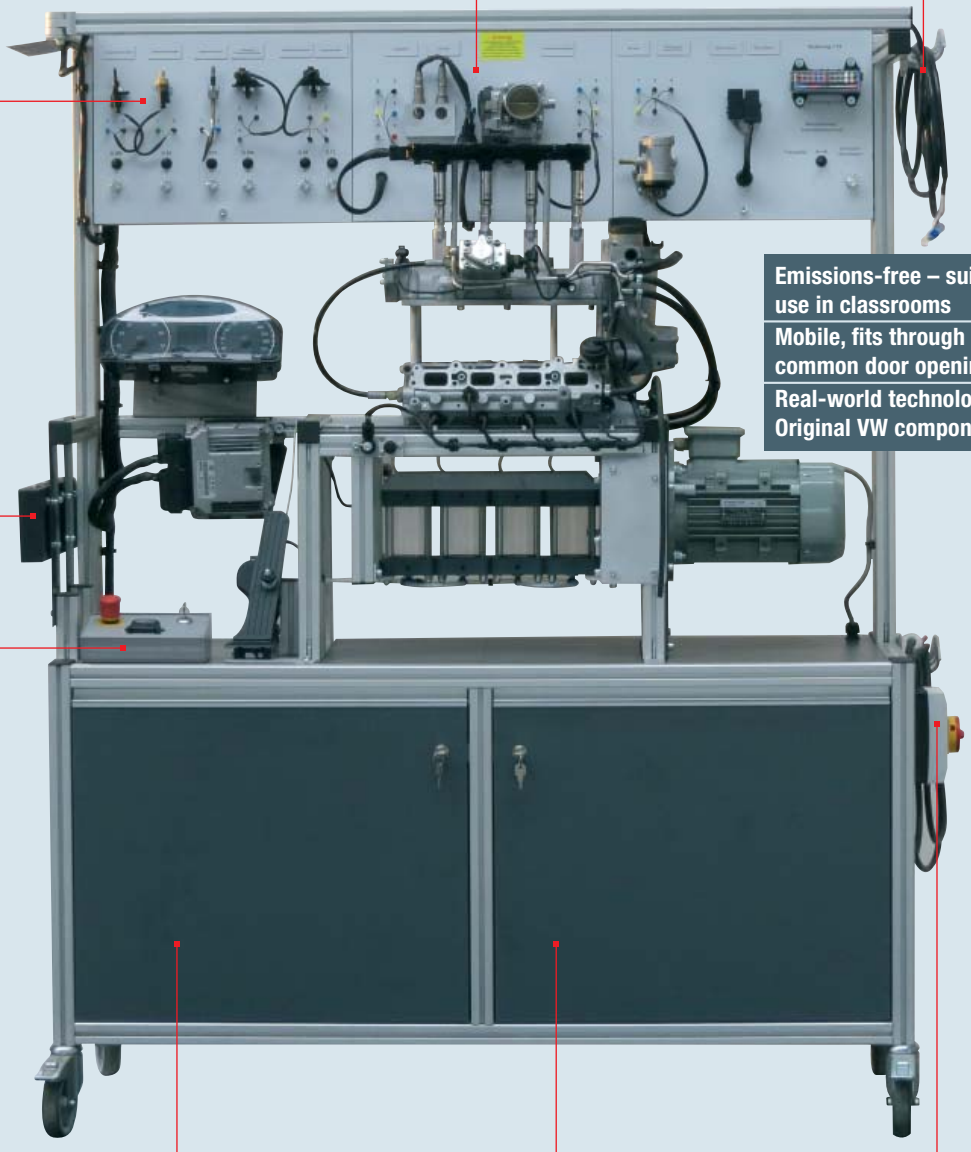
Order-No.
92970

Petrol/Direct Injection – VW Golf 1.4 FSI

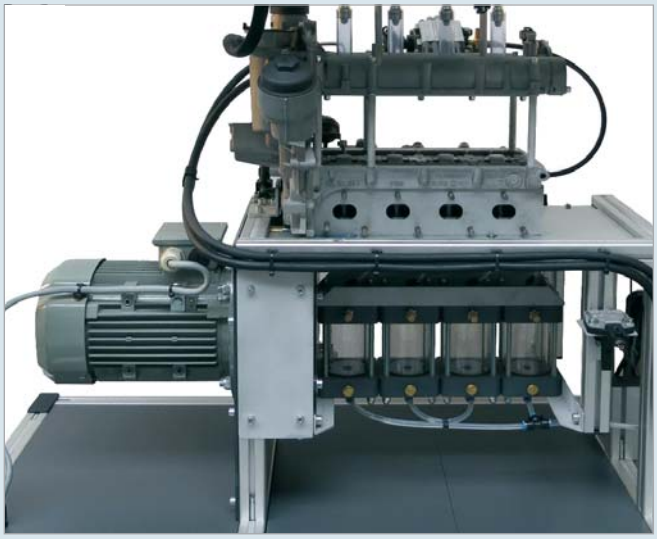
The FSI petrol direct injection training stand has been created using original components from the Golf 1.4 FSI. During its design, particular emphasis was placed on ensuring that the components and their connections are established as realistically as possible. This allows measurements to be taken in real-world conditions for component and system diagnostics.

Various training situations can be simulated using the integrated fault circuit. A component simulation allows various load conditions to be shown. The key advantage of the FSI functional model is its ability to demonstrate the functions and procedures of direct petrol injection under real conditions in the classroom, yet without any emissions.

All original components of the FSI direct petrol injection system with demand-regulated high-pressure pump and the fuel system are both fully functional and suitable for diagnostic purposes. The signals and values can be measured directly on the components or exported via the OBD connection for use with standard commercial diagnostic systems.



Petrol/Direct Injection – VW Golf 1.4 FSI



Learning objectives:

- Working with wiring diagrams, symbols, terminal designations, wires and wiring connections
- Naming mechanical, electrical and electronic components, assembly groups and systems
- Documenting, analysing and evaluating measured values, signals and error protocols
- Making use of the possibilities offered by commonly used workshop diagnostic devices
- Selecting and using mechanical and electrical measuring and testing equipment

Scope of delivery:

Ready-to-use and movable functional model, including fault circuit, circuit diagrams, operating manual and voltage-stabilised 12 V switched mode power supply

Specifications:

Mains connection: 400 V 16 A
Dimensions: W x D x H 1500 x 600 x 1960 mm
Weight: approx. 240 kg

Standard series equipment:

- Bosch Motronic MED 9.5.10 FSI system
- Operating box with ignition starter switch, emergency-off switch and OBD connection
- Interface for trainee measuring station
- Fuel tank with original inline tank pump and fuel pump control unit
- Fuel level indicator via instrument cluster
- Fuel cooler for the original Bosch test oil system
- Idling shutdown for the closed system in the event of any leaks
- Isolation of travel encoder with manual speed adjustment for load simulations

Article	Order-No.
Training Stand/Functional Model VW FSI	77189

Recommended Accessories (optional)

Trainee measuring station

Order-No.
83454

VW test box, 105-pin, VAG

Order-No.
86594

Adapter cable set, 154-pin, VAG

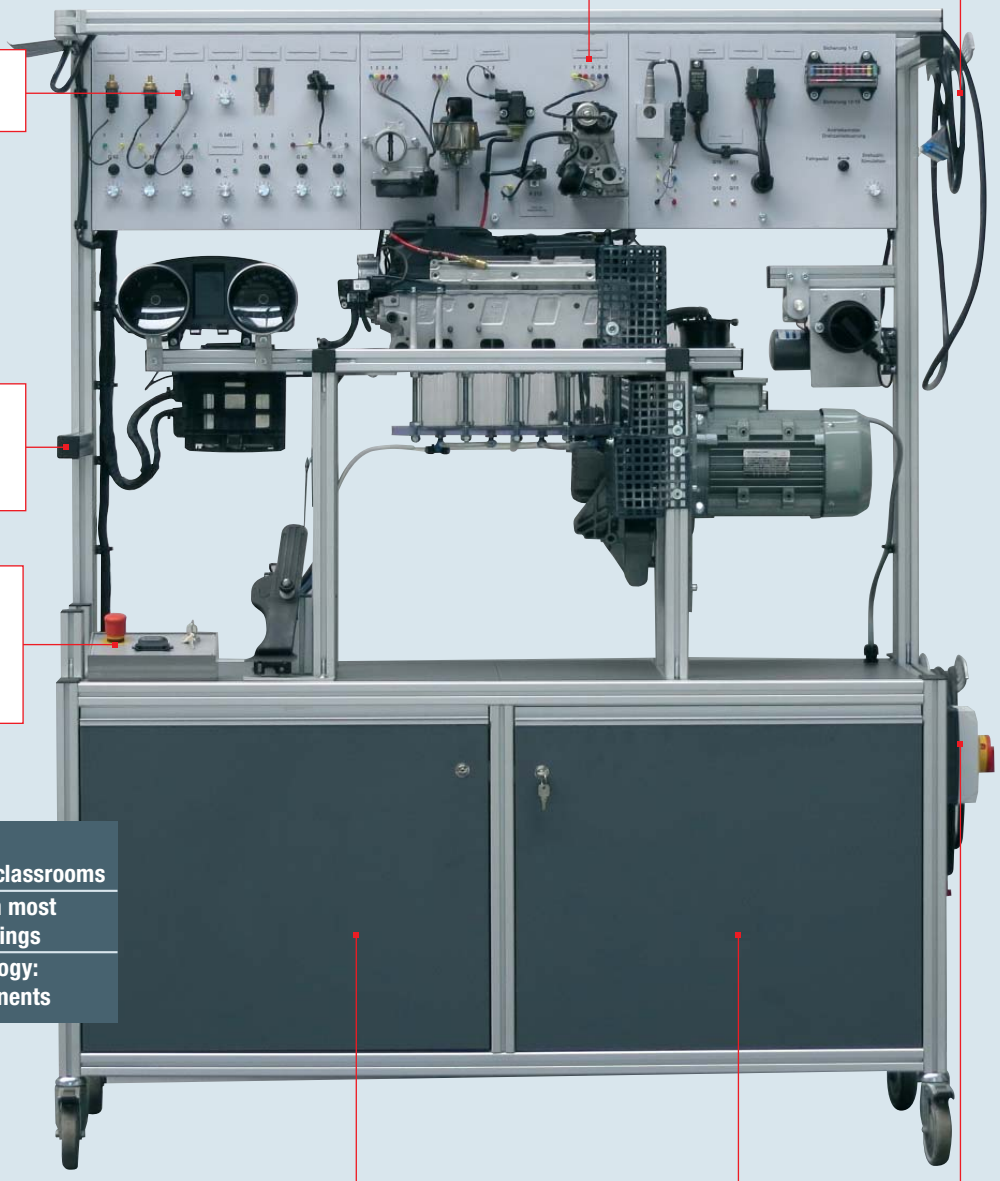
Order-No.
86595

Common-Rail Injection System with Piezo Injection Valves – VW Golf 2.0 TDI

The training stand with common-rail injection system and piezo injection valves has been created using original components from the Golf 2.0 TDI. During its design, particular emphasis was placed on ensuring that the components and their connections are established as realistically as possible. This allows measurements to be taken in real-world conditions for component and system diagnostics.

Various training situations can be simulated using the integrated fault circuit. A component simulation allows various load conditions to be shown. The key advantage of the CR functional model is its ability to demonstrate the functions and procedures of the high pressure common-rail injection system for diesel engines under real conditions in the classroom, yet without any emissions.

All original components of the common-rail injection system and the fuel delivery system, including the fuel pump for pre-feed and additional fuel pump, have been set up in such a way that they are fully functional and suitable for diagnostic purposes. The signals and values can be measured directly on the components or exported via the OBD connection for use with standard commercial diagnostic systems.

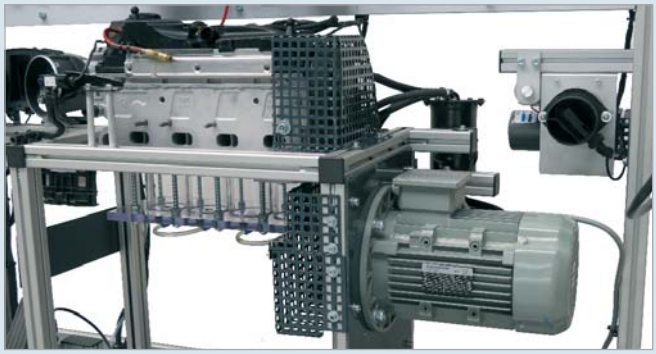


Emissions-free – suitable for use in classrooms

Mobile, fits through most common door openings

Real-world technology: Original VW components

Common-Rail Injection System with Piezo Injection Valves – VW Golf 2.0 TDI



Standard series equipment:

- Bosch EDC 17 common-rail injection system
- Operating box with ignition starter switch, emergency-off switch and OBD connection
- Interface for trainee measuring station
- Fuel tank with original inline tank pump and additional fuel pump
- Fuel level indicator via instrument cluster
- Fuel cooler for the original Bosch test oil system
- Idling shutdown for the closed system in the event of any leaks
- Isolation of travel encoder with manual speed adjustment for load simulations
- Manually controllable air mass for changing the air-to-fuel ratio

Learning objectives:

- Working with wiring diagrams, symbols, terminal designations, wires and wiring connections
- Naming mechanical, electrical and electronic components, assembly groups and systems
- Documenting, analysing and evaluating measured values, signals and error protocols
- Making use of the possibilities offered by commonly used workshop diagnostic devices
- Selecting and using mechanical and electrical measuring and testing equipment

Scope of delivery:

Ready-to-use and movable functional model, including fault circuit, circuit diagrams, operating manual and voltage-stabilised 12 V switched mode power supply

Specifications:

Mains connection: 400 V 16 A
Dimensions: W x D x H 1500 x 600 x 1960 mm
Weight: approx. 280 kg

Article	Order-No.
Training Stand - Training course Common Rail with Piezoin jectors	**77188**

Recommended Accessories (optional)

Trainee measuring station

The trainee measuring station for Christiani training stands is a robust, universal plastic case with carrying handle. The case comes with 45 measuring sockets with a diameter of 2 mm. The measuring station can be used with all Christiani training stands that come with the corresponding interface. Each measuring station includes an expansion option via plug connection up to a total of 14 units. One connection cable is supplied per measuring station for connection and/or extension purposes.

Order-No.
83454

Return volume measuring system

Lehnert Tools Common-Rail Diagnostic System with recirculation process for measuring the return flow volume, pressure and temperature (four cylinders).
Scope of supply:

- Four-cylinder return flow volume measuring unit
- Pressure gauge
- Eight-piece adapter hose set for Bosch piezo injectors
- T-piece 10 mm nozzle
- 1 m adapter hose with coupling
- 1 - 5 bar pressure gauge with plug-in adapter

Order-No.
86604

Passenger Vehicle Functioning Engines

The Christiani functioning engines are fitted to a movable frame made of high-strength aluminium profile. The instrument cluster, fuse block, as well as the ignition switch, emergency-off switch and a component simulation are fitted to the front panel of the control console.

The component simulation is used to display various operating states and emergency running properties. Manipulating individual sensors allows trainees to visually follow the reaction of the engine management system, for example by evaluating measured value blocks or fault code entries. The original OBD interface and the interface for trainee measuring stations are both located on the lower front panel. This makes it possible to connect standard workshop diagnostics systems and trainee measuring stations (up to 14 units in series). A pull-out storage tray for measuring equipment, laptop or work documentation can be found below the interface plate.

The fitted and lockable fault circuit allows 24 different electrical faults to be connected within the engine management system, the power supply system, the fuel injection system and the fuel supply system. The malfunctions that result from this enable the trainer to use the various realistic training situations.

Trainee measuring stations or test boxes with test adapter for the engine management system are optionally available for troubleshooting. These allow the signals and voltage values of all system-relevant components to be measured/diagnosed. In addition to this, parallel measuring adapters can be fitted to the plug connections of the components to which faults are applied. This makes it possible to measure the electrical line connections, including those in hard-to-reach places, without having to dismantle the equipment. The training stand has a restbus simulation for generating the necessary signals of drive components which are not fitted. This guarantees full and unrestricted functionality and diagnostic capabilities.

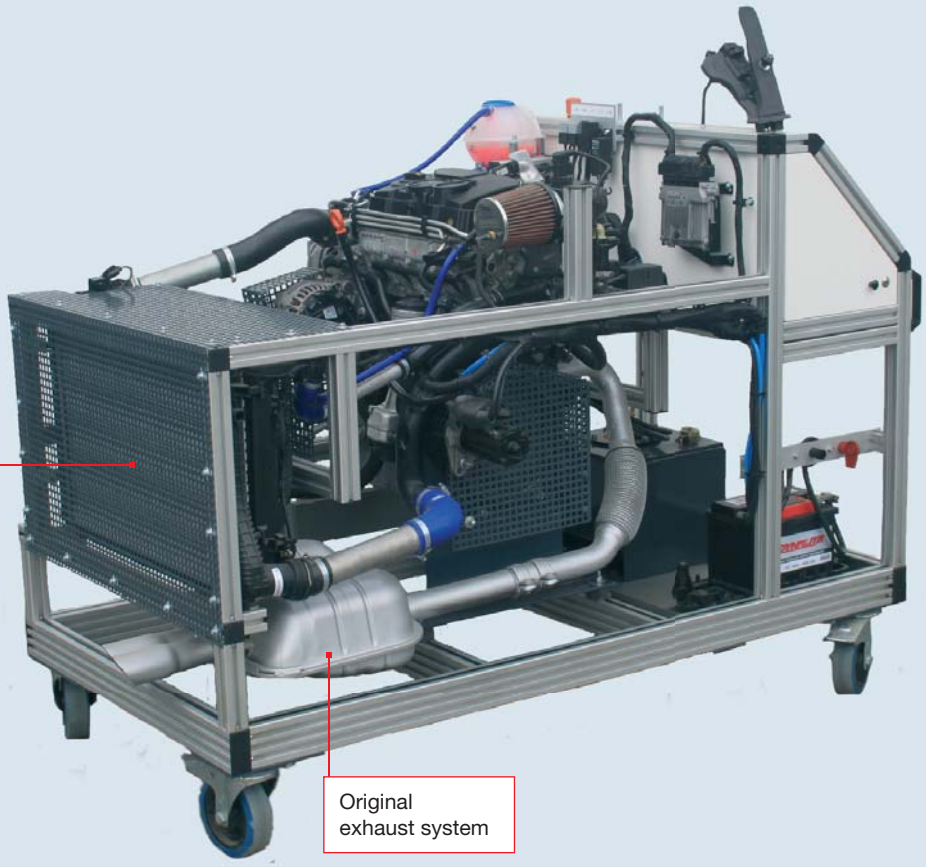
Rotating components and assemblies at high operating temperatures are protected from unintentional physical contact. All components used for genuine functions are original components from the respective manufacturer.

The set-ups shown are examples of functioning engine training stands there have been assembled in the past.

Since a combustion engine is NOT emissions-free, it may only be used outdoors or in areas that offer the necessary extraction to comply with legal stipulations.

- **Equipment with original components**
- **Component simulation and integrated fault circuit**
- **Can be used for exhaust emissions test trainings**
- **Fully operational, with diagnostic capability and ready-to-use**

Passenger Vehicle Functioning Engines



Standard series equipment:

- Control panel with instrument cluster, ignition starter switch, emergency-off switch and OBD connection
- Lockable component state simulation for manipulating various sensor values and presenting emergency running properties
- Interface for trainee measuring station
- Fuel tank made of sheet steel (20 litre capacity) with original inline tank pump, fuel pump control unit and closed original tank ventilation system
- Fuel level indicator via instrument cluster
- Battery main switch

Possible uses:

- Checking and repairing mechanical, electrical and electronic circuits and systems
- Assembly and disassembly work on the engine, working with maintenance and circuit diagrams
- Measuring electrical variables and signals, as well at their documentation and evaluation
- Identifying individual components and learning about their operating characteristics and parameters
- Learning how to use standard workshop diagnostic equipment
- Working with electrical and mechanical measurement and test equipment, such as return flow volume measurement
- Checking components to decide which repair measures are necessary (if any)

Learning objectives:

- Working with maintenance schedules, wiring diagrams, symbols, terminal designations, wires and wiring connections
- Naming mechanical, electrical and electronic components, assembly groups and systems
- Checking and repairing mechanical, electrical and electronic circuits and systems
- Selecting and using mechanical and electrical measuring and testing equipment
- Measuring and evaluating electrical variables and signals
- Documenting work results and evaluating by comparing them with calculated variables and manufacturer specifications
- Making use of the possibilities offered by commonly used workshop diagnostic devices
- Making use of problem resolution strategies and/or alternatives during diagnosis
- Documenting, analysing and evaluating measured values, signals and error protocols
- Examining individual components and making a decision about necessary repair measures

Scope of delivery:

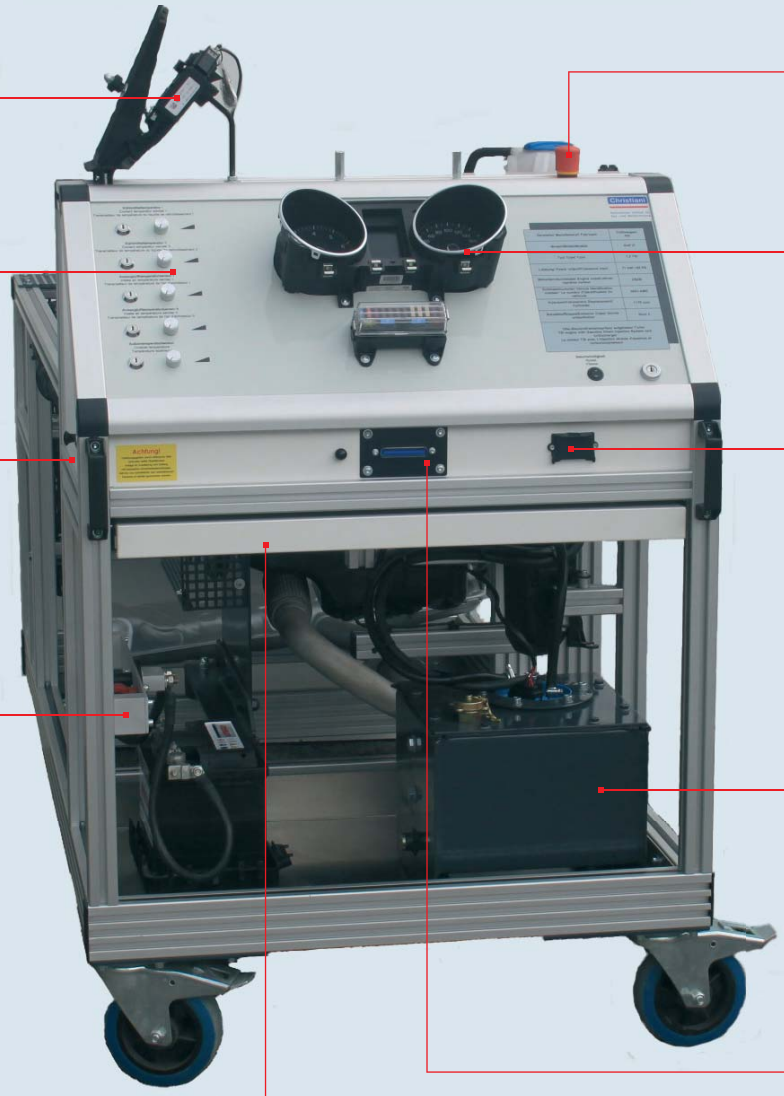
Ready-to-use and movable functional model, including fault circuit, datasheets, circuit diagrams and operating instructions

Specifications:

Dimensions: L x W x H 1700 x 850 x 1600 mm
Weight: approximately 200 - 380 Kg, depending on the model

You can find further information on the following pages – please turn over.

Passenger Vehicle Functioning Engines



Petrol engines that can be supplied (export version)	Order-No.
Opel Multipoint	84240
VW 1.4 MPI	84482
VW 1.4 TSI CAXA	83888
VW 1.4 TSI CAVD	93069
VW 1.4 FSI	77201
VW 2.0 TFSI	83283
VW 2.0 TFSI mit LPG	84067
VW 1.2 TSI	86551
VW 1.6 Bi-Fuel mit LPG	88867

Diesel engines that can be supplied (export version)	Order-No.
Mercedes 200/220 CDI	77181
Ford 1.4 TDCI	84242
Opel 1.3 CDTI	84241
VW 1.6 TDI-CR	83749
VW 1.9 TDI-PD	83172
VW 2.0 TDI-CR	84490
VW 2.0 TDI Blue Motion	88753
VW Crafter 2.0	89253
VW 1.2 TDI-CR 3-Zylinder	92499

Recommended Accessories (optional)

Trainee measuring station

The trainee measuring station for Christiani training stands is a universally deployable and robust plastic case with carrying handle. The case comes with 45 measuring sockets with a diameter of 2 mm. The measuring station measuring station can be used with all Christiani training stands that have the accompanying interface. Each measuring station can also be expanded to up to 14 units via the plug connection. One connection cable is supplied per measuring station for connection and/or extension purposes.

Order-No.
83454

VW test box, 105-pin, VAG 1598/42

In connection with original VW adapter cable sets, the test box allows measurements to be taken with the multimeter and/or oscilloscope on components and line connections. It is fully screened against radiated interference and equipped with an additional earth connection.

Order-No.
86594

Adapter cable set, 154-pin VAG 1598/39

The adapter cable is required in connection with the new test box, VAG 1598/42, for checking the engine control unit. The new test box, VAG 1598/42, is not included in the scope of supply. Two test boxes (order no. 86594) are required for taking measurements. The measurements are performed in parallel. The adapters also have additional connections.

Order-No.
86595

Installation frame

with angle bracket and accessories
System frame made of extruded aluminium profile, including powder coated mounting brackets for the measurement boxes and accessories for attachment to the system frame of Christiani Training Stand/Functioning Engines: (only for engines from Volkswagen).

Order-No.
85294

Digital storage oscilloscope

This combination of one digital 2-channel/20 MHz storage oscilloscope and one true RMS multimeter represents the solution for any measurement task. The creative shortcut design simplifies operation, the high-resolution 3.8“ TFT colour display (640 x 480 pixels - 65,535 colours) makes it easy to observe the curves, while the long service life of the lithium-ion battery guarantees continuous operation.

Order-No.
58053

Measurement cable kit

Measurement cable kit for use with the oscilloscope, order no. 58053. For measuring signals and values on engine training stands with and without test box, as well as on CAN-BUS training systems with measuring tips, laboratory cables and adapters with 4 mm measuring sockets.

Order-No.
80968

Return volume measuring system

Lehnert Tools Common-Rail diagnostic system with recirculation process for measuring the return flow volume, pressure and temperature (four cylinders). Only suitable for use with diesel engines.

Order-No.
86604

Sensors/Actuators – VW Golf 6 1.4

The training stand consists of a networked system of engine management system and brake control unit on the basis of the Golf 6 1.4 with power output of 59 KW. The objective of this training stand is to target training of the IPO principle (Input-Processing-Output) and provide visible examples of this. The components fitted are colour coded based on their respective task. The front panel is also laminated with a printed film and can be written on using water-soluble pens.

All components are connected and labelled as per the original Volkswagen circuit diagram. The connection has been implemented using plug connections with measuring sockets. These allow the signals to be measured, recorded or visualised using a multimeter or oscilloscope. All measured values are also to be exported to the measured value blocks via the OBD interface using a suitable diagnostics system.

The rotary speed of the camshaft, as well as speed control for the pole wheel for the speed sensors are controlled using a potentiometer. Both forward and reverse travel can be simulated on the wheel speed sensors. The system is equipped with a stabilised 12 V switched-mode power supply for powering the drives.

The following are digitally printed on the front panel with circuit diagram:

Sensors:

- Hall sensor, inductive sensor, reed contact, knock sensor, NTC and PTC sensor, TPMS sensor, photosensors, pressure sensors, position indicators, angle sensors, hot-film mass airflow sensors, AMR sensors

Actuators:

- Ignition coils with power output stages, spark plugs in the Makrolon block and connection valves for underpressure and overpressure, electromotive throttle controller, transducer, injection valve, brake control unit, instrument cluster

One analogue and one digital hot-film mass airflow sensor are also fitted (HFM5 and HFM 6). These serve as supplementary units and are not directly linked to the engine management system assembled.

The functional model is activated via the operator panel, which includes the ignition starter switch, the interfaces for OBD and trainee measuring stations, as well as an emergency-off switch.

Sensors/Actuators – VW Golf 6 1.4

Standard series equipment:

- Ready-to-use and movable functional model
- Voltage-stabilised switched mode power supply
- Front can be labelled with marker pen
- OBD diagnostics interface
- Interface for trainee measuring stations

Learning objectives:

- Working with maintenance schedules, wiring diagrams, symbols, terminal designations, wires and wiring connections
- Naming electrical and electronic components, functional units and systems
- Selecting and using electrical measuring and testing equipment
- Measuring and evaluating electrical variables and signals
- Documenting work results and evaluating by comparing them with calculated variables and manufacturer specifications
- Documenting, analysing and evaluating measured values, signals and error protocols

Possible uses:

- Working with wiring diagrams, symbols, terminal designations, wires and wiring connections
- Measuring electrical variables and signals, as well at their documentation and evaluation
- Making use of the possibilities offered by standard workshop measurement and diagnostic equipment
- Identifying individual components and learning about their operating characteristics and parameters
- Examining individual components and making a decision about necessary repair measures

Scope of delivery:

Ready-to-use and movable functional model, including voltage-stabilised 12 V switched mode power supply, datasheets, circuit diagrams, manual and operating instructions.

Specifications:

Dimensions: L x W x H 1600 x 800 x 1950 mm
Weight: approx. 160 kg
Electrical connection: 110 V/240 V mains connection

Article	Order-No.
Functional Model/Training Stand: Sensors/Actuators	**81979**

Other version

Functional Model/Training Stand: Sensors/Actuators with Parking Aid (Park Distance Control)

Design same as article no.: 81979, although also with fully functional PDC system fitted to both the left-hand and right-hand side panel of the functional model, each with four front and rear ultrasonic sensors. The connections employ plug-in connectors and measuring sockets. The PDC activation switch is located on the operator panel.

Article	Order-No.
Functional Model/Training Stand: Sensors/Actuators with Parking Aid (Park Distance Control)	**93025**

Recommended Accessories (optional)

Digital storage oscilloscope

This combination of one digital Two-channel/20 MHz storage oscilloscope and one true RMS multimeter represents the ideal solution for any measurement task. The creative shortcut design simplifies operation, the high-resolution 3.8“ TFT colour display (640 x 480 pixels - 65,535 colours) makes it easy to observe the curves, while the long service life of the lithium-ion battery guarantees continuous operation. The device is therefore ideal for use in modern testing/measurement environments and for taking on-site measurements.

Order-No.
58053

Measurement cable kit

Measurement cable kit for use with the oscilloscope Order no. 58053.

For measuring signals and values on engine training stands with and without test box, as well as on CAN-BUS training systems with measuring tips, laboratory cables and adapters with 4 mm measuring sockets.

Order-No.
80968

TSZI, TSZH and Fully Electrical Ignition with Resting High Voltage Distribution

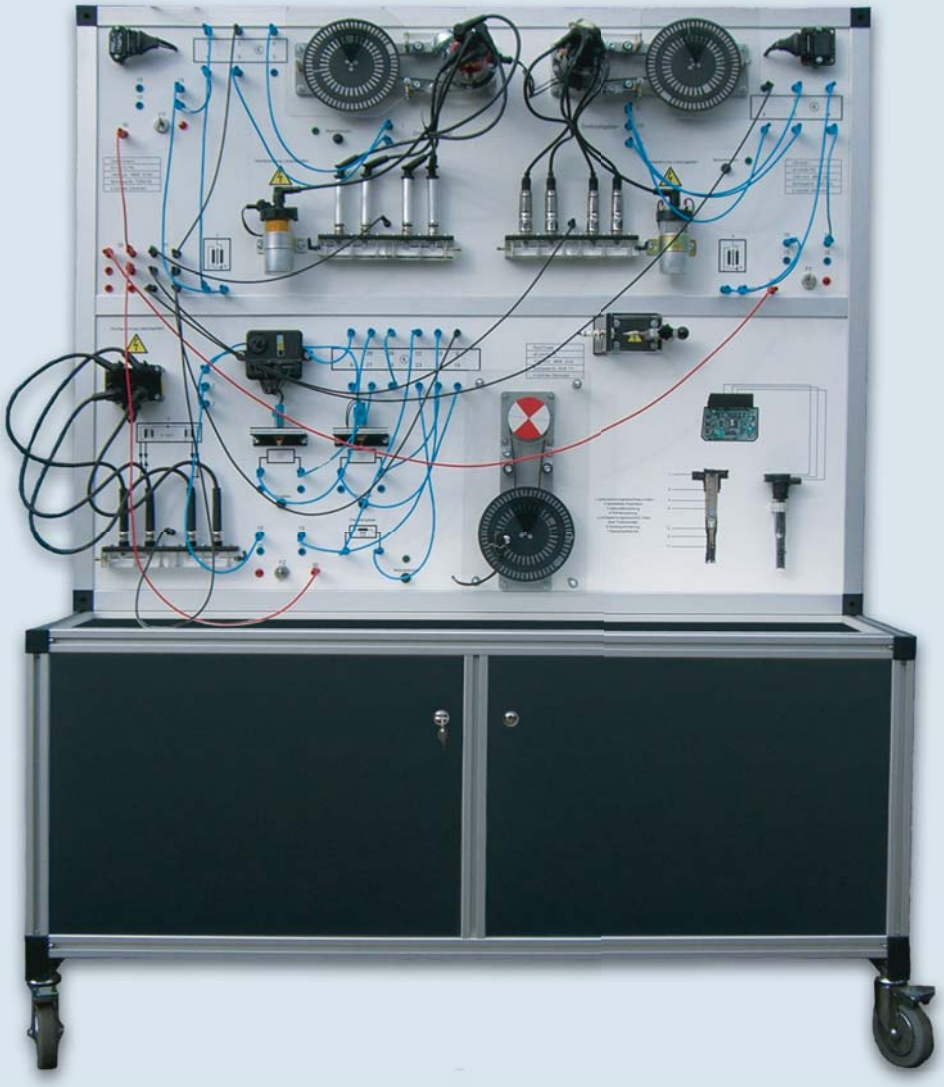
This test stand was created from original components from various vehicles (Volkswagen, Ford, GM). During the design phase, particular emphasis was placed on creating the most realistic representation possible of the components and their connections, so that original documents and wiring diagrams from Volkswagen AG can be used. This makes it possible to perform measurements, fault simulation and diagnostics as on a conventional vehicle. By manipulating the components, various faults have been incorporated into the test set-up so that practical troubleshooting is possible.

Transistorised ignition with Hall sensor, transistorised ignition with inductive sensor and resting high voltage distribution are all available. The connections on each component are designed as forward-facing 4 mm safety sockets.

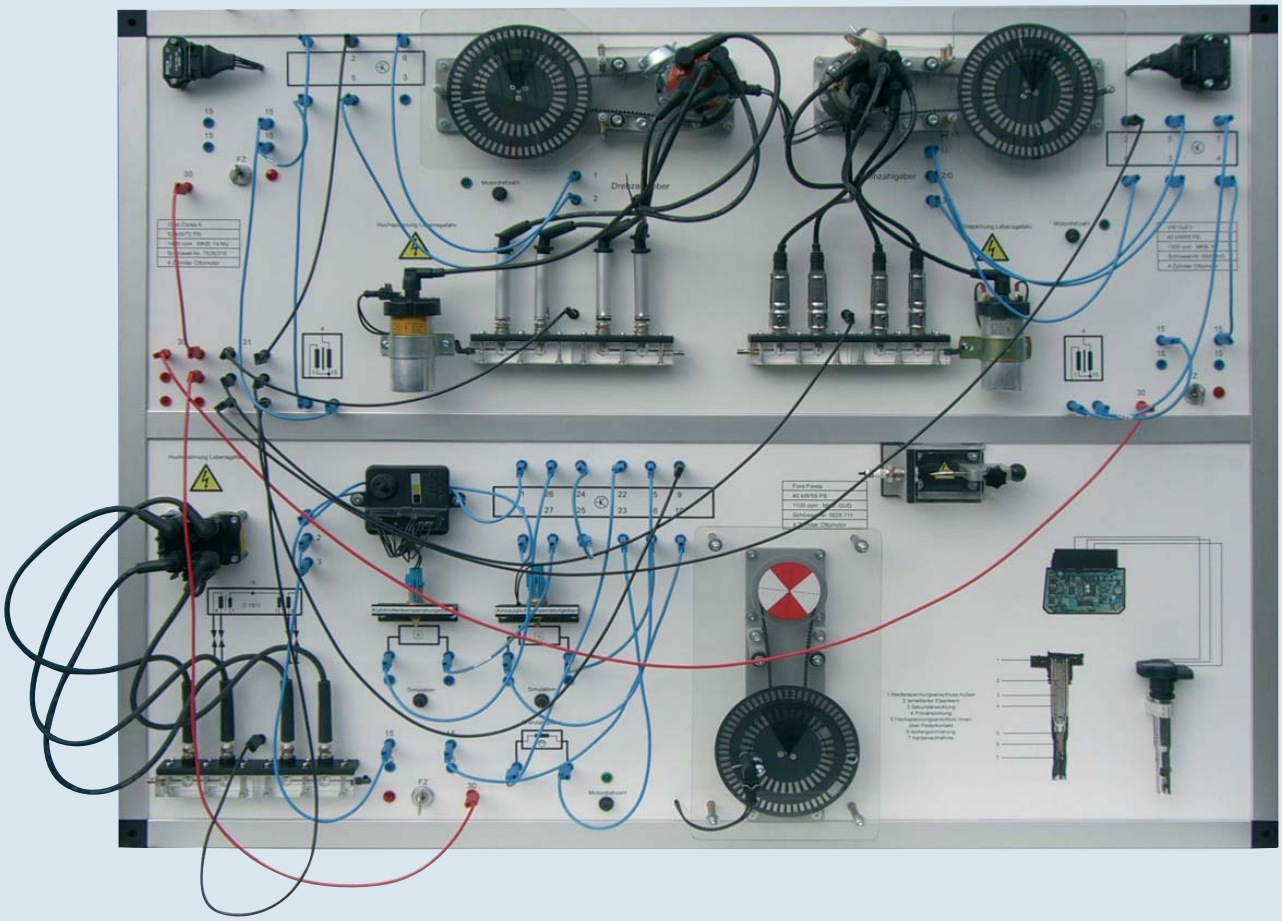
Each connection is labelled with the terminal designations as per DIN 72522 or, depending on the model in question, with the designations of the respective OEM wiring diagram. So that all measuring points can be worked on using an oscilloscope or a multimeter, these measuring points are fitted to the front panel and therefore easily accessible. The components are connected using 4 mm laboratory safety cables.

There is also an option to connect up to 14 trainee measuring stations to the experimental apparatus via the interface provided. This allows measurement exercises to be performed using the multimeter and oscilloscope with several trainees at the same time. The base cabinet with lockable folding doors also serves as storage space for the measuring equipment/optional accessories. The movable apparatus comprises a high-strength aluminium profile with four lockable heavy-duty steering rollers. Circuit diagrams and work documents are included in the scope of supply.

Connection options:
Trainee measuring stations, multimeter, oscilloscope, stroboscope



TSZI, TSZH and Fully Electrical Ignition with Resting High Voltage Distribution



Standard series equipment:

- Ready-to-use and movable functional model with lockable base cabinets
- Voltage-stabilised switched mode power supply (fitted in base cabinet)
- Connection cables with safety sockets
- Three functional units that operate independently of one another with manual speed control
- Spark plugs in Makrolon blocks with overpressure and underpressure connections
- Spark gap simulation
- Front can be labelled with marker pen

Possible uses:

- Checking and repairing mechanical, electrical and electronic circuits and systems
- Working with maintenance and circuit diagrams
- Measuring electrical variables and signals, as well at their documentation and evaluation
- Identifying individual components and learning about their operating characteristics and parameters
- Working with electrical and mechanical measurement and test equipment
- Checking components to decide which repair measures are necessary (if any)

Learning objectives:

- Working with maintenance schedules, wiring diagrams, symbols, terminal designations, wires and wiring connections
- Naming mechanical, electrical and electronic components, assembly groups and systems
- Checking and repairing mechanical, electrical and electronic circuits and systems
- Selecting and using mechanical and electrical measuring and testing equipment
- Measuring and evaluating electrical variables and signals
- Documenting work results and evaluating by comparing them with calculated variables and manufacturer specifications
- Documenting, analysing and evaluating measured values, signals and error protocols
- Examining individual components and making a decision about necessary repair measures

Scope of delivery:

Ready-to-use and movable functional model, including voltage-stabilised 12 V switched mode power supply, datasheets, circuit diagrams and operating manual

Specifications:

Dimensions: L x W x H 1600 x 800 x 1950 mm
Weight: approx. 220 kg
Electrical connection: 110 V/240 V mains connection

Article	Order-No.
TSZI, TSZH and fully electrical ignition with resting high voltage distribution	**77403**

SSC (Small-Size-Car)

Our training vehicles from the current Volkswagen model range have been specially prepared for vocational training. Models from the current Golf 7 range serve as the basic vehicle here.

Alongside use at vocational training centres, these methodically prepared training vehicles are also used within the scope of practical teaching at vocational schools/colleges. All versions of the models supplied with petrol or diesel engines, as well as the manual and DSG gearbox options, are exactly the same as Volkswagen's current series production models. This makes it possible to perform training using state-of-the-art vehicles. The SSC is fully functional with full diagnostic capability.

As standard, fault switching can be locked in the glove compartment:

Using a fault circuit fitted in the glove compartment, various faults can be simulated and their localisation and rectification can be both learned and practised in real-world conditions. The standard equipment includes 20 practical faults, as they occur in workshops on a day-to-day basis. It goes without saying that multiple switchings are possible. In this way, the trainers can determine the level of difficulty of the troubleshooting themselves. An additional fault circuit box with 20 further faults is also available as an optional extension.

SSC functional model

Door modules for easier handling and accessibility

To avoid installation work and improve the accessibility of components and control equipment, the original driver and passenger doors have been replaced by door modules. All components and control systems of the respective door are fitted in a way that allows them to be measured and isolated here. Components from the rear section of the original vehicle that has been removed, such as the brake system with wheel speed sensors, fuel tank, rear lights, boot lid lock etc., are fitted in easily accessible locations in the footwell and on the back.

Functional Model VW Golf 7

The Golf 7 functional model training vehicle from the current modular transverse matrix (MQB) of Volkswagen AG is fully functional. Alongside all troubleshooting and diagnostic work, it can also be used for power measurements on roller dynamometers, wheel alignment in chassis analysis systems and various other applications.

All important fault and diagnostics points in the interior are exposed and have been made accessible. Among other things, this makes it easier to check components of the restraint system, seat adjustment, electric windows or the central locking system and thereby also to get a better feel for their position and function. This means that all necessary measurements can be easily carried out using a multimeter or oscilloscope on components and control units, without having to carry out any installation work. This makes it easier to fully understand the functions of vehicles, while also simplifying the troubleshooting process.

An integrated fault circuit box with 20 faults is fitted to the functional models as standard. This allows real-world workshop situations to be processed in a very short time and the necessary troubleshooting/fault localisation routines to be performed step-by-step. An optional extension is also available for the integrated fault circuit, offering 20 additional faults.

Optional, factory-fitted measurement boxes with control equipment adapter for the engine management system or the ABS/ESP control unit facilitate non-destructive measurements without the need to continually connect/disconnect the sensitive plug connections on control equipment with lots of PIN connections.

A standard workshop diagnostic system can be used to perform self-diagnostics and encoding on all fitted control devices. The connection to diagnostic equipment is established using the 16-pin connector as per the VW ISO/OBD standard.

Functional model, Golf 7
(example image)

Rear view (example image)

Internal view (example image)

Functional Model VW Golf 7

Engine and gearbox

As a general rule, all drive versions available in series production can be supplied. When placing an order or sending a request, please specify the desired engine and gearbox. We will make every effort to meet your requests.

Front passenger door (example image)

Boot lid (example image)

Fault box (example image)

Internal view (example image)

Additional fault circuit boxes and an ABS test box (optional):
On request (and for a surcharge), the vehicle can be equipped with an additional fault circuit box that contains 20 extra faults and/or an active test box connected in parallel for the ABS system. The connections are integrated into the original vehicle's cable harness. The fault circuit boxes and the ABS test box cannot be retrofitted. Please take this into consideration when ordering a vehicle. Using test boxes and fault circuit boxes prevents potential sources of faults from occurring over time due to the constant connection of plugs to components and disconnection of control equipment plugs.

Article	Order-No.
Training Vehicle VW Golf 7	94829
Functional Model VW Golf 7 with Fault box	94830
Functional Model VW-SSC Golf 7 TDI	85918
Functional Model VW-SSC Golf 7 TSI	85783

Recommended Accessories (optional)

Article	Order-No.
VW ABS/ESP test box	83793
VCDS pro basic kit	82251
VW engine compartment test box, 14-pin	92970
VCDS pro maxi service case	86596
Fault circuit extension for functional model 94830 with 20 faults	89782
Measurement boxes with adapter for VW engine management system, 154-pin (Bosch ECU)	74250
Measurement boxes with adapter for VW engine management system, 196-pin (Simos ECU)	83791

Training Stand/Functional Model: Starter Motor Generator

The training stand has been designed for performing measurement exercises and troubleshooting, as well as for learning how an alternator and pre-engaged starter motor work. The parts installed are printed in a list on the front panel and also carry the respective electrical switching symbol and circuit diagram. There are measuring points with 4 mm safety measuring sockets within the circuit diagram. The front panel can be written on using water-soluble pens.

The 3-phase alternator has been specially prepared and various faults can be activated via an integrated fault circuit to practice diagnostic methods and fault interpretation. Voltages, currents, control responses and redundancies can be measured, recorded and evaluated using a multimeter or oscilloscope via the measuring sockets in the front panel.

The 3-phase alternator is driven via a 230 V AC motor with frequency converter. In conjunction with a freely variable speed control and various switched consumers, this makes it possible to simulate all functions of the alternator and the charge controller. Real-world operating situations are thereby created and the kinds of measurements typically taken in practice can be performed. A digital display is fitted for this.

In addition to this, the stand is equipped with a vehicle battery and a starter. The starter is functional. It is equipped with a mechanical brake to simulate load conditions. An ammeter with current probe can be used to demonstrate the change in power consumption under load, as well as the battery discharge that this causes.

There is a selector switch between the circuit diagram of the pre-engaged starter motor and the 3-phase alternator. Depending on the position, it is possible to work either with the starter or with the alternator.

While work is being performed on the 3-phase alternator, the battery is charged, as it would be in real-world conditions. However, this obviously requires ALL fault switches and consumers to be switched off.

A special measuring instrument (battery tester) is provided for diagnosing the charge status of the battery. No multimeter or oscilloscope is included in the scope of supply.

Charging current with consumer connected approximately 230 W at around 2000 rpm

Standard series equipment:

- Ready-to-use and movable functional model
- Connectable consumers for load simulation on the alternator
- Mechanical brake for load simulation on the starter
- Front can be labelled with marker pen
- Fault circuit with 11 faults

Possible uses:

- Working with wiring diagrams, symbols, terminal designations, wires and wiring connections
- Making use of the possibilities offered by standard workshop measurement and testing equipment
- Making use of problem resolution strategies and/or alternatives during diagnosis
- Examining individual components and making a decision about necessary repair measures
- Troubleshooting in electrical circuits

Learning objectives:

- Naming electrical and electronic components, functional units and systems
- Checking and repairing electrical and electronic circuits
- Selecting and using electrical measuring and testing equipment
- Measuring and evaluating electrical variables and signals
- Documenting work results and evaluating by comparing them with calculated variables and manufacturer specifications

Scope of delivery:

Ready-to-use and movable functional model, including 12 V vehicle battery, datasheets, circuit diagrams and operating manual

Specifications:

Dimensions: L x W x H 1400 x 800 x 1950 mm
Weight: approx. 140 kg
Electrical connection: 240 V mains connection (110 V on request)

Article	Order-No.
Training Stand/Functional Model: Starter Motor Generator	**85568**

CAN-Lin Bus Function Wall – VW Golf 6

The CAN bus stand for performing experiments was created using original components from the VW Golf 6. The realistic representation of the components and their connections is worthy of special mention with this design. In contrast to comparable systems, no bunch plugs or standardised plug connections are used for the connections between the original components here. Instead, only original connections from the actual vehicle are used.

This allows the use of original manufacturer documentation and circuit diagrams, supplied by Volkswagen AG, while also allowing measurements, fault simulations and diagnostics to be performed in real-world conditions. The function wall's CAN function box serves as the central interface and also provides additional connection options for accessories.

To facilitate this, the function box includes 10 parallel interfaces for the diagnostic cable, LIN-Bus and all other CAN bus connections, as well as connections for the accompanying power supply and earth connection. The supply of the individual components can be monitored on two LEDs. To prevent short-circuit damage, the parallel connections are also safeguarded with two fuses.

As well as the diagnostic cable, individual 7-pin sub-D sockets are provided for the CAN and LIN-buses to not only allow the signals to be visualised as voltages on the CAN bus, but also to be able to export the contents of the CAN messages using the accompanying control unit addresses (identifiers). When used with a CAN or LIN interface, these allow the messages to be queried/exported in plain text.

The connection to diagnostic test equipment is established using the 16-pin OBD connector as per the VAG standard. A voltagestabilised 12 V switched mode power supply with sufficient power output (min. 200 W) is recommended for supplying voltage to the function wall. Alternatively, a 12 V car battery with sufficient capacity can be used (12 V 60 AH).

CAN-Lin Bus Function Wall – VW Golf 6

Additional options:

The functional model can be extended with the following modules:
- Convenience module for driver and front passenger door
- Trailer module

Connections are established via the function box.

Standard series equipment:

- Headlight combination with bi-xenon cornering light, as well as vehicle position sensor
- LED rear lights
- Rear window brake light
- License plate light
- Instrument cluster (Highline equipment)
- Fog light and rear fog light
- BCM (body control module) control unit (Highline equipment)
- Original fuse box
- Wiper motor
- Washer pump for front and rear wipers
- CAN-LIN function box with parallel sockets for components, sockets for CAN interface and OBD connection
- Integrated fault switching box with 16 fault circuits (lockable)
- Steering column combination switch with control unit
- Diagnostic interface (gateway)
- Light switch centre
- Reversing lights
- Component measurement points with connection sockets for oscilloscope/multimeter
- Restbus simulator with speed control and component simulation

Learning objectives:

- Naming electrical and electronic components, functional units and systems
- Checking and repairing electrical and electronic circuits
- Selecting and using electrical measuring and testing equipment
- Measuring and evaluating electrical variables and signals
- Documenting work results and evaluating by comparing them with calculated variables and manufacturer specifications
- Working with wiring diagrams, logic diagrams and networking plans
- Networking of systems, system analysis, system limitations and system interfaces
- Data communications wires, information transmission, data protocols and electromagnetic compatibility

Possible uses:

- Working with wiring diagrams, symbols, terminal designations, wires and wiring connections
- Making use of the possibilities offered by commonly used workshop diagnostic devices
- Making use of problem resolution strategies and/or alternatives during diagnosis
- Examining individual components and making a decision about necessary repair measures

Encoding control units, adapting software statuses and checking data communications wires, taking account of legal stipulations and manufacturer specifications

Scope of delivery:

Including technical documentation and circuit diagrams
Fully operational and ready-to-use training stand with fault circuit, operating manual, technical documentation and circuit diagrams

Specifications:

Dimensions: L x W x H 1400 x 800 x 1950 mm
Weight: approx. 80 kg
Electrical connection: 110 V/240 V mains connection

Article	Order-No.
CAN-Lin Bus Function Wall – VW Golf 6	81951

Recommended Accessories (optional)

Article	Order-No.
CAN fault patch box for CAN comfort	74730
CAN-LIN measuring box	74731
CAN fault switch box for CAN comfort	74732
Trailer module	75351
Switched mode power supply DC 1 - 16 V 0 - 40 A	77196
VCDS pro basic kit diagnostic system	82251
Convenience module 2-door	81952
Digital storage oscilloscope 20 MHz/digital multimeter	58053

CAN-Bus Function Wall – VW Golf 5

The CAN bus stand for performing experiments was created using original components from the VW Golf 5. The realistic representation of the components and their connections is worthy of special mention with this design. In contrast to comparable systems, no bunch plugs or standardised plug connections are used for the connections between the original components here. Instead, only original connections from the actual vehicle are used. This allows the use of original manufacturer documentation and circuit diagrams, supplied by Volkswagen AG, while also allowing measurements, fault simulations and diagnostics to be performed in real-world conditions.

The function wall's CAN function box serves as the central interface and also provides additional connection options for accessories. To facilitate this, the function box includes 10 parallel interfaces for the diagnostic cable, LIN-Bus and all other CAN bus connections, as well as connections for the accompanying power supply and earth connection. The supply of the individual components can be monitored on two LEDs. To prevent short-circuit damage, the parallel connections are also safeguarded with two fuses.

As well as the diagnostic cable, individual 7-pin sub-D sockets are provided for the CAN and LIN-buses to not only allow the signals to be visualised as voltages on the CAN bus, but also to be able to export the contents of the CAN messages using the accompanying control unit addresses (identifiers). When used with a CAN or LIN interface, these allow the messages to be queried/exported in plain text.

The connection to diagnostic test equipment is established using the 16-pin OBD connector as per the VAG standard. A voltage-stabilised 12 V switched mode power supply with sufficient power output (min. 200 W) is recommended for supplying voltage to the function wall. Alternatively, a 12 V car battery with sufficient capacity can be used (12 V 60 AH).

CAN-Bus Function Wall – VW Golf 5

Standard series equipment:

- Headlight combination H7
- Rear lights combination
- Rear window brake light
- License plate light
- Instrument cluster
- Front fog light
- Rear fog light
- Vehicle electrical system control unit
- Safety plate
- Wiper motor (LIN-BUS)
- Washer pump for front and rear wipers
- CAN-LIN function box with parallel sockets for components, sockets for CAN interface, power supply connections and OBD connection
- Integrated fault switching box with 14 fault switches (lockable)
- Steering column combination switch with control unit
- Diagnostic interface (gateway)
- Light switch centre
- Reversing lights
- Component measurement points with connection sockets for oscillo scope/multimeter

Learning objectives:

- Naming electrical and electronic components, functional units and systems
- Checking and repairing electrical and electronic circuits
- Selecting and using electrical measuring and testing equipment
- Measuring and evaluating electrical variables and signals
- Documenting work results and evaluating by comparing with calcu lated variables and manufacturer specifications

Possible uses:

- Working with wiring diagrams, symbols, terminal designations, wires and wiring connections
- Making use of the possibilities offered by commonly used workshop diagnostic devices
- Making use of problem resolution strategies and/or alternatives during diagnosis
- Examining individual components and making a decision about necessary repair measures
- Encoding control units, adapting software statuses and checking data communications wires, taking account of legal stipulations and manufacturer specifications

Scope of delivery:

Fully operational and ready-to-use training stand with fault circuit, operating manual, technical documentation and circuit diagrams

Specifications:

Dimensions: L x W x H 1400 x 800 x 1950 mm
Weight: approx. 80 kg
Electrical connection: 110 V/240 V mains connection

Article	Order-No.
Training Stand/Functional Model CAN-Bus Function Wall – VW Golf 5	**85767**

Recommended Accessories (optional)

Article	Order-No.
VW-CAN convenience module	**85530**
Rain/light sensor	**81953**
Trailer module	**75351**
Switched mode power supply DC 1 - 16 V 0 - 40 A	**77196**
VCDS pro basic kit diagnostic system	**82251**
Digital storage oscilloscope 20 MHz/digital multimeter	**58053**
PCAN Interface/ISO adapter with USB connection	**74734**
PCAN Explorer 4 – comprehensive CAN monitor for Windows®	**74735**

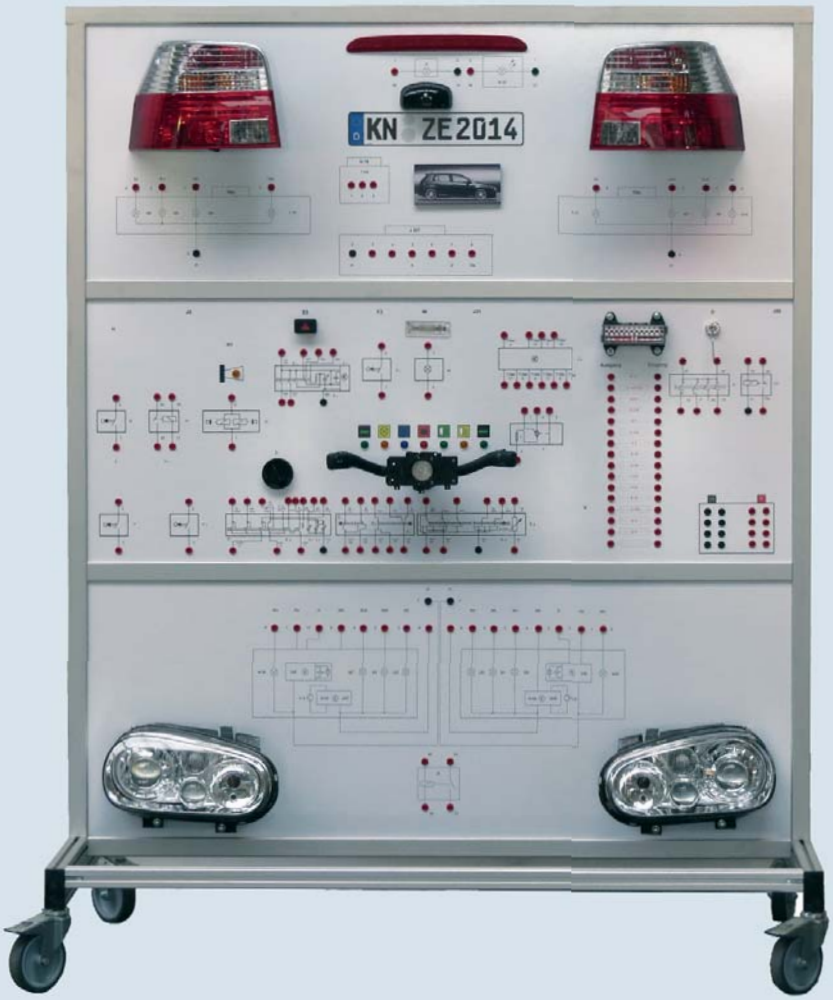
Basics of Electrical Systems in Motor Vehicles – VW Golf 4

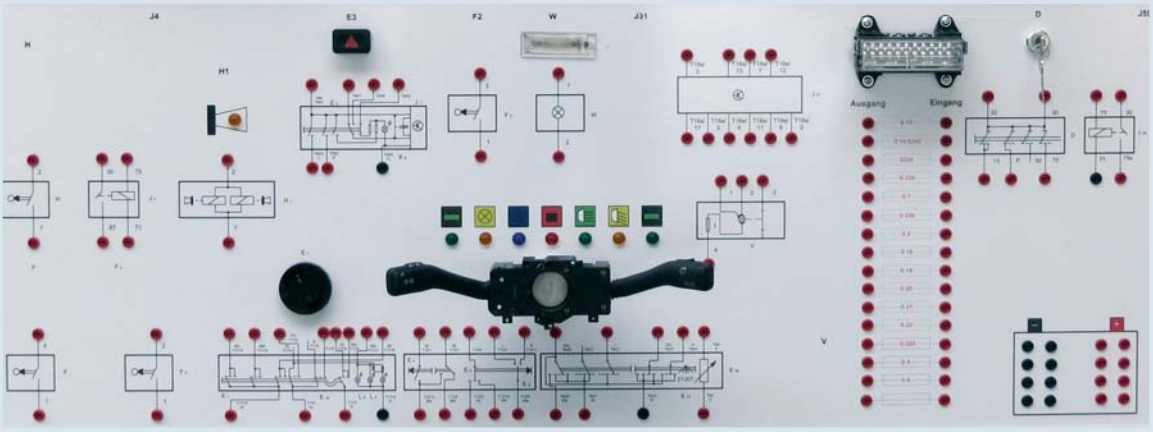
The training stand has been specifically designed for demonstrating the basics of electrical systems in motor vehicles. The components used for the apparatus are based on the Golf 4 and are both fitted and connected to one another exactly as they were in the original vehicle.

The trainee‘s task is to lay the entire cabling of the components in a lighting system as per the end-to-end circuit diagram and demonstrate that all of these components are working correctly through commissioning. An integrated fault circuit with remote control introduces the trainees to systematic troubleshooting in a step-by-step approach.

Since the original DIN switching symbols and DIN 72522 terminal designations are used, it is possible to wire up the entire vehicle training stand exactly as shown in the circuit diagram. All components are equipped with the specific plug-in sockets with digital diagram printout on the base plate. This guarantees the same cabling structure at all times.

Functional assemblies such as light switches, headlights, wipers, etc. can also be wired up individually as an initial training exercise. Working in groups, all consumers and switching elements can then be connected to one another in such a way that the relatively complex system wiring diagram and interactions between the individual elements are easier to understand.





Basics of Electrical Systems in Motor Vehicles – VW Golf 4

Standard series equipment:

- Ready-to-use and movable functional model
- Voltage-stabilised switched mode power supply
- All connection leads required (laboratory cables with 4 mm safety sockets)
- Front can be labelled with marker pen
- Fault circuit with eight faults and remote control
- Xenon headlights with automatic headlight beam throw adjustment, fog lights and original rear lights, ignition starter switch, steering column switch, hazard warning lights system, level sensor, wiper motor, light switch, brake light switch, additional brake light, rear lights, number plate light, interior light, power distribution box, relay, door contact switch, horn

Possible uses:

- Working with wiring diagrams, symbols, terminal designations, wires and wiring connections
- Making use of the possibilities offered by commonly used workshop diagnostic devices
- Making use of problem resolution strategies and/or alternatives during diagnosis
- Examining individual components and making a decision about necessary repair measures
- Troubleshooting in electrical circuits

Learning objectives:

- Naming electrical and electronic components, functional units and systems
- Checking and repairing electrical and electronic circuits
- Selecting and using electrical measuring and testing equipment
- Measuring and evaluating electrical variables and signals
- Documenting work results and evaluating by comparing with calculated variables and manufacturer specifications

Scope of delivery:

Ready-to-use and movable functional model, including voltage-stabilised 12 V switched mode power supply, datasheets, circuit diagrams and operating manual

Specifications:

Dimensions: L x W x H 1600 x 800 x 1950 mm
Weight: approx. 140 kg
Electrical connection: 110 V/240 V mains connection

Article	Order-No.
Basics of Electrical Systems in Motor Vehicles – VW Golf 4	**95992**
Trailer socket extension	**95998**
Preheating system extension	**95999**

Recommended Accessories (optional)

Digital multimeter for motor vehicle applications

Speed measurement, closing angle measurement, Frequency measurement, of the pulse-pause ratio and pulse duration, Temperature measurement. The multimeter is equipped with high-power fuses for the current measuring ranges and comes with a dust-proof and waterproof housing.

Order-No.
58450

Storage oscilloscope

This combination of one digital Two-channel/20 MHz storage oscilloscope and one true RMS multimeter represents the ideal solution for any measurement task. The creative shortcut design simplifies operation, the high-resolution 3.8“ TFT colour display (640 x 480 pixels - 65,535 colours) makes it easy to observe curves, while the lithium-ion battery guarantees continuous operation with its long service life.

Order-No.
58053

Measurement cable kit

Measurement cable kit for use with the oscilloscope Order no. 58053.
For measuring signals and values on engine training stands with and without a test box, as well as on CAN-BUS training systems with measuring tips, laboratory cables and adapters with 4 mm measuring sockets.

Order-No.
80968

Locktronics

An Introduction to motors and generators

This solution allows students to investigate the electrical principles behind motors and generators and is designed to support the teaching of a range of automotive units. It is accompanied by a comprehensive set of curriculum worksheets and supporting documentation to facilitate the learning of this core topic in automotive electrical technology.

Order-No.
87163

Electricity, magnetism and materials solution

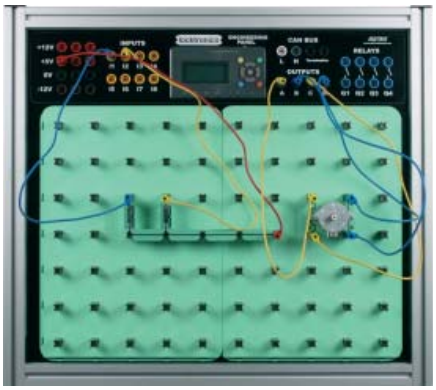
The kit is supplied with two sets of printable worksheets on CD ROM (around 80 pages) that cover the electrical properties of materials, electricity, and electrical circuits. The solution includes component carriers, base board, power supply, and storage trays. Suitable for Science in the UK at Key Stages 3 and 4.

Order-No.
85931

Sensors and control in automotive applications with baseboard

This solution provides an introduction to the role of an Electronic Control Unit. Students use a number of prewritten programs for the MIAC Electronic Control Unit (ECU) to enable them to construct a wide variety of Input - Process - Output circuits using sensors and actuators typically found in vehicles. A full curriculum pack is provided.. The solution includes component carriers, base board, a power supply, and storage trays.

Order-No.
86614



Sensors and control in automotive applications with engineering panel

This solution provides an introduction to the role of an Electronic Control Unit. Students use a number of prewritten programs for the MIAC Electronic Control Unit (ECU) to enable them to construct a wide variety of Input - Process - Output circuits using sensors and actuators typically found in vehicles. A full curriculum pack is provided.. The solution includes component carriers, base board, a power supply, and storage trays.

Order-No.
89522

CAN bus systems and operation solution

This kit allows a fully functioning CAN bus system, mimicking vehicle operation, to be set up using 4 MIAC Electronics Control Units representing Instrument panel, Front ECU, Powertrain control, and Rear ECU. A fifth MIAC is used for system diagnosis, releasing faults and viewing CAN bus messages. Students are tasked with setting up a fully working CAN bus system, inserting faults and using hardware and software tools to understand fault diagnosis procedures and practice. The solution includes component carriers, baseboard, power supplies and storage trays and is supplied with a full curriculum pack including teacher‘s notes.

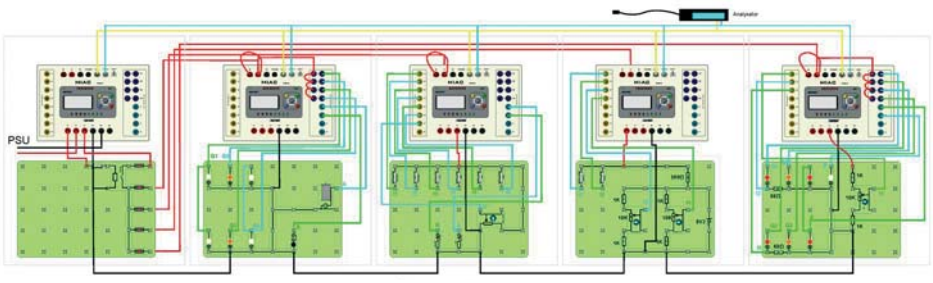
Order-No.
86516

CAN bus systems and operation solution with engineering panel

This kit allows a fully functioning CAN bus system, mimicking vehicle operation, to be set up using 4 MIAC Electronics Control Units representing Instrument panel, Front ECU, Powertrain control, and Rear ECU. A fifth MIAC is used for system diagnosis, releasing faults and viewing CAN bus messages. Students are tasked with setting up a fully working CAN bus system, inserting faults and using hardware and software tools to understand fault diagnosis procedures and practice. The solution includes component carriers, baseboard, power supplies and storage trays and is supplied with a full curriculum pack including teacher‘s notes.

Order-No.
89521

The number of nodes, and how they are configured, varies greatly from one car to another. Different manufacturers use different software, and different messages within their CAN bus systems. The system used in this course is broadly representative of systems found in cars. Each node consists of an ECU and the associated circuitry required to control the devices attached to that node. Each node is supplied with power, ground and the two wires, called CAN High (CANH) and CAN Low (CANL). In motor vehicles, these CAN wires are twisted together.



Scan/fuse | Front (A) | Instrument panel (B) | Powertrain (C) | Rear (C)

Dual-Zone Climatronic – VW Golf 6

This training stand has been assembled using original components from the Dual-Zone Climatronic system used in the VW Golf 6. Everything is arranged as it would be in the vehicle. The connections of all functionally relevant sensors and actuators, as well as the control devices and components of the cooling circuit are original connections exactly like those found in the vehicle. This makes it possible to work with the manufacturer's original documentation and circuit diagrams. Most of the original components are easily accessible for this or have been exposed to make them accessible.

The on-board diagnostic interface (OBD) allows connection of standard workshop diagnostics systems. This grants access to all fitted control devices and guarantees options such as basic settings of actuators, actuator diagnostics and measured value block exports. Another interface allows connection of up to 14 trainee measuring stations. This guarantees execution of measurement exercises when working in larger groups and using the multimeter or oscilloscope to take measurements and thereby determine the values and various signals.

In addition, the system is equipped with a heating circuit with an electric heating element. This circuit simulates the engine cooling circuit. This makes it possible to generate realistic operating conditions as a way of receiving measured values from the dual-zone control system for diagnostic purposes.

Various components can be manipulated via an integrated and lockable fault circuit with 11 practical faults to perform troubleshooting. One pressure gauge for the high-pressure side and one for the low-pressure side are used to show the pressures under various load conditions. In addition to this, connections are provided for using maintenance stations. The maintenance connections allow climate control maintenance units to be connected. This makes it easy to demonstrate and practice how to extract, clean, evacuate and fill the system with „R134a" refrigerant.

The air-conditioning compressor is powered by a 3.6 kW 400 V three-phase AC motor and speed-controlled via a frequency inverter. The on-board electrical system is powered via a stabilised 12 V 40 A switched mode power supply. Emissions-free operation allows the unit to be used in training rooms.

Dual-Zone Climatronic – VW Golf 6

Standard series equipment:

- Original dashboard from the Golf 6
- Complete Climatronic system with all accompanying control units
- Electric heating rod for simulating the engine's cooling circuit
- Original vehicle radiator with twin fan
- Pressure gauge for the high-pressure and low-pressure side
- Maintenance connections for air conditioning maintenance units
- Webasto ThermoTop V additional water heater (only order number 86070)

Learning objectives:

- Working with maintenance schedules, wiring diagrams, symbols, terminal designations, wires and wiring connections
- Naming mechanical, electrical and electronic components, assembly groups and systems
- Checking and repairing mechanical, electrical and electronic circuits and systems
- Measuring and evaluating electrical variables and signals
- Making use of the possibilities offered by commonly used workshop diagnosis testers
- Processes for timing and in the control circuit
- Functions of sensors and actuators based on the IPO principle (Input-Processing-Output)
- Sequential and selective final control diagnostics, basic actuator settings

Scope of delivery:

Complete, operational and ready-to-use training stand, two pressure gauges, fault circuit, operating manual, technical documentation and electric wiring diagrams

Specifications:

Dimensions: L x W x H 1400 x 800 x 1950 mm
Weight: approx. 150 kg
Electrical connection: 400 V/16 A mains connection

Article	Order-No.
Functional Model/Training Stand VW Dual-Zone Climatronic	77174

VW Dual-Zone Climatronic with Webasto Thermo-Top V standard series additional water heater

Version of the training stand similar to (order number 77174), although with factory-fitted, fully diagnostic-capable Webasto Thermo-Top V additional water heater. The system is programmed via the auxiliary heater fitted and is operated using 95 octane petrol. To this end, a removable 5 litre fuel tank is attached to the system using quick-release fastenings. This makes it easier to fill the tank. Since the additional water heater is NOT emissions-free, it may only be used outdoors or in areas that offer the necessary extraction to comply with legal stipulations.

Article	Order-No.
Functional Model/Training Stand Climatronic Golf 6 with Webasto Thermo Top standard series auxiliary heater	86070

Recommended Accessories (optional)

Article	Order-No.
Wiring diagram stand for trainee measuring station	95029
Wiring diagram stand, neutral	94910
Student measuring station	83454
VW Testing Box VAG 1598/42	86594
VW Testing Adapter VAG 1598/4	89383
VCDS Basic Kit	82251
VCDS Pro Maxi Service Case	86596
PCAN Interface/ISO adapter with USB connection	58053
Webasto retrofit auxiliary heater in kit form	86685

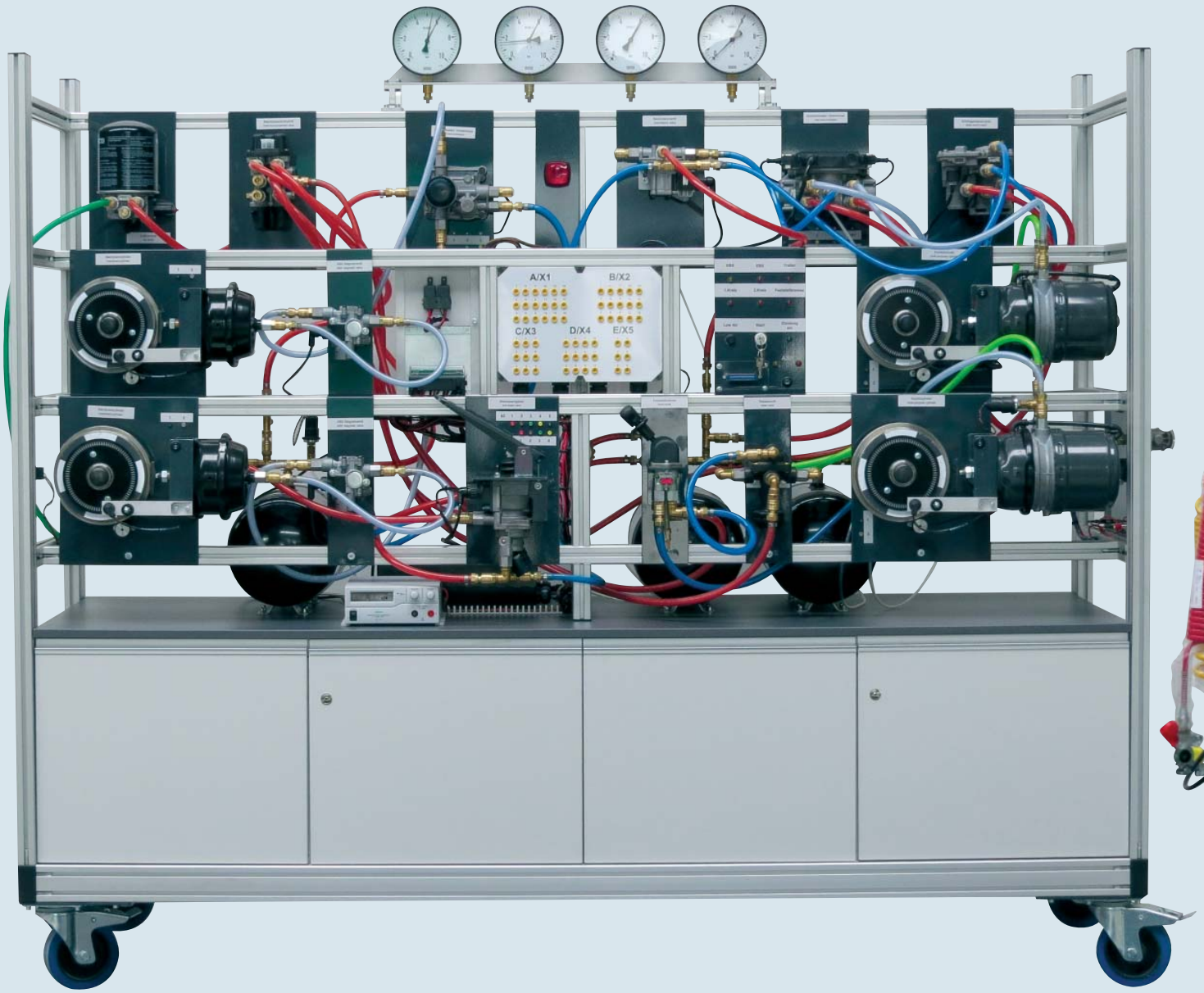
EBS 1C Compressed-Air Braking System

The motor vehicle compressed-air braking system consists solely of original components from WABCO. To show the EBS control procedures, the functional model has four electrically driven wheel units for simulation of the front and rear axle. An integrated fault circuit, with 10 practically oriented faults, makes it possible to follow realistic operating situations and practice troubleshooting. The modular system structure allows students to gradually become accustomed to the field of commercial vehicle compressed-air braking systems.

The flexible component connections ensure the greatest possible freedom in designing training situations and action-oriented learning content transfer. The differently coloured compressed-air lines support a clearly structured test set-up. The system has an OBD diagnostic interface for connecting suitable diagnostic systems. Another interface allows connection of up to 14 trainee measuring stations.

Supplied with four large pressure gauges and original test connections, the test steps of the functional and SP pressure protection tests can be presented in a logical structure in line with Appendix VIII § 29 of the German road traffic licensing regulations (StVZO).
The original WABCO diagnostic program, WABCO test equipment and WABCO presentation programs are available as enhancements and accessories.

The size has been matched to the size of a conventional 80 cm door. This allows the set-up to be moved around a building without causing problems, allowing it to be used at various locations.



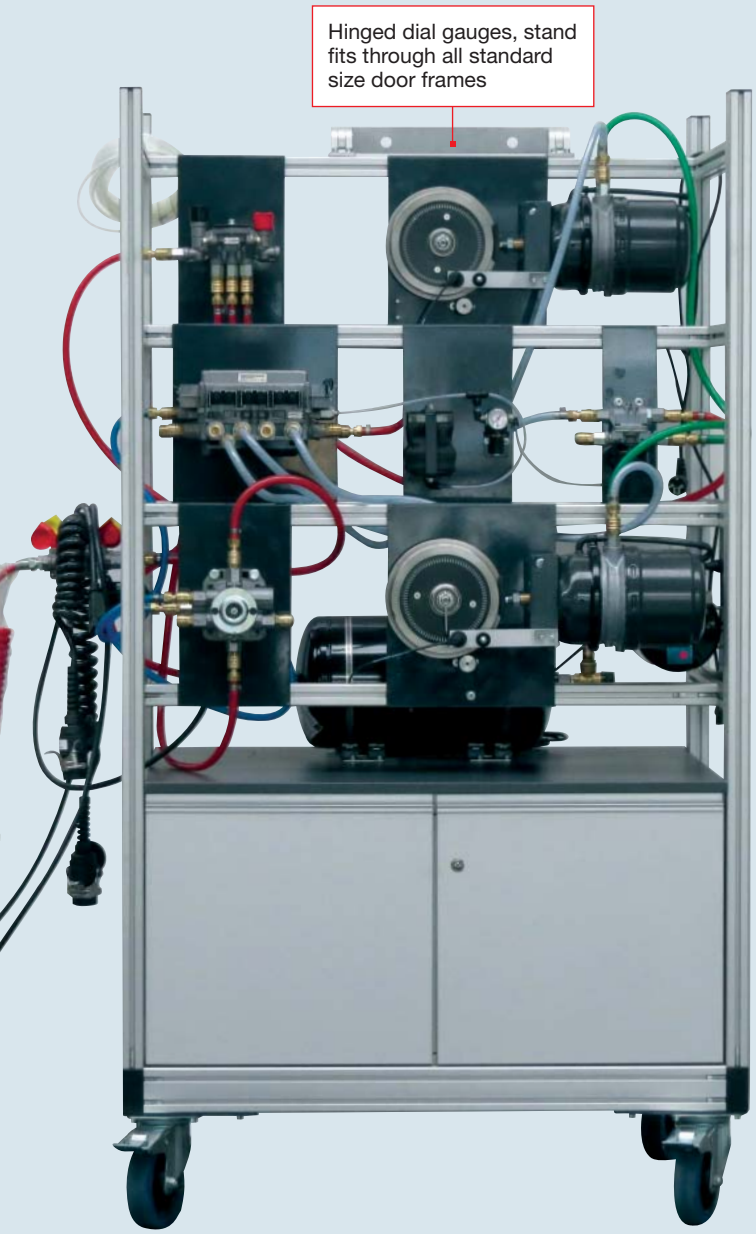
EBS 1C Compressed-Air Braking System

Standard motor vehicle equipment:

- EBS 1C compressed-air braking systems with original WABCO components
- Integrate fault circuit with 10 practical faults
- Measuring points on components with fault circuit
- Four large pressure gauges for functional and pressure protection tests (SP)
- Versatile test connections with T-piece for functional and pressure protection tests (SP)
- OBD diagnostic connection
- Interface for trainee measuring stations
- Training documentation, basic course on the compressed-air braking system
- Training documentation, EBS, ABS, ECAS

Standard equipment with trailer:

- Supply and brake line with Wendelflex pipes and coupling heads
- Dual-line dual-circuit brake systems as per EG
- EBS electronic brake system
- ECAS electronically controlled air suspension
- Original WABCO trailer diagnostic connection
- Trailer supply cable with EBS connector



Learning objectives:

- Performing maintenance, diagnostic and repair work on brake systems and networked systems
- Identifying brake systems, analysing the functions and interactions with other systems
- Localising faults in brake systems
- Evaluating the self-diagnostics of electronic braking energy regulation systems and networked systems, linking of control units, analysing the data exchange
- Documenting the measured values, signals and fault protocols
- Making use of the opportunities offered by standard workshop diagnostic and information technology
- Encoding control units, adapting software statuses and checking data communications lines
- Observing manufacturer-specific regulations for the exchange of worn and defective components
- Performing a functional and pressure protection test SP in line with Appendix VIII § 29 of the German road traffic licensing regulations (StVZO)

Scope of delivery:

Ready-to-use and movable functional model, including voltage-stabilised 12 V 60 A switched mode power supply, self-sealing compressed air safety couplings on all components, all required hose connections, datasheets, circuit and hose diagram, manual and operating instructions.

Specifications (motor vehicle):

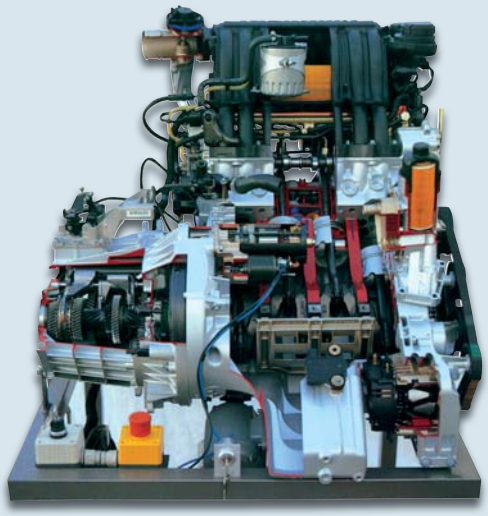
Dimensions: L x W x H 2400 x 800 x 1970 mm
Weight: approx. 570 kg
Electrical connection: 110 V/240 V mains connection
Compressed-air connection: Compressor with min. 10 bar and sufficient performance (L/min)

Specifications (trailer):

- Dimensions: L x W x H 110 x 800 x 1970 mm
- Weight: approx. 230 kg

Article	Order-No.
Training Stand/Functional Model EBS 1C Compressed-Air Braking System with motor vehicle and trailer	**77192**
Training Stand/Functional Model EBS 1C Compressed-Air Braking System motor vehicle	**80870**
Training Stand/Functional Model EBS 1C Compressed-Air Braking System trailer	**80871**

Diesel Engine with Common Rail Technique – DaimlerChrysler A Class



A superlative engine with the latest technique. The engine is driven by a 220V geared motor, all the assemblies also run. The start can be engaged, the transmission shifted.

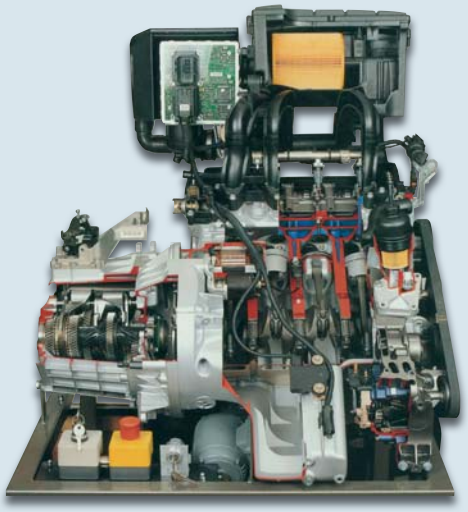
The following are cutaway:

cylinder head (with 16 valves), cylinder block, crankcase, oil pan one piston with cooling duct, oil injection cooling for pistons hydraulic valve tappet, oil pump, chain case, generator (internally ventilated), starter, exhaust gas re-circulation valve, turbocharger intake manifold, air filter box, high-pressure pump, one injector feed pump, rail manifold, valve cover, air-mass sensor, oil filter with heat exchanger, thermostat, modern single-vane vacuum pump, 5-gear transmission and differential

All actors and sensors are available and connected to the cable tree.

Order-No.
77127

Petrol Engine with Injection – DaimlerChrysler A Class



New construction with the latest technique. The engine is driven by a 220V geared motor, all the assemblies also run. The start can be engaged, the transmission shifted.

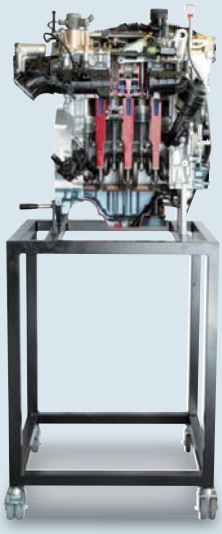
The following are cutaway:

cylinder head, cylinder block, crankcase, oil pan, one piston roller valve lever with clearance compensation element, oil pump chain case, generator (internally ventilated), starter, intake manifold air filter box, double ignition coil, electronic control unit, actuator throttle valve, valve cover, oil filter, thermostat, air-mass sensor, 5-gear transmission and differential

All actors and sensors are available and connected to the cable tree.

Order-No.
77128

Petrol Direct Injection Engine – DaimlerChrysler M 270



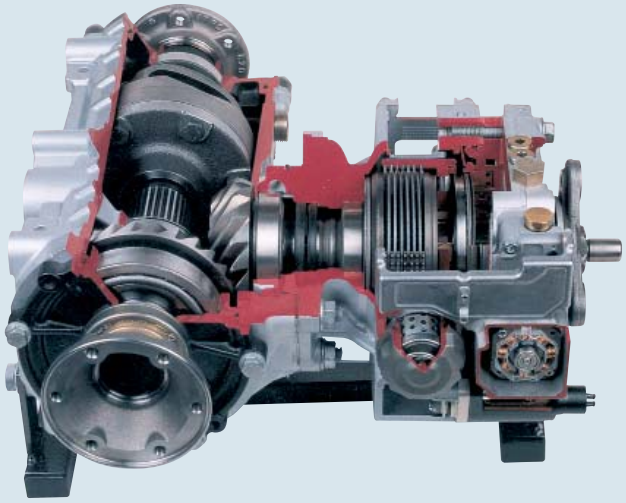
The engine can be turned easily by a crank handle. All parts move along.

The following are cutaway:

Cylinder and cylinder head, Turbo charger, Water pump, Valve cup, Camshaft timing chain housing, Vacuum pump, Fuel injection pump, Ignition coil, Rail tube, Injection nozzle, Air intake manifold, Hydraulic valve lifter, Oil pump

Order-No.
93624

Haldex Clutch



It replaces the known viscous clutch in four-wheel drive (synchro). As soon as a difference in speed comes about between the front and the rear axle, the swash plate turns in the housing. Fluid is pressed to the disk plunger by hydraulic pistons. The friction disks are pushed together, and force transmission comes about as a result of the friction. The slip can be varied with the help of an electronically controlled throttle valve.

Cut open parts:
differential housing, clutch housing, friction disks, pump plunger hydraulic piston, electronic control unit, stepper motor, electric motor with inlet pressure pump and all the valves

The function of the pump plungers and the differential can be shown by turning on the gearbox flange.

Order-No.
73490

Two-Stage Turbocharger (Bi-Turbo)

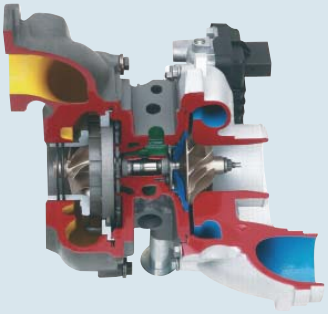
Cutaway are:
both turbochargers, control flaps, fresh-air valve

The turbines and throttle valves can be moved. Exhaust air, fresh air and oil channels are accentuated in colour.

Order-No.
89915

Turbocharger with Ball Bearing and Variable Vane Geometry

This is a model of the latest generation of turbochargers in which the friction bearing has been replaced by two ball bearings with ceramic balls. This makes up to 300.000 rpm possible. These turbochargers have less abrasion, can transmit greater powers, suffer less from the afterworker effect and have a high charging effect even at low speeds.



Order-No.
89916

Ignition Model Case – Model Board

3 cutaway distributors (induction, Hall, contact breaker), magneto ignition, 2 cutaway ignition coils, one uncut, 1 cutaway vacuum cell, 2 distributor rotors (one with speed limiting device), Ignition cable with connector plug and 4 different spark plugs, One cutaway ignition control unit

Order-No.
73555

Pumps – Model Board

A collection of 8 different pumps for various applications and showing various pumping principles:

fuel pumps: diaphragm and roller-cell pumps, oil pumps: external and internal gear pumps, rotor pump, vacuum pumps: vane-type pump, piston pump, water pump: rotary pump

Order-No.
73564

Six-Speed Direct Shift Transmission (VW)

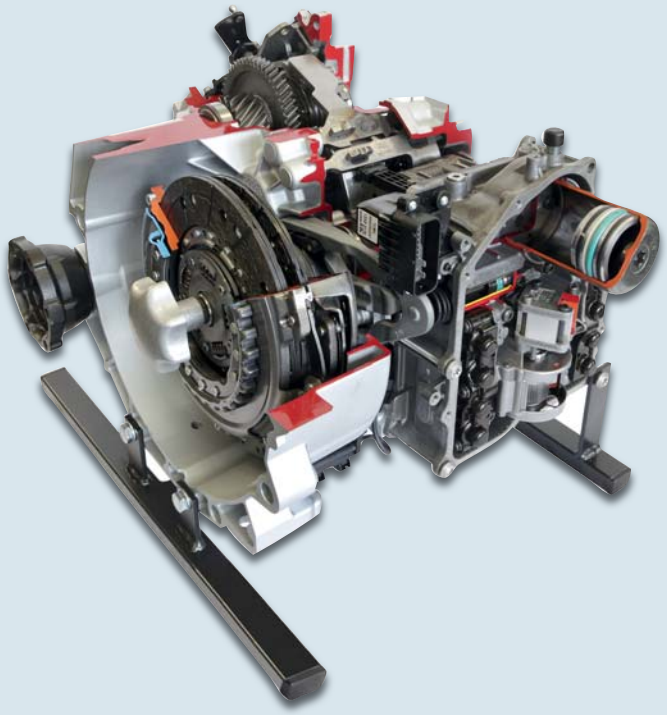
The transmission can be turned easily, the gears changed by hand and compressed air applied in part. The shift lock is functional. The function of the clutch can be demonstrated by pressing the disks together. The transmission is mounted on a table stand. Self-study booklet from VW included in the scope of supply.

Cutaway are:

wet clutch, timing case, transmission case, main shaft, oil cooler, oil filter, oil pump

Order-No.
80969

Seven-Speed Direct Shift Transmission (VW)



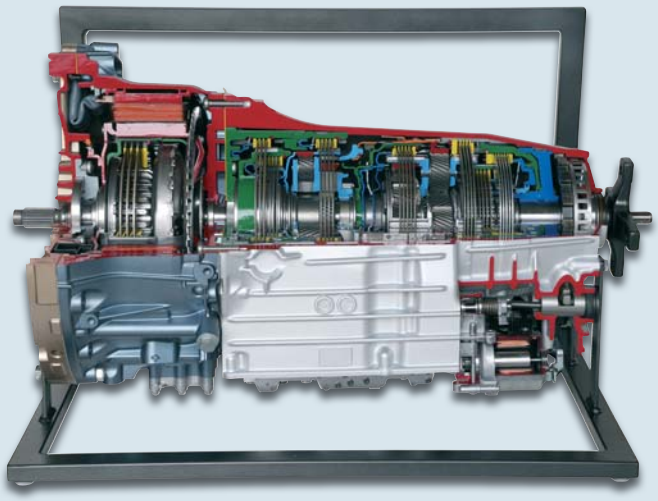
The transmission can be turned easily, the gears changed by hand and compressed air applied in part. The shift lock is functional. The transmission is mounted on a table stand. Self-study booklet from VW included in the scope of supply.

Cutaway are:

dry clutch, timing case, transmission case, oil pump, main shaft, pressure accumulator, clutch actuation

Order-No.
85344

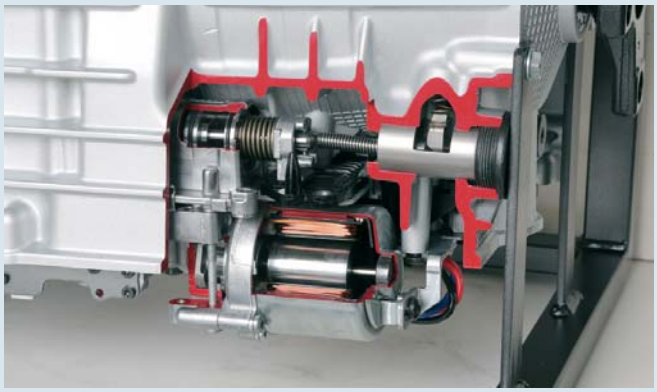
Mercedes-Benz 7-Speed Automatic Transmission (Hybrid)



With the 6th generation of Mercedes-Benz automatic transmissons, the following is achieved: High shifting comfort, lightweight construction, fuel savings and increased driving enjoyment.
The transmission can be turned easily both from the drive and also from the output side.

The following is visible:

All 7 hydraulic couplings, E-Motor, Planetary wheel set, Ravigneaux planetary gear train and two simple planetary gear trains, Disk springs, Parking lock (can be activated and released)
Hydraulic control, Oil pumps, Sport clutch, Solenoid valves, Many small construction parts



Order-No.
94464

Rear Axle Differential A-Class AMG

The electronic traction system is an automatically operating system for improving start-off and acceleration capabilities on different road surfaces.

Cut away are:

aluminium housing, multi-disk clutch, oil pump, solenoid valve, hydraulic piston

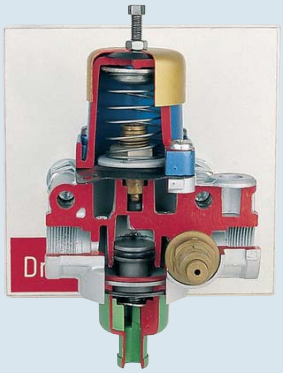
Order-No.
95582

Non-Return Valve

Function of a non-return valve,
air flow only possible in one direction

Order-No.
73540

Pressure Regulator



Function of the intake and exhaust valves, function of the diaphragm, function of the valves body, load position, idle position, top-up position

Order-No.
73541

Two-Wheel Technique – Model Board

This model board enables a comparison of car engine components and two-wheel technique.

The following components have been cutaway:
Moped cylinder with piston, generator, starter, four-stroke single-track piston, segment of a complete cylinder head with 16 valves

The following are also on the model board:
ignition coil, camshaft, one-cylinder engine, camshaft four-cylinder with 16 valves, crankshaft with connection bar and rolling bearing, camshaft with clearance compensation, connecting bar, rocker arm

Order-No.
72580

Differential Model Board

All components of the differential are clearly visible, they are mounted on a board and are easy to remove. This board is for exercises in dismantling and assembling compiled by differential gears. All components are clearly arranged on the board and specially prepared for easy installation.

Scope of delivery:	
Part 1	differential case (basket)
Part 2	crown
Part 3	2 taper roller bearings
Part 4	shim
Part 5	10 mounting screws
Part 6	2 side gears
Part 7	2 pinions
Part 8	2 Achswellenflansche
Part 9	axis for differential gears
Part 10	balancing cross

Order-No.
73482

Automatic Transmission Model Board

Contains the most important automatic transmission components (some parts cut open). Hydraulic control with shift valve, centrifugal governor, freewheel, internal gear pump, complete planetary gear train (easily dismantled), brake band, 2 hydraulic couplings, park position with ratchet, disk set.

Order-No.
73474

Renewable Energy & Sanitation/HVAC

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Training equipment and teaching methods

Our training material in renewable energy suits to new technologies used in daily working life. Especially training stands for heat pump, solar heating and photovoltaic show very realistic appliances. For flexible training either inside or outside in the sun, our solar cases can be used everywhere and give an easy access for beginners. Sanitation and HVAC are easily explained with our brand new training stands.

As a single-source provider for technical training, our portfolio covers both the hardware for the training labs and the teaching materials prepared for the lessons. This conclusive overall concept contributes to a lasting learning success!

Whether for vocational institutes, colleges and universities or for small and medium-sized companies and major corporations: We offer to our customers guidance, conception, planning and execution as well as train the trainer courses.

Teaching Systems

Christiani materials are available in many different languages. Visit:

christiani-tvet.com

You can directly access the online shops and the contacts for the respective regions.

Experiment Manuals

Training Cases

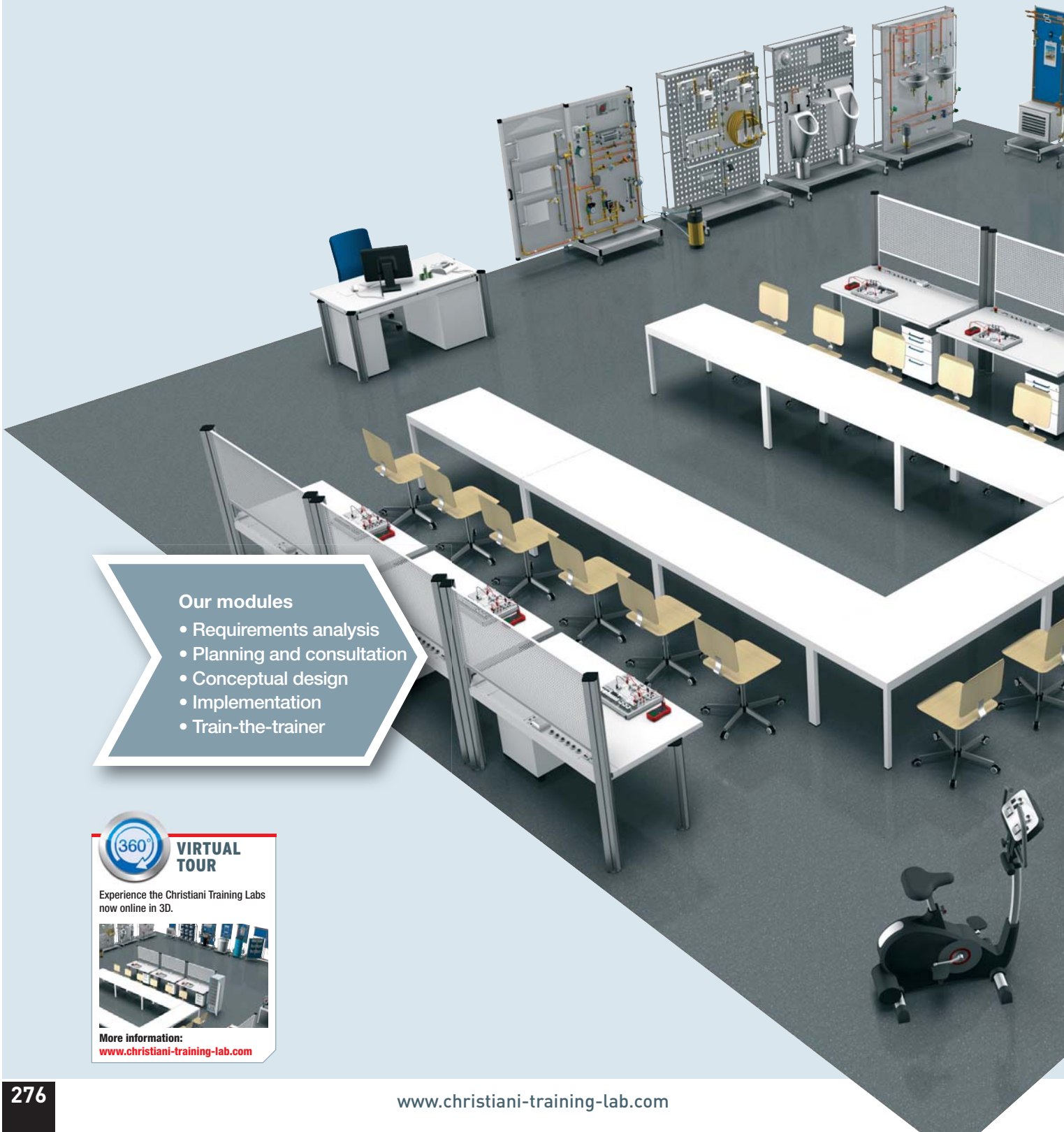
Workstations

Renewable Energy

Ideal learning conditions

With its technical training lab concept for renewable energy and sanitation/HVAC, Christiani offers the key fundamentals for successful qualifications and further training. The practically oriented training concept is aligned with current and future requirements in the field of building energy supply and provides optimum support for instructors and trainers.

The technical training lab shown here contains the standard equipment for sanitation, heating and air conditioning technology, as well as renewable energies. We will be happy to develop the individual, tailor-made solution for your requirements.



Our modules

- Requirements analysis
- Planning and consultation
- Conceptual design
- Implementation
- Train-the-trainer

VIRTUAL TOUR

Experience the Christiani Training Labs now online in 3D.

More information:
www.christiani-training-lab.com

COMPACT INFO

Technical Training Lab for Renewable Energy/Sanitation/HVAC

Example configuration for 16 workplaces:

- 1 generator bike
- 8 solar power cases
- 8 solar power laboratory lab benches, complete
- 1 teaching system - heat pump with solar heat and photovoltaics (consisting of six training stands)
- 1 WILO Brain Box classic plus
- 1 learning unit
- 1 gas technology training stand
- 1 bathroom installation training stand
- 1 drinking water training stand

Suitable for:

- HVAC plant mechanics
- Electronics engineer specialising in building services technology
- Further training in renewable energies/HVAC

Topics/Learning objectives:

Establishment of in-depth knowledge of planning, setup and configuration of systems

- Photovoltaics
- Solar heating
- Heat pump
- Gas technology
- Bathroom installation
- Drinking water

Gaining sound knowledge on

- Optimising heating systems, including troubleshooting, fault assessment and elimination

The Christiani technical training lab for renewable energy/sanitation/HVAC offers you the following:

- Theory and practice from a single source
- Motivation to learn and sustainable learning success
- Didactic diversity and practically oriented training media
- Strong partnerships with industry
- Professional consulting – from the planning stage, all the way up to implementation

Powerful Specialised Lab Components

At Christiani, specialised technical training lab equipment and didactic training materials are precisely matched to one another. With this uniform holistic concept, you can offer state-of-the-art training, as well as conveying practically oriented specialist knowledge and the necessary personal skills. In developing our innovative products, we work closely with strong partners from the industrial sector.

Training system for heat pump with solar heating and photovoltaics:
Six multi-functional training stands, which can be combined with each other in various combinations depending on the teaching objective or „customer order“.

- S2 fan convector as source or sink
- S6 hybrid collector
- S5 heat pump – now with switchover function for heating or cooling (optional)
- S1 geothermal energy source or underfloor heating
- S4 hydraulic switch, plate heat exchanger and buffer storage
- S3 solar collector with solar simulation – now with more powerful thermal collector

NEW

Solar thermal system – with new, more powerful thermal collector
Thermal pump – now with optional switchover function for heating or cooling

Training stands that have already been supplied can be retrofitted.

WILO-Brain Box Classic Plus

The WILO-Brain Box classic plus reveals what is often concealed by insulation or plaster in reality: On the mobile experiment stand, all the essential components of a heating system are grouped together. In part transparent, they are connected by pipes in such a way that the heating process can be reproduced almost completely. Thus, defects can be demonstrated on the Brain Box and corrected professionally.

Suitable for:

Vocational education and further training at
- **Vocational colleges**
- **In-house or third-party training centres**

Topics/Learning objectives:
- Pumps and controllers
- Hydraulics
- Pressure maintenance
- Filling and purging heating systems

Specifications:
- **Dimensions when folded out in working position (H x W x D):** 1980 x 1900 x 780 mm
  Folded in: 1980 x 1000 x 780 mm
- **Weight:** 80 kg

Article	Order-No.
Wilo-Brain Box classic plus	58129

More information at: www.christiani-international.com/58129

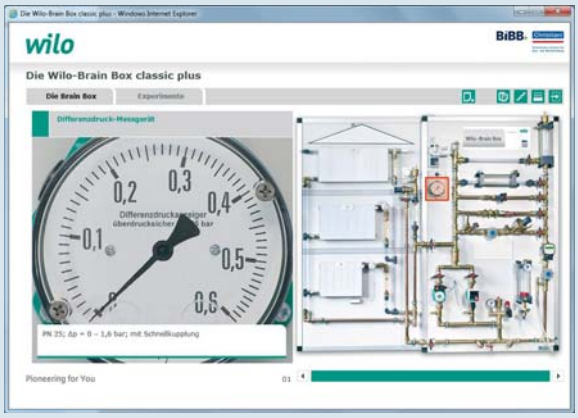
Practically Oriented Training Media

Our teaching materials have been drafted by didactically and technically experienced instructors and experts. They are also continuously updated.

„Train-the-Trainer“

Only those trainers who are themselves well-prepared and properly trained can guarantee optimum learning.
We offer tailor-made trainer training for all requirements with our practically oriented training concepts.

WILO-Brain Learning System



Outstanding
The activity-based WILO-Brain learning concept is available for download free of charge

Typically Christiani: There is a didactically well thought-out learning concept to match the practical WILO Brain-Box training stand. Practical learning is the focus here – from the time of order acceptance through to on-site repair. With WILO-Brain, plant mechanics can learn about the heating, ventilation and air conditioning technology of their trade and can practice professional interactions with customers. Available for download free of charge at www.christiani-international.com/95280

Winners in the category: Vocational training and study, training

digita 2014 Deutscher Bildungsmedien Preis

A training room full of energy technology

Experiencing energy technology for oneself and learning how to deal with new energy technologies is the basic principle of the renewable energies technical training lab concept. From teaching knowledge to working on units for solar heat, heat pumps, photovoltaics and much more, everything is possible here.

The technical training lab shown here contains the standard equipment for the renewable energies field. We will be happy to develop the individual, tailor-made solution for your requirements.

Our modules

- Requirements analysis
- Planning and consultation
- Conceptual design
- Implementation
- Train-the-trainer

VIRTUAL TOUR

Experience the Christiani Training Labs now online in 3D.

More information:
www.christiani-training-lab.com

COMPACT INFO

Technical Training Lab for Renewable Energy

Example configuration for 16 workplaces:

- 1 generator bike
- 8 solar power cases
- 8 solar power laboratory lab benches, complete
- 1 teaching system - heat pump with solar heat and photovoltaics (consisting of six training stands)

Suitable for:

- Electronics engineer specialising in building services technology
- Further training in renewable energies

Topics/Learning objectives:

Conveying basic skills of energy technology

Establishment of in-depth knowledge of planning, setup and configuration of systems

- Photovoltaics
- Solar heating
- Heat pump

The Christiani technical training lab for renewable energy offers you the following:

- Theory and practice from a single source
- Motivation to learn and sustainable learning success
- Didactic diversity and practically oriented training media
- Strong partnerships with industry
- Professional consulting – from the planning stage, all the way up to implementation

Powerful Specialised Lab Components

State-of-the-art training stands and teaching media, combined with sophisticated teaching documentation and competent training and consultation: these are the Christiani building blocks for successful technical training lab concepts.

Practically Oriented Training Media

Our teaching materials have been drafted by didactically and technically experienced instructors and experts. They are also continuously updated.

„Train-the-Trainer“

We train your training staff to the latest standards and show how you can most effectively use our training systems and materials.

Please feel free to get in touch with one of our customer consultants.

“Whether you are looking to expand your existing specialised training lab or are planning something new – we are happy to support you with the necessary advice and expertise. Tell us about your individual requirements. We can then advise you on all questions.”

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The right place for sanitation and HVAC experts

State-of-the-art and well thought-out sanitation, heating and air conditioning technology training stands form the core of this technical training lab. In addition to the “classical” technologies such as gas, water and heating installations, this technical training lab also offers applications for photovoltaics and solar heat.

The technical training lab shown here contains the standard equipment for the sanitation, heating and air conditioning field. We will be happy to develop the individual, tailor-made solution for your requirements.

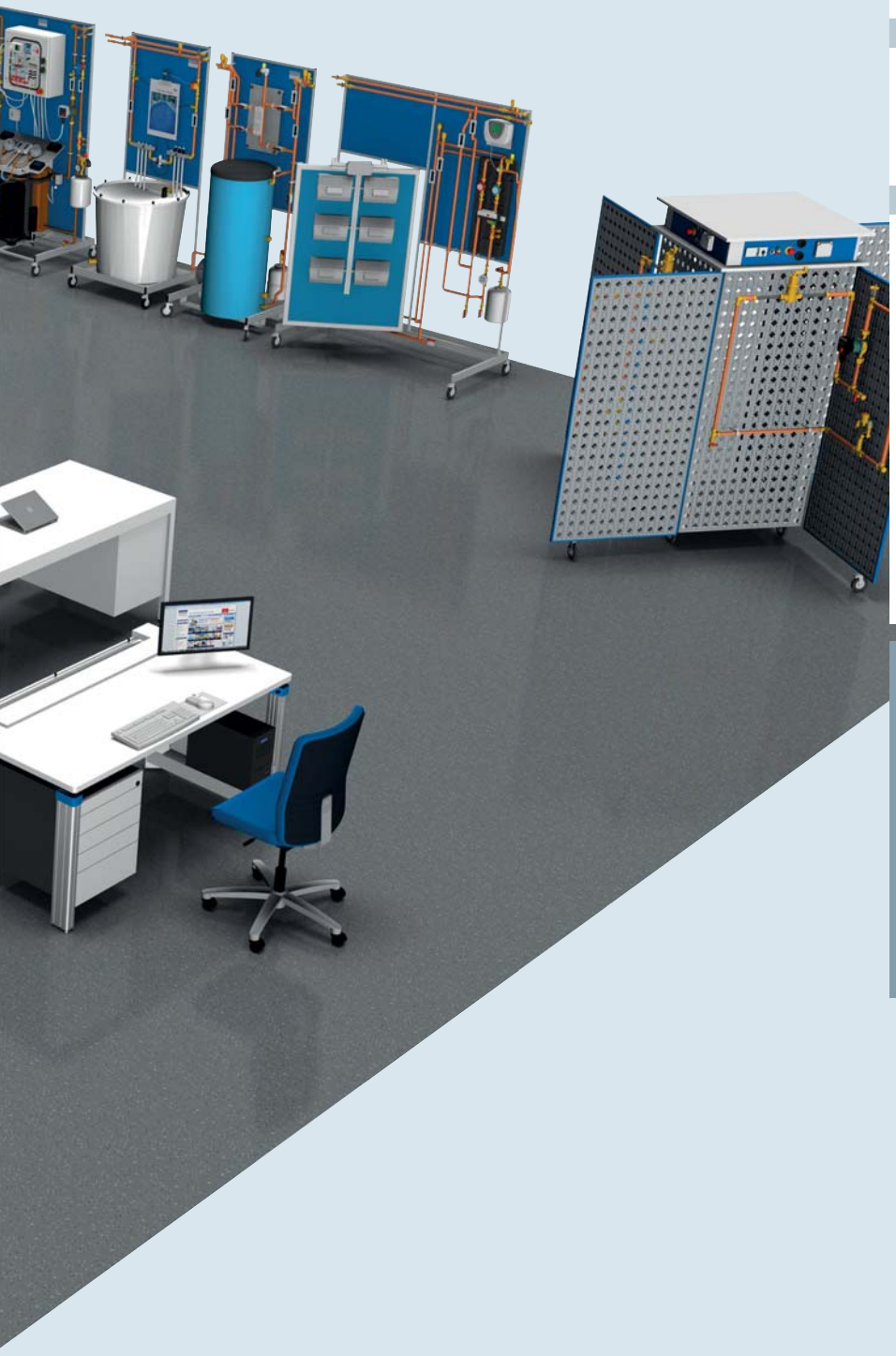
Our modules

- Requirements analysis
- Planning and consultation
- Conceptual design
- Implementation
- Train-the-trainer

VIRTUAL TOUR

Experience the Christiani Training Labs now online in 3D.

More information:
www.christiani-training-lab.com



COMPACT INFO

Technical Training Lab for Sanitation/HVAC

Example configuration for 16 workplaces:

- 1 teaching system - heat pump with solar heat and photovoltaics (consisting of six training stands)
- 1 WILO Brain Box classic plus
- 1 learning unit
- 1 gas technology training stand
- 1 bathroom installation training stand
- 1 drinking water training stand

Suitable for:

- HVAC plant mechanics
- Electronics engineer specialising in building services technology
- Further training in renewable energies/HVAC

Topics/Learning objectives:

Establishment of in-depth knowledge of planning, setup and configuration of systems

- Gas technology
- Bathroom installation
- Drinking water
- Photovoltaics
- Solar heating
- Heat pump

Gaining sound knowledge on

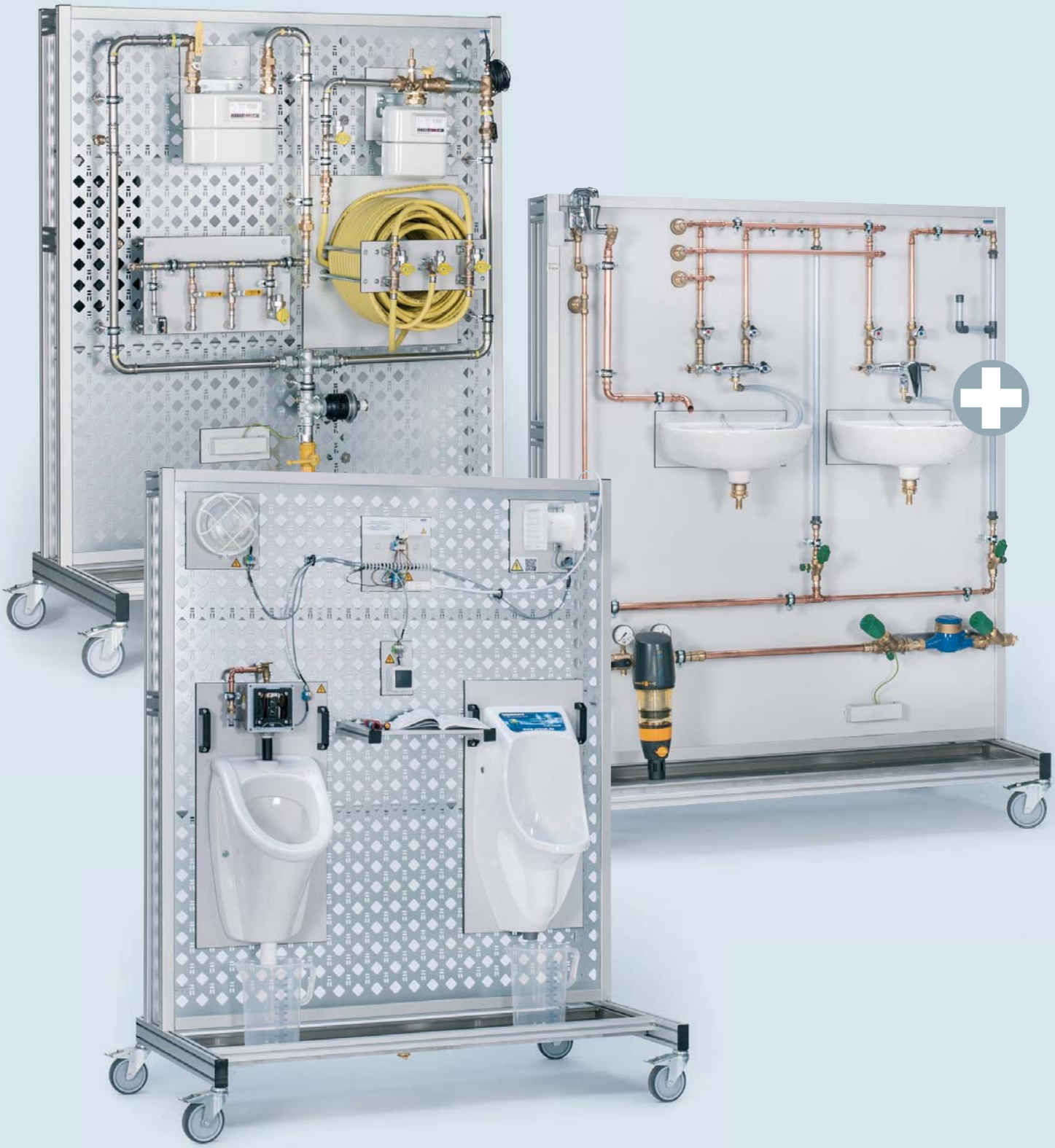
- Optimising heating systems,including troubleshooting, fault assessment and elimination

The Christiani technical training lab for sanitation/HVAC offers you the following:

- Theory and practice from a single source
- Motivation to learn and sustainable learning success
- Didactic diversity and practically oriented training media
- Strong partnerships with industry
- Professional consulting – from the planning stage, all the way up to implementation

Powerful Specialised Lab Components

At Christiani, specialised technical training lab equipment and didactic training materials are precisely matched to one another. With this uniform holistic concept, you can offer state-of-the-art training, as well as conveying practically oriented specialist knowledge and the necessary personal skills. In developing our innovative products, we work closely with strong partners from the industrial sector.



Practically Oriented Training Media

Our teaching materials have been drafted by didactically and technically experienced instructors and experts. They are also continuously updated.

„Train-the-Trainer“

Only those trainers who are themselves well-prepared and properly trained can guarantee optimum learning. We offer tailor-made trainer training for all requirements with our practically oriented training concepts.

Please feel free to get in touch with one of our customer consultants.

“Whether you are looking to expand your existing specialised training lab or are planning something new – we are happy to support you with the necessary advice and expertise. Tell us about your individual requirements. We can then advise you on all questions.”

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Theory and practise in the space-saving mode

In just one square metre, the Christiani learning unit provides four working stations, on each of which several trainees can be working. With several learning units, rooms can be designed in which whole classes can practise and conduct experiments at the same time. When not in use, the roll-up learning units can easily be moved to the side.

The technical training lab shown here contains a sample configuration for a theory and practise room. We will be happy to develop the individual, tailor-made solution for your requirements.

Our modules

- Requirements analysis
- Planning and consultation
- Conceptual design
- Implementation
- Train-the-trainer

VIRTUAL TOUR

Experience the Christiani Training Labs now online in 3D.

More information:
www.christiani-training-lab.com

COMPACT INFO

Technical Training Lab
Flexible Workstation Systems

Example configuration for 16 theory seats and workstation systems:

- 4 learning units

Suitable for:

- HVAC-/Building technology
- Renewable energy
- Electrical engineering
- Hydraulics
- Pneumatics

The Christiani technical training lab flexible workstation systems offers you the following:

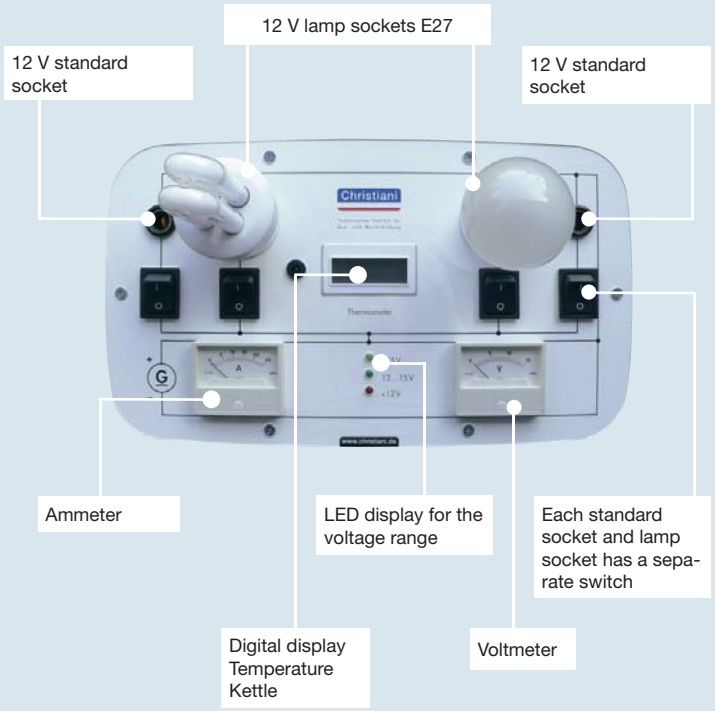
- Theory and practice from a single source
- Motivation to learn and sustainable learning success
- Didactic diversity and practically oriented training media
- Strong partnerships with industry
- Professional consulting – from the planning stage, all the way up to implementation

The Generator Bike – experience and understand energy in a hands-on way!

The generator bike is the ideal way to learn about renewable energy. Experience and understand energy in a hands-on way – this is the idea behind the generator bike. Various devices requiring electric power are powered using muscular force. Whereas the energy-saving lamp is illuminated without too much effort, hard work is needed for light from the conventional light bulb. Athletic performance is called for if the kettle is now switched on as well. Up to four devices can be operated simultaneously from the 12 V output sockets available.

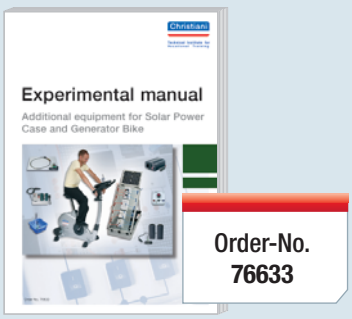
ONLINE
VIDEO
Find out about our functions and potential areas of application in our detailed product video.

- **Activity-based knowledge transfer**
- **Understanding of the basic factors that are current, voltage, power and energy**
- **Optional USB interface**
- **Suitable didactic material**



Experiment Manual for Teachers and Students

The experiment manual is a major constituent in the overall didactic concept for the generator bike. A detailed description is given for each experimental set-up; the results are compiled and then analysed.
The experiment manual for the generator bike is made up of an information section, an exercise section and a section with the solutions.
The students' edition does not include the solutions.



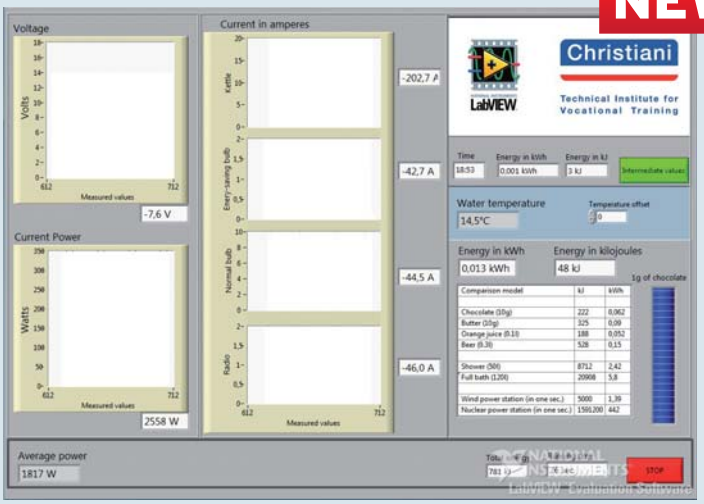
! The experiment manuals are supplied exclusively to customers that have also ordered a generator bike (Order-No.: 75637 or 93800) from Christiani.

The Generator Bike – The Basic Idea

The generator bike allows students to acquire fundamental, practical knowledge, working largely by themselves. The students can use the experiment manual to both quantify fundamental issues relating to energy as well as to derive and develop concepts on how energy can be saved. The experiments teach the students through practical experience. Over the course of only a few lessons, they acquire an integrated understanding of energy-related matters. The generator bike can become the main attraction at open days and project weeks at schools to test performance and show how electricity can be produced from muscular force, for example for the "Human-powered disco station", etc!

Generator bike with USB interface

NEW



The tried-and-tested Christiani generator bike is now available with an optional USB interface. The voltage, current and power are displayed both graphically in development curves and also as digital values via the interface and the supplied programme. The display also shows you when the amount of energy equivalent to a gram of chocolate has been produced by muscular force.
The values can be projected to the whole class at the same time using a projector (not included). The generator bike with USB interface follows on logically from the tried-and-tested generator bike that has been around for years.

Suitable for:

- **All general education schools** (primary, middle and secondary schools of all kinds) from infants to sixth formers
- **Vocational colleges** for all areas in which a basic understanding of energy is required
- **Company and industry training centres** (training and further education) for all areas in which a basic understanding of energy is required
- **Unions and associations** in the areas of environmental protection, energy and energy technology

Learning objectives/Skills:

- Arranging electrical devices in order of the energy they consume
- Integrating energy measurement values into one's own concepts and experiences
- Distinguishing between energy-saving measures according to their efficiency
- Supplying various consumers with power from the measuring and switching panel for the generator bike
- Developing an ability to judge energy-related issues by estimating, investigating and analysis
- Drawing conclusions regarding energy usage from the results
- Calculating the power and energy from the values measured for current, voltage and time
- Critically appraising the manual power outputted by a human being
- Calculating the time required to generate one "kWh" using human muscular force
- Measuring how hot a defined quantity of water becomes over a specified period of time
- Performing energy-related calculations with the measured values
- Assessing power conversions in energy systems
- Explaining and calculating the energy consumed by an energy-saving lamp and by a conventional light bulb for the same intensity of light
- Correctly assessing the potential for saving energy by using energy-saving bulbs compared to using other types of bulbs
- Measuring and calculating the difference in the power input at 12 V DC and 230 V AC
- Making suggestions on how energy can be saved when operating consumer electronics
- Physically experiencing and describing some of the basic principles of electrical engineering

Scope of delivery:

Generator bike with base frame and display
Kettle, radio recorder, energy-saving lamp, light bulb
Optional: USB interface with accompanying visualisation software

Generator Bike Basic Equipment

Similar to as shown

Active speaker with MP3 player

Similar to as shown

Kettle

Similar to as shown

Bulbs

Article	Order-No. English	Order-No. Spanish
Generator bike basic equipment	75637	
Generator bike with USB interface	93800	
Experiment manual: Generator bike basic equipment – Teachers' edition	76634	77652
Experiment manual: Generator bike basic equipment – Students' edition	82806	95577

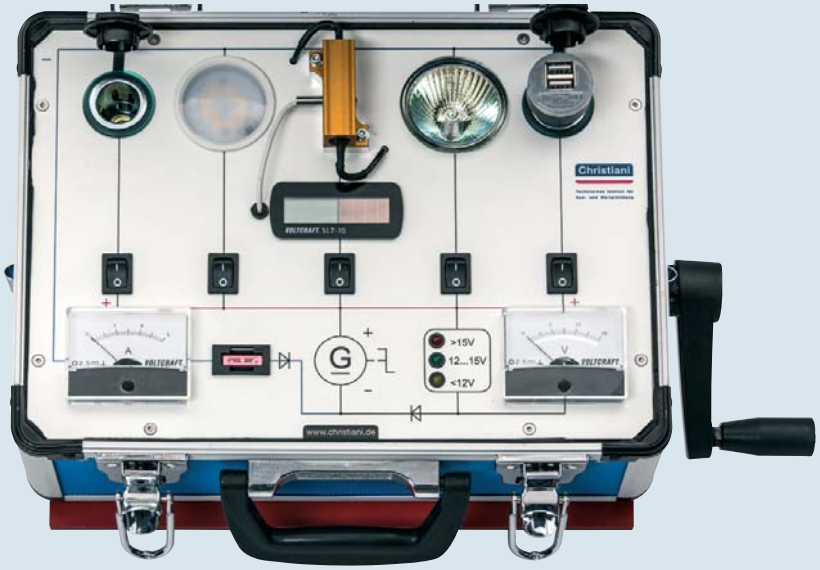
The Energy Trainer: Understand energy in an instant!

Energy Trainer

With the energy trainer, pupils quickly get the hang of energy: The handy case is fitted with a generator, which is operated via a crank handle. Various consumers can be operated with the self-generated electricity.

Pupils learn the differences in energy requirements using their own exertions. How much more energy must the pupil generate in order to power a halogen lamp, compared with an LED lamp? How much power is required to heat a thermal resistor to 40 degrees Celsius? How much power to play music through an active loudspeaker?

The new didactic learning case from Christiani: ideal for teaching the basics of energy.



Suitable for:

- **All general schools** from primary level upwards
- **Vocational colleges** for all areas in which a basic understanding of energy is required
- **Company and industry training centres** (training and further education)
- **Unions and associations** in the areas of environmental protection, energy and energy technology

Learning objectives (selection):

The pupil can

- Arrange electrical devices in order of the energy they consume
- Integrate energy measurement values into his/her own concepts and experiences
- Distinguish between energy-saving measures according to the efficiency of these
- Develop an ability to judge energy-related issues by estimating, investigating and analysis
- Draw conclusions regarding energy usage from the results
- Calculate the power and the energy from the values measured for current, voltage and time
- Physically experience and describe some of the basic principles of electrical engineering

Basic equipment:

- Manually operated energy trainer with generator for 12 Volt DC; Pmax = 35 Watt in a compact experimentation case
- Measurement and switching board with triple LED indication of the optimum voltage generated by the crank handle
- Analogue display for the current and voltage on the various consumers
- Switchable heat generator on metal plate with digital temperature display and own solar power supply, serving as a sample application for photovoltaics
- Further four switchable consumers via two 12-volt sockets, one LED lamp (12 V DC; 3 W) and a halogen lamp (12 V; 20 W)
- Active loudspeaker with integrated MP3 player
- Two screw clamps for fastening
- Experiment manual

Experiment manual for experience-oriented teaching

Using the experiment manual supplied, pupils qualitatively and quantitatively investigate basic questions relating to energy. This enables them to derive and develop concrete action concepts for saving energy. The experiments with the energy trainer make learning an experience.

Article	Order no.
Energy trainer with 1 pair of active loudspeakers + MP3 player, 2 screw clamps and 1 experiment manual	**97437**
Supplementary equipment:	
Simulation of a pumped storage power station with cable winch + bucket (5 litres)	**77493**
Model railway layout	**77494**
Voltage transformer 12/230 V; 150 W	**82809**

More information: www.christiani-international.com/97437

Creating a mobile source of energy

Solar Work Case

The solar work case generates electricity anywhere in the world via an integrated solar module. The robust case also contains a battery for storing energy, various consumers, detailed assembly instructions and accompanying educational material on photovoltaics. The solar workcase is ideal for advanced professional training in the field of renewable energy, for teaching at general schools, for international development projects and for all users who require a mobile source of energy.

- For use during training and in practice
- Mobile source of energy for mobile applications
- As a machining kit or fully assembled

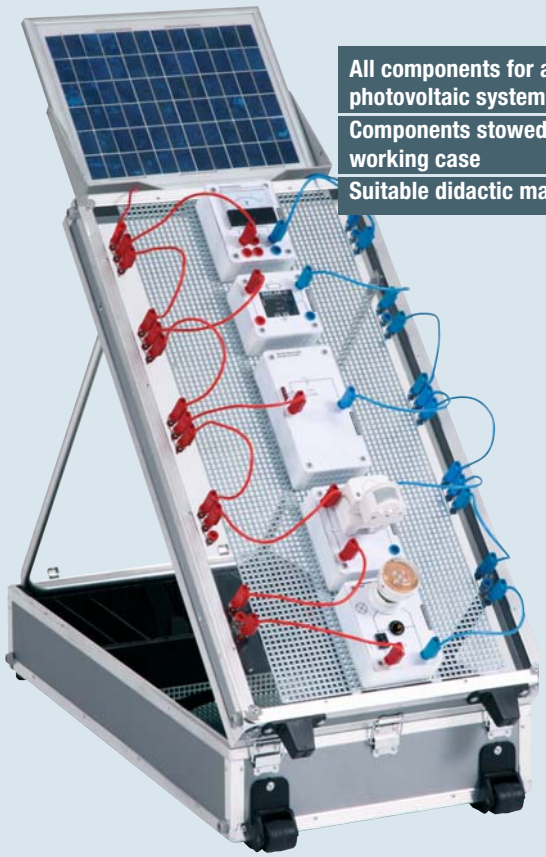
Original material kit

Solar Work Case	Order-No.
Original material kit	94920
Prepared material kit	94921
Fully assembled	94922

More information: www.christiani-international.com/94920

The Solar Power Case – the fast and simple way to understand photovoltaics

The solar power case follows the generator bike and constitutes the second stage of the overall didactic concept from Christiani in the field of renewable energy.
Instead of using muscles, the power for the solar power case comes from the sun. The way the solar power case has been designed as a modular system is a straightforward and entertaining introduction to electrical and solar engineering. Topping up a battery using the charging regulator, the installation of a motion sensor as well as the initial measurements of voltage and current provide the initial successes to be enjoyed besides building simple electrical circuits.
The solar power case can be used by the teacher to present the theoretical and practical sides of the technology and also by students, individually and in groups, to learn the basics of photovoltaic applications independently. The experiments teach the students through practical experience.



- All components for an off-grid photovoltaic system
- Components stowed away safely in the working case
- Suitable didactic material

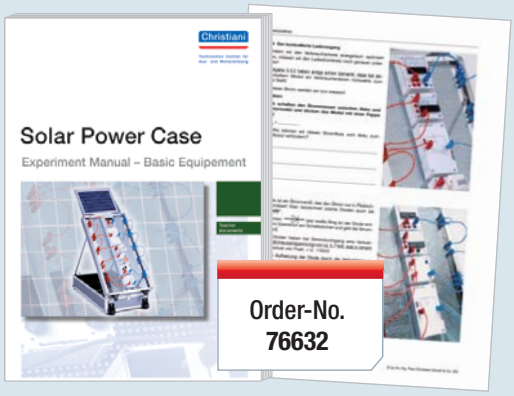
ONLINE
VIDEO

Find out about our functions and potential areas of application in our detailed product video.

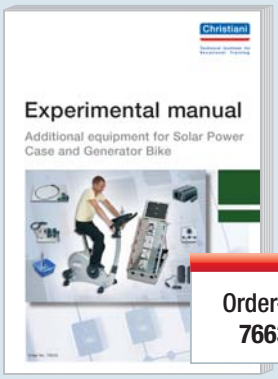
With practical transportation system on wheels!

Experiment Manual for Teachers and Students

The experiment manual is a major constituent in the overall didactic concept for the solar power case. The experiments have been designed and selected based on the knowledge to be mediated and the practical experience from qualified solar specialists. The experiment manual is made up of an information section, an exercise section and a section with the solutions.



Order-No. 76632



Order-No. 76633

! The experiment manuals are supplied exclusively to customers that have also ordered the solar power case (Order-No.: 75636 or 76704) from Christiani.

The Solar Power Case – The Basic Idea and Possibilities for Use

The solar power case is an effective system that can be used by both teachers and students.
Used in practical project-based teaching, it allows students to understand the relationship between the sun as a source of energy, and photovoltaic technology as a way of converting and utilising that energy.

Generating, storing, using and understanding energy – Modules of the solar power case

Case

Photovoltaic module

Consumer (low-voltage socket and E27 bulb socket)

Charging device, 12 V light bulb, 12 V energy-saving bulb, 12 V LED lamp

Lead-gel battery

Generator connection (voltmeter)

Motion sensor

Ammeter

Schottky diode

Charge regulator

Article	Order-No. English	Order-No. Spanish
Solar Power Case basic equipment	**75636**	
Solar Power Case enhanced equipment (Basic equipment item no.: 75636, buzzer, halogen spotlight with stand, digital multimeter)	**76704**	
Experiment manual: Basic solar power case equipment Teachers' edition	**76632**	**77650**
Experiment manual: Basic solar power case equipment Students' edition	**82805**	**83304**

Suitable for:

- **All general education schools, from approx. age 9** (primary, middle and secondary schools of all kinds)
- **Vocational colleges**
- **In-house and third-party training centres** (training and further education)
- **Unions and associations**

Learning objectives/Skills:

- The electric circuit: Understanding the system with a source of energy, cables and consumer modules
- The energy accumulator: The link bet ween the charging circuit and the consumer circuit
- The solar power system: Understanding the individual functions and the work the components shall perform
- The energy efficiency: Investigating ways to optimise the components in the electric circuit
- The project: Designing, building and testing an entire solar-powered off-grid technology system
- The result: Operating an alarm system using solar power (designing, constructing and testing)
- The transfer: Planning other projects for solar power at the school

Technical data:

- **Dimensions (H/W/D in cm):** 45/87/21
- **Weight:** 17 kg

Scope of delivery:

Each component has its own unique place in the case in this construction and storage system designed specifically for schools. This simplifies the training in use for both instructors and students and ensures that this system for teaching and learning has a long service life.

- Working case
- Photovoltaic module
- Ammeter
- Lead-gel battery 12 V, 4.5 Ah with vehicle fuse
- Motion sensors
- Consumer (low-voltage socket, E27 bulb socket)
- Charge regulator
- Generator connection (voltmeter)
- Schottky diode
- Charging device, 12 V light bulb, 12 V energy-saving bulb, 12 V LED lamp
- 15 x red MC wires + 15 x blue MC wires
- 3 x spare fuses 7.5 A

The Solar Power Laboratory – for the photovoltaics professionals of the future

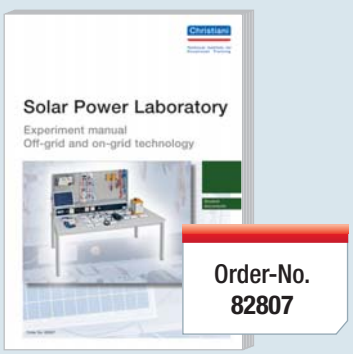
The solar power laboratory provides students with a practical understanding of both off-grid and on-grid technology. Entire classrooms can be fully equipped with laboratory workplaces. Christiani supplies the fitments required to fully equip these specialist rooms. We will gladly help you from the initial concept stage right through to its realisation. The solar power laboratory can also be installed as an individual workplace for learning purposes both in companies and in educational institutes. An experienced and professional educational specialist has developed the components and the experimental set-ups together with solar engineering specialists. The comprehensive description provided for the experiments rounds off the overall didactic concept in an ideal manner. The technology used in the solar power laboratory has been optimally tailored to suit the requirements of practical applications in domestic engineering.

- Learning based on industry components
- Modular design
- Suitable didactic material

Detailed illustration:
Power supply channel

Experiment Manual for Teachers and Students

The experiment manuals for the solar power laboratory are the result of various further-education concepts. Besides basic information on climate protection and renewable energy given in separate sections, the manuals provide an introduction to off-grid and on-grid technologies.The teachers' edition is in colour, available in German and English and includes the solutions for the exercises. The students' edition is printed in back and white and does not include the section with solutions.

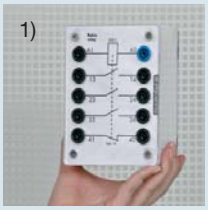


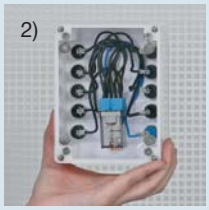
! The experiment manuals are supplied exclusively to customers that have also ordered the solar power laboratory (Order-No.: 82371 or 76970) from Christiani.

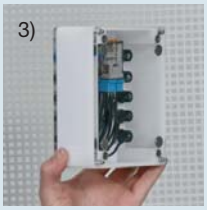
Solar Power Laboratory – Concept and Type

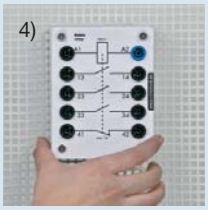
Working with the individual modules, students gain a clear insight into the circuits commonly used in photovoltaics. The modules are made of sturdy, shatter-proof material and have replaceable sides, fronts and backs. In addition, the rear wall is transparent to make the technology inside visible to the trainees.

The solar power laboratory modules are state-of-the-art in photovoltaic technology









1) Standardised and easily-remembered symbols, made from extremely robust and shatterproof material

2) See-through back panel: Show students the interior

3) + 4) Held safely in place by powerful magnets; flexible for use on bread board walls, metal panels and boards on steel walls

and comply with the relevant requirements (VDE 0100 Part 712). The inverters for the PV on-grid technology are from the Steca company.

The modules are identified by embossing with standardised symbols. All connections are routed to 4 mm shatter-proof safety sockets on the front panel. There are no live connections from any installed devices to the outside. The back panel has been designed to hold boards on steel walls for illustrating theory, as well as laboratory breadboards for demonstrating the practical side of a tutorial. As well as the holding system, the modules are fitted with four spring-loaded dowel pins for stability on the lab breadboard. The circuit diagrams can be visualised by attaching the modules to the steel panels for better comprehension.

	English	Spanish
Article	**Order-No.**	
Solar power laboratory, complete (Consisting of: laboratory bench with breadboard wall and power supply duct, roller container, components for on-grid and off-grid technology and experiment manual, teachers' edition)	82371	
Laboratory bench with power supply duct and breadboard wall	89387	
Roller container	89784	
Solar power laboratory components for off-grid technology	76970	
Solar power laboratory components for on-grid technology	76971	
Experiment manual: Solar power laboratory, teachers' edition	82017	83302
Experiment manual: Solar power laboratory, students' edition	82807	83303

Suitable for:

- **General education schools** (e.g. technical secondary schools or specialised physics courses)
- **Vocational colleges**
- **Company and industry training centres** (training and further education)
- **Universities and colleges**
- **Unions and associations**

Learning objectives/Skills:

Off-grid technology learning objectives

- Measurements with the solar power circuit: Open-circuit voltage and short-circuit current at various light intensities, angles of incidence and temperatures
- Identifying the IV characteristic and the MPP
- The battery is the energy accumulator in the PV off-grid technology: Discharge protection and charging regulator; current distribution during charging and draining; internal-resistance measurements of module and battery, exhaustive discharge protection
- Electric circuits with the off-grid PV system: Individual functions of surge voltage protection; fuses, distributors and consumers
- Off-grid inverter: Measurement of voltages and currents; efficiency and AC voltage types
- Project: Developing a back-up power supply for safety lighting
- Transfer: Designing, constructing and testing solar power off-grid technology

On-grid technology learning objectives

- Investigating devices in the StecaGRID on-grid feed system
- Measuring and optimising PV string concepts; circuit variations, measurement recording and safety concepts
- Overvoltage protection and safety regulations for grid feed
- ENS basic function and functional test
- Setting up, measuring and expanding the feed-in system
- Transferring data from the inverter to the display
- Efficiency and balancing calculations of the power for consumption and supply
- Transfer: Expanding the circuitry and service
- Project: Designing and building a PV ongrid system for use in practice

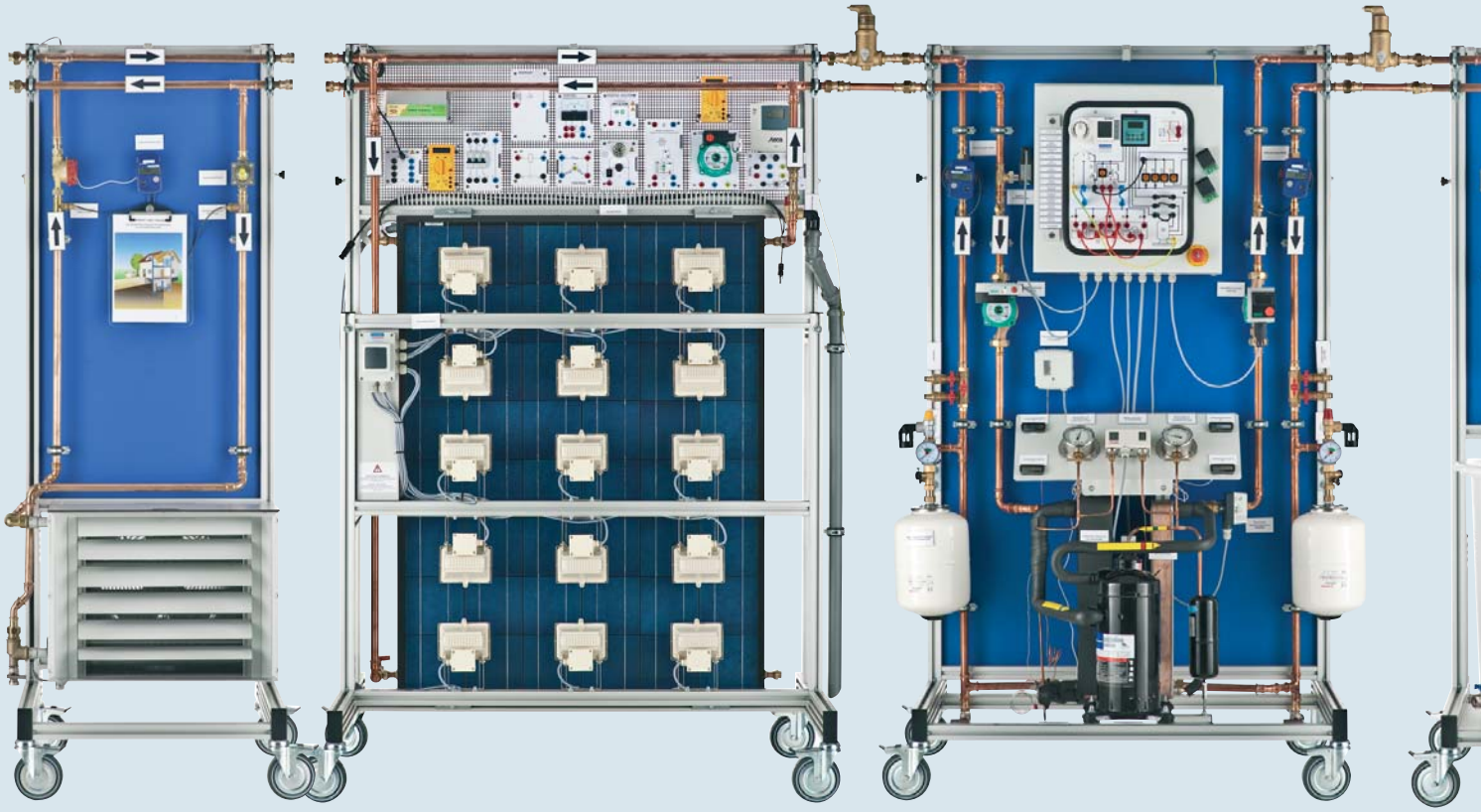
Technical data:

- **Dimensions** total (H/W/D in cm) 153/180/90
- **Dimensions** Laboratory bench (H/W/D in cm) 72/180/90
- **Weight** total approx. 120 kg

Scope of delivery:

- Laboratory bench with power supply and breadboard wall
- Roller containers for storing the modules
- Solar power laboratory components for off-grid technology
- Solar power laboratory components for on-grid technology
- Experiment manual, teachers' edition

Teaching system Heat Pump with



S2 Compressor Convector as Source or Sink

S6 Hybrid Collector

S5 Heat Pump with switching function for heating or cooling (optional)

In both the electrical and HVAC trades, increasing attention must be paid to renewable energy technologies during initial and advanced training. This means that teaching and learning concepts, just as much as any energy application, require efficient and optimised process planning. Where the methodology and didactics of learning processes are concerned, activity-based concepts are what meet these requirements more than anything else. For this reason, Christiani provides training stands for vocational training, developed to enable optimum professional qualification in the field of solar heat and heat pump technology with specialist electrotechnical and hydraulic knowledge.

Solar Heat and Photovoltaics

S1 Geothermal Energy Source or Underfloor Heating

S4 Hydraulic Switch, Plate Heat Exchanger and Buffer Storage

S3 Solar Collector with Solar Simulation

Hands-on learning!

The teaching system allows optimum technical training in the field of solar thermal energy and heat pump technology combined with specialised knowledge in the fields of electrical engineering and hydraulics.

Appreciating and understanding

Two key factors for the quality of the training are that practical exercises and measuring opportunities can be carried out using real equipment.

It is only by literally "grasping" and "touching" that the technical processes are understood, and hence can be managed as well. Suitable experimental measurements have to be taken for anything that cannot be directly observed or sensed.

Key features

- 6 mobile training stands on castors
- For simulating diverse real-world situations and system concepts through various combinations and parameterisations of the training stands
- Experiments and simulations with original industry components used in practice
- Comprehensive description of the experiments

ANY QUESTIONS?

For further information please contact our consultants by e-mail:
info@christiani-tvet.com

Decades of experience combined into a single teaching system

The Didactic Concept of the Teaching System

S2 fan convector as source

S5 heat pump

S1 underfloor heating

Application example

Structure of a heating system with an air source heat pump and underfloor heating

Experiment set-up

The ambient air is taken in at the fan convector (training stand S2) with the ambient temperature, and the ambient heat is fed to the heat pump (training stand S5). Here the heat is removed and transferred via the hot circuit to the three pipe systems (training stand S1), which, in this experiment, can be considered to be the floor heating or the heater core. The cold which is generated in this process at the same time is discharged by means of the fan convector (training stand S2).

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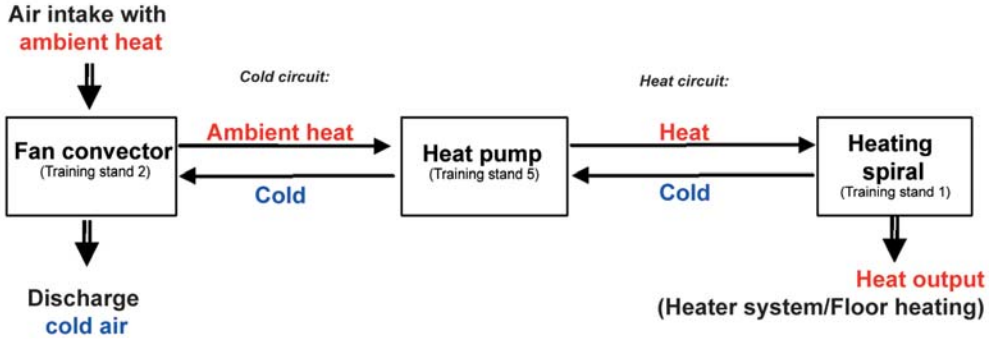
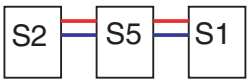
Diagram of the Principle:



Simplified view of the experimental set-up:



Pedagogic requirements

- Maximum learning efficiency through closely linking theoretical and practical topics to actionbased learning processes.
- To avoid wasting any time in the learning organisation, all learning processes have to be provided at the place of learning in a qualified and optimised manner, and the system technology must be designed for practical applications
  to allow these processes to be realised accordingly.
- This calls for "integrated specialist classrooms", where both theoryand the practical side of the area of technology concerned can be mediated.
- The learning content must be made "graspable" in both meanings of the word!
- The efficiency in conveying the knowledge and findings is part of the balanced concept which includes written information and exercises organised using modern media techniques, PC workplaces, experimental, laboratory and demonstration equipment to practise on.
- All learning processes are designed in the concept of "complete action" with the problem assignment (job, information, conditional analysis (analysis of the knowledge relevant to the organisation, planning) project realisation (execution) realisation, test record) and transfer (documentation, assuring the results, testing).

Learning objectives:

The following learning goals can be achieved with the teaching system.

- Understanding the technical system requirements for heat-pump heater systems and solar-heat equipment
- Knowledge of the electric, hydraulic and control requirements needed for operation, using a heat-pump heater system or solar-heat equipment as an example.
- Knowledge of the physical processes in the cold circuit of a heat pump.
- Systematic approach to commissioning a heat pump heater system or solar-heat equipment.
- Capability to plan, set up and commission heat-pump and solar heat heater systems in a concerted manner.
- Capability to prepare test records for heat-pump heater systems and solar heat equipment.
- Skills in recording measurements and evaluating the electrical and hydraulic processes using heat-pump and solar-heat systems as examples.
- Understanding the processes to optimise the energy in heater systems using heat pumps and solar heat.
- Knowledge of the terms and operating resources used for heat-pump and solar-heat systems.
- Capability to judge the electrical and hydraulic values measured in heat-pump heater systems and to plan any related process changes.
- Understanding of the technical controls and optimisation of the energy in the circulation pumps used in heater systems.
- Skills for optimising energy processes in heater systems.

Training Stand 1: Geothermal Energy Source or Underfloor Heating

This training stand can be used as a source of heat in the configuration "brine heat pump“ (training stand 5) or as the heat sink in combination with the heat pump or the solar heat stand (training stands S3 and S4).

Operation with or without filling with water is possible here.

- 200-litre water tank
- 3 pipe systems (10, 20 and 30 metres in length)
- Integrated hot-medium meters to measure the overall flow, the hot and the cold outputs as well as the admission and return temperatures
- Bypass valve between the heating circuits for the experiments to bypass the three pipe systems
- Experiments on "hydraulic adjustment" with the three pipe systems routed in parallel using the volumetric flowmeters and throttle valves

ONLINE
VIDEO

Find out about our functions and potential areas of application in our detailed product video.

Experiment Manual

All the experimental set-ups together with other combinations and possible uses are described in detail in the experiment manual. The experiment manual contains an information section, an exercise section and a section with the solutions, and is included free-of-charge in the delivery when the S5 training stand (heat pump) is ordered.

! The experiment manuals are supplied exclusively to customers that have also ordered the S5 training stand for the heat pump (Order-No.: 82129) from Christiani.

Technical data:

- Dimensions: (W/D/H in mm) approx. 1100 x 800 x 1980 mm
- Weight: approx. 80 kg

Article	Order-No.
S1 geothermal energy source or underfloor heating	82125

Training Stand 2: Fan Convector as Source or Sink

Both the source of energy and the energy sink with discharge of warm air can be realised with the fan convector in these experiments.

- Fan power air throughput up to 2300 m³/h
- Heating power up to 22.4 kW at 90/70/20°C
- Adjustable cooling performance from 3 to 5.4 kW at 7/12/27°C
- Continuous throttle action in the hydraulic circuit by turning valves on the convector
- Series of experiments to optimise the energy between the heating power available from the heating circuit and the energy conveyed from the convector to the air in the room
- Integrated hot-medium meter

ONLINE VIDEO

Find out about our functions and potential areas of application in our detailed product video.

Experiment Manual

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Technical data:

- Dimensions: (W/D/H in mm) approx. 1100 x 800 x 1980 mm
- Weight: approx. 80 kg
- Power supply: 230 V AC

Article	Order-No.
S2 Fan convector as the source or the sink	82126

Training Stand 3: Solar Collector with Solar Simulation

The main components of this training stand are the flat plate collector, the solar heat regulator and the circulation pump with the new more powerful thermal collector

- Clear glass collector with copper absorber (collector area > 2 m², standstill temperature to about 208°C)
- System regulator with diverse regulating functions and energy measuring/sensing for the functional value using a data stick
- High-efficiency pump (minimum power input 5.8 W and maximum delivery height 5 m) as the wet-running meter with EC motor, and with automatic adjustment of the power
- 6 x 500 W halogen spotlights for simulation of the irradiated solar power
- Safety devices with diaphragm expansion vessel and 6-bar pressure control valve
- 2 ball valves, with integrated thermometer and gravity braking system in the collector circuit
- Flowmeter and "Flow Check" for controlling the flow (5 to 40 L/min)
- Fittings for filling and flushing

ONLINE
VIDEO

Find out about our functions and potential areas of application in our detailed product video.

Experiment Manual

All the experimental set-ups together with other combinations and potential areas of application are described in detail in the experiment manual. The experiment manual contains an information section, an exercise section and a section with the solutions, and is included free-of-charge in the delivery when the S5 training stand (heat pump) is ordered.

! The experiment manuals are supplied exclusively to customers that have also ordered the S5 training stand for the heat pump (Order-No.: 82129) from Christiani.

Technical data:

- Dimensions: (W/D/H in mm) approx. 1500 x 800 x 1980 mm
- Weight: approx. 100 kg
- Power supply: 230 V AC

Article	Order-No.
S3 solar collector with solar simulation	82127

Training Stand 4: Hydraulic Switch, Plate Heat Exchanger and Buffer Storage

This training stand is used for adaptation to the hydraulic conditions. The hydraulic switch, the plate heat exchanger or the heat exchanger integrated in the storage system can be used for various experimental set-ups.

- Hydraulic switch and plate heat exchanger are interchangeable using an exchangeable disc (the component not being used is fastened to the rear of the stand)
- Hydraulic switch:
  Stainless steel vessel (volume approx. 1 litre), primary circuit and secondary circuit are at the same pressure but are not hydraulically coupled
- Plate heat exchanger:
  16 exchange plates, exchanger performance 17 kW at 70/50°C primary and 35/45°C secondary
- Enamel reservoir for holding 160 litres of water, with integrated straight-tube heat exchanger

ONLINE
VIDEO

Find out about our functions and potential areas of application in our detailed product video.

Rear view of S4

Experiment Manual

All the experimental set-ups together with other combinations and potential areas of application are described in detail in the experiment manual. The experiment manual contains an information section, an exercise section and a section with the solutions, and is included free-of-charge in the delivery when the S5 training stand (heat pump) is ordered.

Technical data:

- Dimensions: (W/D/H in mm) approx. 1200 x 800 x 1980 mm
- Weight: approx. 80 kg

Article	Order-No.
S4 coupling component hydraulic switch, plate heat exchanger and buffer storage	**82128**

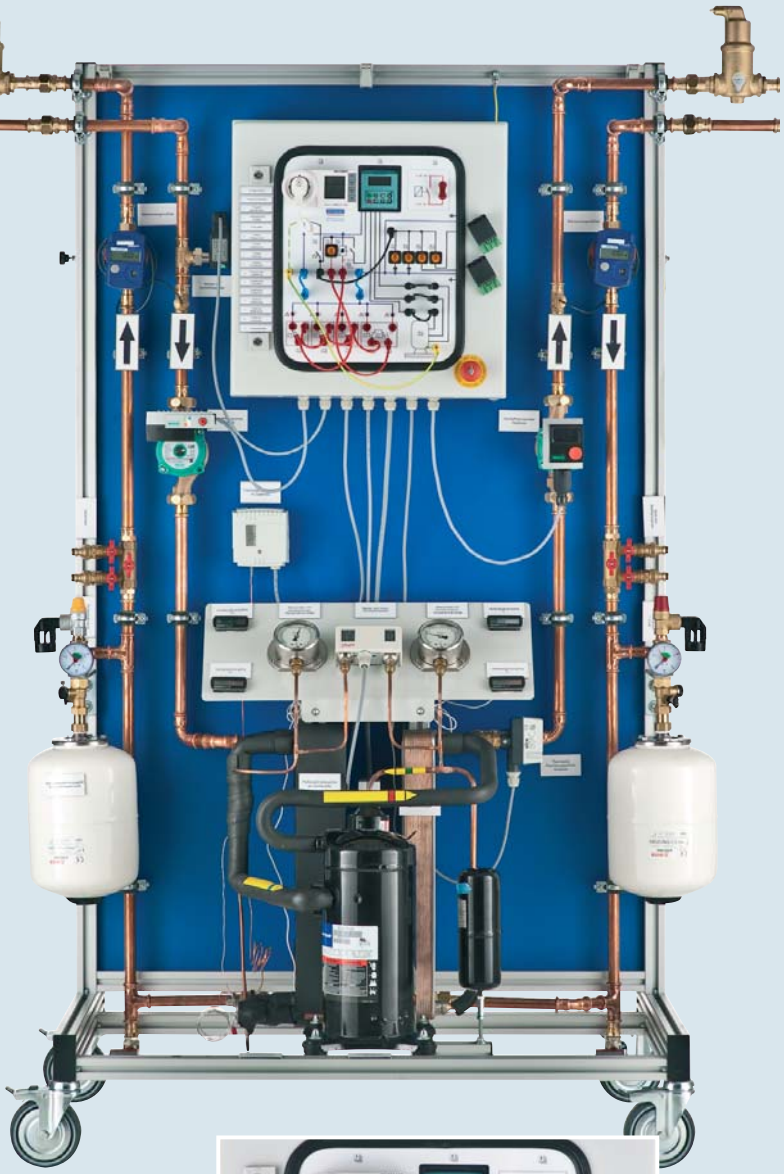
! The experiment manuals are supplied exclusively to customers that have also ordered the S5 training stand for the heat pump (Order-No.: 82129) from Christiani.

Training Stand 5: Heat Pump

This training stand constitutes the central element of the teaching system.

Besides the heat pump, the stand contains all the power supply points for the other training stands. With the brine and heating circuit connection, the circulation pumps and the safety devices are already installed for the professional operation of a heat pump.

- Conventional heat pump with evaporator, scroll compressor, liquefier and expansion valve in line with state-of-the-art technology.
- Permanently fitted cold circuit (not accessible for experimental interventions), refrigerant R407c.
- Manometer for sensing and measuring physical events in the cold circuit.
- Digital thermometers for measuring the temperatures in the cold circuit downstream of the evaporator, air compressor, liquefier and expansion valve.
- Low and high-pressure control devices energy measuring device, high-efficiency circulation pumps and other components.
- Power supply, measuring and switching unit with RCT, main fuses, energy measuring device, control-circuit fuse and contactor relay.



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Experiment Manual

All the experimental set-ups together with other combinations and possible uses are described in detail in the experiment manual. The experiment manual contains an information section, an exercise section and a section with the solutions, and is included free-of-charge in the delivery when the S5 training stand (heat pump) is ordered.

! The experiment manuals are supplied exclusively to customers that have also ordered the S5 training stand for the heat pump (Order-No.: 82129) from Christiani.

Technical data:

- Dimensions: (W/D/H in mm) approx. 1200 x 800 x 1980 mm
- Weight: approx. 120 kg
- Power supply: 230 V AC

Article	Order-No.
S5 Heat pump	82129

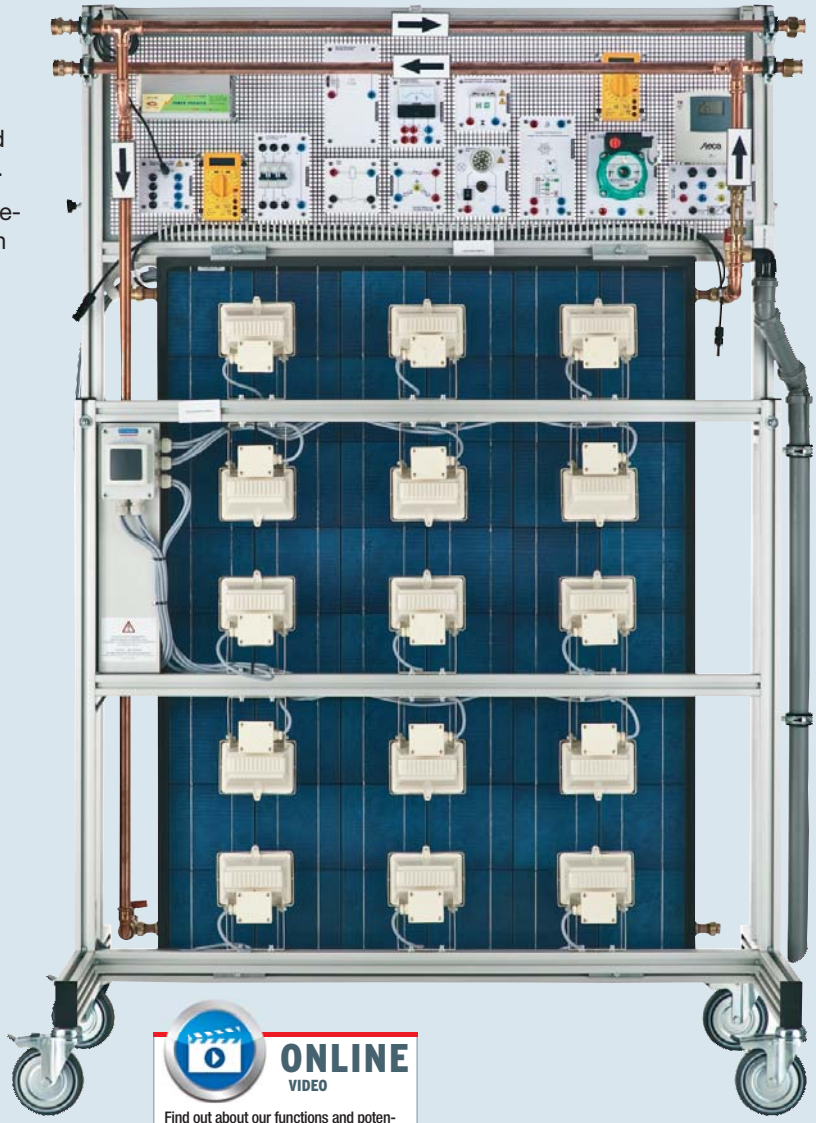
Training Stand 6: Hybrid Collector

This training stand adds a further key technology - photovoltaics - to the teaching system. This also allows a solid fundamental knowledge of hybrid collectors to be accumulated and built upon.

Thus, heat pump system concepts can be developed and tested using photovoltaics and hybrid collectors.

The training provides an excellent opportunity to experience the process of system integration as a solution with its many benefits.

- To understand the function of a hybrid collector on the basis of experiments and measured values
- To plan heat pump systems with hybrid collectors as an energy source for the heat pump
- To understand the effect of the temperature profile on the thermal collector and PV module
- To record and analyse measured values
- To plan and execute an emergency power system for a circulation pump with regulator
- Sensible use of PV electricity in off-grid systems or in the emergency power system
- Experimental derivation
- To understand the physical process of a hybrid collector in thermal energy extraction through the brine circuit of a heat pump
- To understand the process of water extraction through condensation at the hybrid collector



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Experiment Manual

All the experimental set-ups together with other combinations and possible uses are described in detail in the experiment manual. The experiment manual contains an information section, an exercise section and a section with the solutions, and is included free-of-charge in the delivery when the S5 training stand (heat pump) is ordered.

! The experiment manuals are supplied exclusively to customers that have also ordered the S5 training stand for the heat pump (Order-No.: 82129) from Christiani.

Technical data:

- Dimensions: (W/D/H in mm) approx. 1450 x 800 x 1980 mm
- Weight: approx. 100 kg

Scope of delivery:

- Training stand S6 hybrid collector
- Modules: circulation pump and solar heat regulator
- Modules: Safety lamp, consumer, lead-gel battery, fuse distributor, 12 V relay, overvoltage protection, generator connection, multimeter (2 pieces), power connection module, 300 W inverter
- Connecting cable

Article	Order-No.
S6 hybrid collector with PV components	85317

These sanitation and HVAC training stands set new standards in training

Action-oriented training always makes reference to practice. Whatever the trainee practises on the model in the training workshop or classroom, he can subsequently also implement in his normal working day on the construction site. For training such as this, one needs teaching systems which combine both: absolute practicality and flexible, versatile applications. Under these preconditions, Christiani has developed and implemented new and attractive training stands, as well as teaching documentation for modern training in sanitation, heating and air conditioning technology.

Heating Control Compact Model

There is no better way in which you can prepare your trainees for the technical requirements in the sanitation, heating, ventilation and air-conditioning sector:

- For numerous learning situations, adapted to the respective areas of learning
- All learning situations correspond to real situations, e.g. the construction site
- For activity-oriented learning
- With original industrial components
- Corresponding to the current level of technology
- Can be individually converted/retrofitted as necessary
- Test-oriented for tasks such as practising expert discussions, etc.

Contains detailed and high-quality teaching materials for training and further education

Newly designed training stands

Full perspective for increased safety

Gas technology training stand (with compressed air operation)

Gas installations require a particular level of precision and safety. For the full perspective, the gas technology training stand is equipped with a camera in the gas flow monitor.

The stand is ideal for these learning objectives, learning situations and topics, amongst others:

- Replacement of a pipeline section
- Inspection of a gas installation
- Installation of a gas line in a detached house
- Selection of raw materials for a gas line
- Determination of the safety fittings
- Implementation of a serviceability inspection

Included in the scope of delivery: Practical experiments for versatile use of the training stand.

Workflow of a customer order for a gas installation, e.g.:

- **Order analysis**
  (technical rules, corrosion protection, attachment of gas lines, etc.)
- **Order planning**
  (planning of the route, work planning for the production of a pipeline section, etc.)
- **Order implementation**
  (production of the pipeline section, documentation of the work, commissioning, etc.)
- **Order assessment**
  (costs calculation, etc.)

NEW

Technical features:

- Camera in the gas flow monitor
- Gas pressure regulator
- Single pipe and two-pipe bellows meter
- Various sections as pipe package with different bends for determining pressure losses
- Flow rate float for visualisation of pressure ratios
- Measurement test connections
- Gas pressure measuring device
- Insulator
- Main shut-off device with TAE
- Connection to the equipotential bonding
- Dimensions: 1,500 x 900 x 1,940 mm (W x D x H)

Order-No.
95740

Practical, with current technology
With camera in the gas flow monitor
Safe operation with compressed air

Topics/Learning Objectives

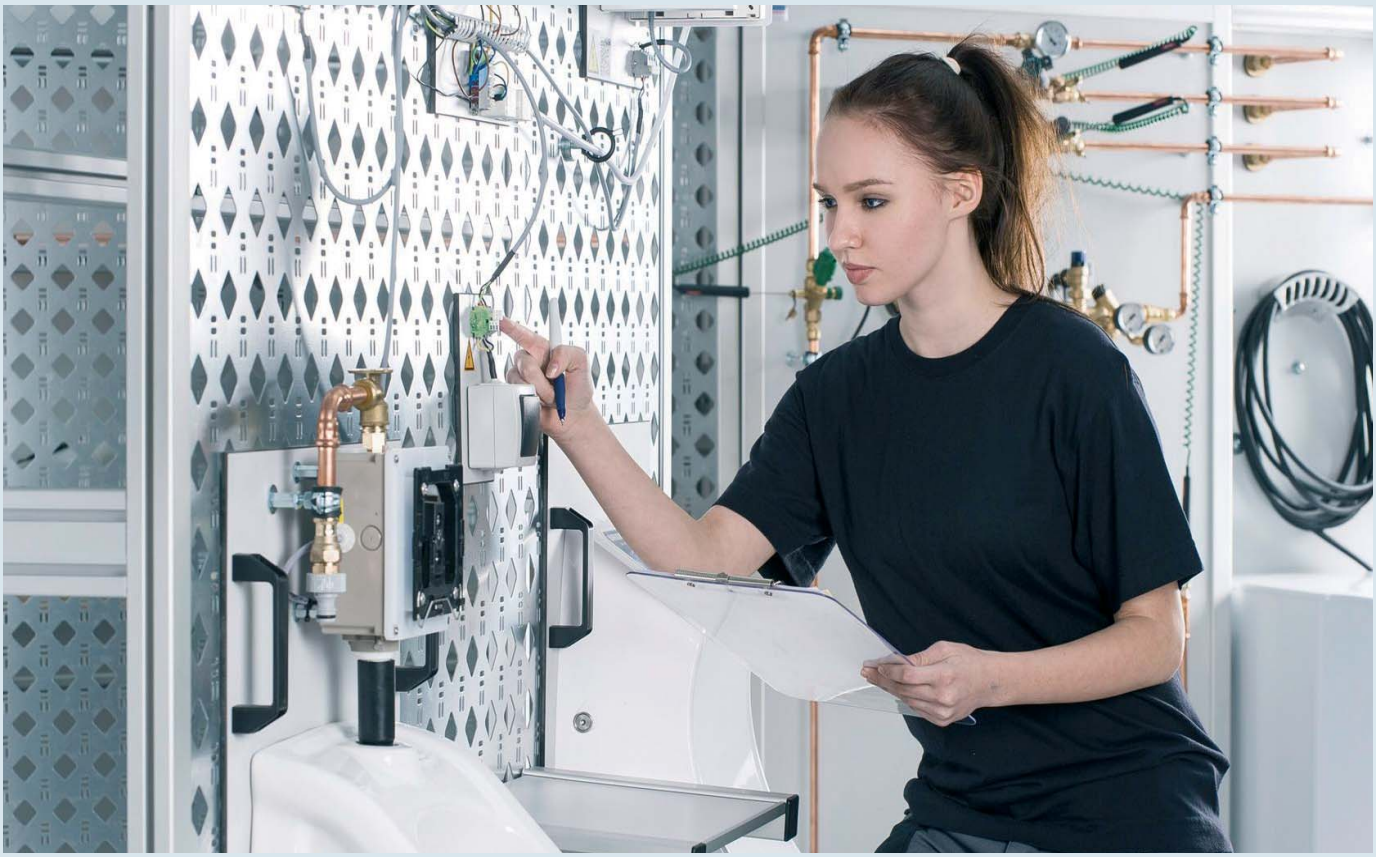
Installation of fuel supply systems – incl.:

- Planning the installation of fuel supply systems for natural gas
- Analysis, planning and realisation of systems for fuel supply
- Preparation for initial commissioning
- Documentation of the results of the leak test
- Notification of customer with regard to prescribed and precautionary inspections as well as what to do in the event of leaks

With camera in the gas flow monitor

Best prepared for trade examinations

Bathroom installation training stand



From planning a bathroom to assessment of the order: With this teaching system, you can teach all aspects of bathroom installation technology, e.g. for the following learning objectives, learning situations and topics:

- Setup of a guest bathroom with urinal
- Selection of a urinal: Creation of layout and outline; material properties, functional processes (flushed and waterless), mounting of urinals, use of sound insulation mats, comparison of water consumption with different urinal types, etc.
- **Electrical connections for HVAC components in order to achieve the *Electrician for defined activities*** qualification

Included in the scope of delivery: Practical experiments for versatile use of the training stand.

Workflow for customer orders, equipment of washrooms:

- **Order analysis**
  (Distinction between flush mechanisms, operating principle of waterless urinals, control technology workflows, etc.)
- **Order planning**
  (Creation of an outline, taking into account the relevant standards, material and tool composition, etc.)
- **Order implementation**
  (Implementation of wiring and VDE measurements, documentation of the work, etc.)
- **Order assessment**
  (Costs calculation, etc.)

NEW

Technical features:

- Comparison of different urinals (with flush and waterless)
- Fans and fan control
- Electrical connection of an optoelectronic tap and abath fan
- Dimensions: 1,500 x 900 x 1,940 mm (W x D x H)

Order-No.
95741

Practical, with current technology
For plumbing and electrical installations
Flexible and mobile

Topics/Learning Objectives

- Planning the configuration of washrooms, taking into account the customer's wishes
- Preparation of assembly work
- Development of planning proposals
- Assessment of taps and devices with regard to function and mechanism
- Observation of the means to save drinking water and for efficient use of energy
- Comparison and assessment of different equipment options
- Documentation of plans
- Presentation of decisions in the form of customer-oriented consultations

An abundance of practical expertise in full flow

The installation and maintenance of drinking water systems requires extensive expertise and skills. With the new drinking water training stand, you can simulate many practical exercises and tasks, including for the following learning objectives, learning situations and topics:

- Backflow testing
- Maintenance work on the service line
- Equipotential bonding
- Professional insulation of drinking water lines to protect against heating or cooling
- Safeguarding of drinking water
- Measures to save drinking water
- Anti-corrosion measures in drinking water systems
- Commissioning of a drinking water line
- Pipe network analysis
- Assembly of an instantaneous water heater
- Construction elements of drinking water heating systems
- Illustration of pipe faults, such as stagnant side arm, trapped air, pressure surges

Included in the scope of delivery: Practical experiments for versatile use of the training stand.

Workflow for customer orders, e.g. for maintenance of technical systems in a drinking water system:

- **Order analysis**
  (liquid categories, safety valves, tasks of components, electrical hot water provision, knowledge about corrosion and condensation etc.)
- **Order planning**
  (calculations, designs, principles for pipe dimensioning, etc.)
- **Order implementation**
  (measured value recording, insulation, leak test, etc.)
- **Order assessment**
  (measured value assessment, costs calculation, etc.)

NEW

Technical features:

- Domestic water connection with shut-off valves and non-return valve
- Water meter with water meter bracket
- Connection to the equipotential bonding
- Combination of pressure regulator and backwashable fine filter
- "Safe" aerator
- Copper pipe installation with transparent, plastic sub-sections
- Twin-tap and lever-mixer
- Electrical hot water tank
- Transparent diaphragm expansion vessel
- Circulation line with pump
- Various measuring points for pressure and temperature recording
- Safety valve
- Thermostatic valve for circulation line
- Balancing valve
- Dimensions:
  1,500 x 900 x 1,940 mm (W x D x H)

Order-No.
95743

Practical, with current technology

Incl. experiment manual for maintenance and installation

Flexible and mobile

Topics/Learning Objectives

- Maintaining technical systems
- Installing drinking water systems
- Installing systems for heating drinking water

Understanding the heating control of different units using the right diagram

Heating Control Compact Model

- Universal system for connecting commercially available controls, e.g. Honeywell, Landis, Viessmann, etc.
- Table model with 6 exchangeable disks
- Voltage supply using 5V controllers (no potential equalisation required)
- Terminal strips on rail to connect the controller
- Indicating the operating states of pumps, mixers, boilers, etc. using LED lights

Compact table model with 6 different exchangeable disks to show:

- 1 mixing circuit and floor heating
- 2 mixing circuits and solar heat
- 2 storage tanks, 2 mixing circuits and solids boiler
- Oil/gas boiler with tap water
- Oil/gas boiler with solar energy system
- Oil/gas boiler with 2 storage tanks and 2 mixing circuits

Order-No.
97269
More information: www.christiani-international.com/97269

Specifications:
Voltage supply 5V Dimensions: (L x D x H) 680 x 160 x 1080

This is where hydraulic relationships become clear

Heating Hydraulics Training Stand

- Mobile training stand with four heater simulations, each one with a thermostat valve, flow meter and capture of the heater's output temperature
- Thermostat with simulated outside temperature (via potentiometer)

For many tasks in the heating hydraulics, e.g.

- Testing work on the diaphragm-type expansion tank
- Programming the outside thermostat
- Flow meter for the total volume flow and strand volume flows
- 4-channel temperature measuring device with data interface
- Gauge connections for both the flow and return, for temperature difference measurement
- Temperature measurements via sensor insert in the medium

Specifications:

- 4 strand regulation valves
- Short-circuit valve for maximum flow
- 3-way mixer unit with high-efficiency pump and safety group
- Heat transfer station with heat exchanger
- Dimensions: (L x D x H) 1500 x 900 x 1940

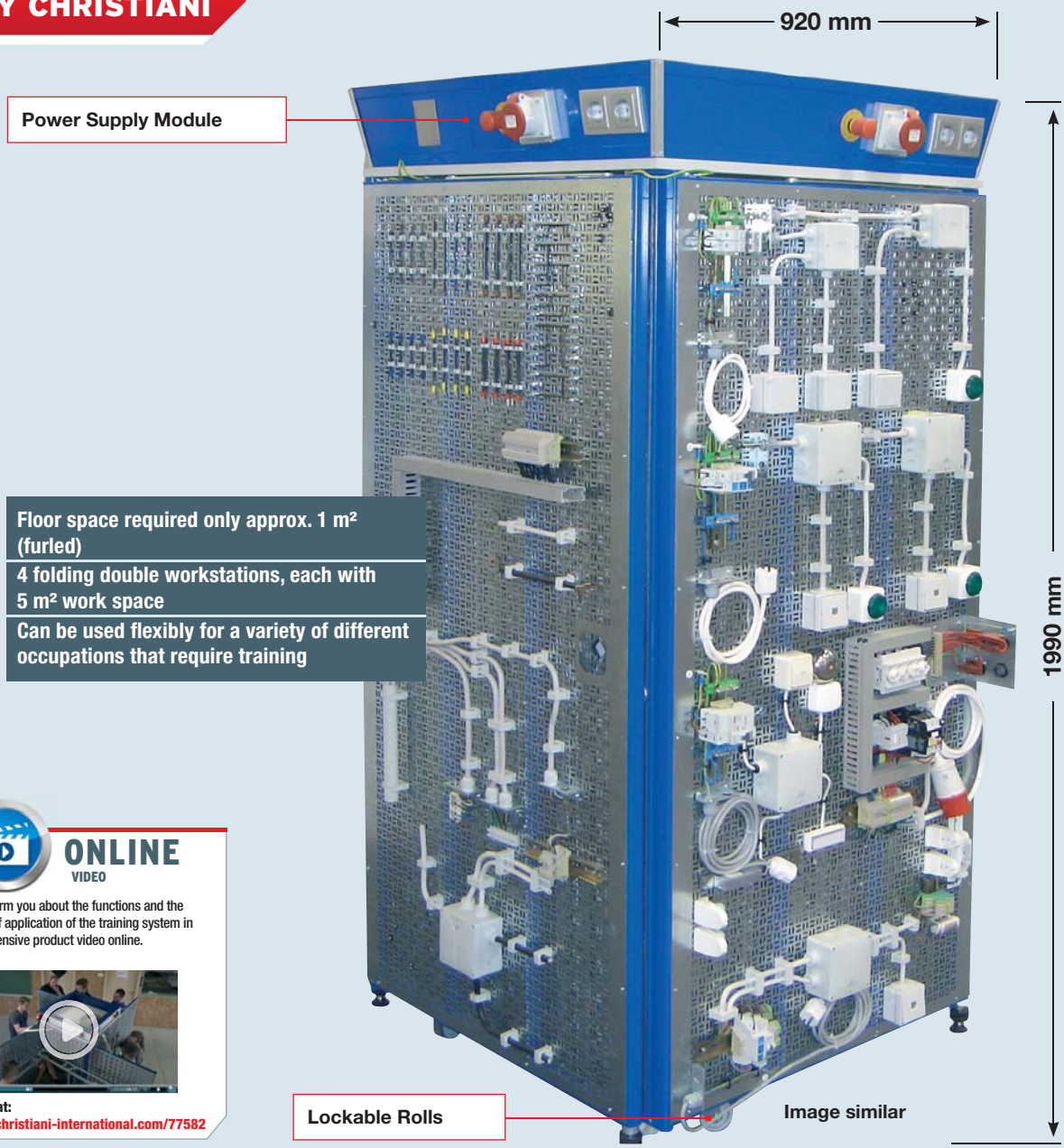
Order-No.
97177
More information: www.christiani-international.com/97177

The Christiani Learning Unit: Four entire training areas on only 1m² floor space

Save space and money: The Christiani learning unit can be used in various different specialist and training areas.

Be it electrics, metal, HVAC or renewable energy – you can customise the Christiani learning unit to your requirements, and convert it quickly and fl exibly. This makes it possible to carry out the practical exercises in parallel – even for different training areas – on a single learning unit. This saves space and money! In order to insert the components, various different hole patterns are available for the work walls. A power supply module is fitted in the top part of the learning unit.

EXCLUSIVE BY CHRISTIANI



- Floor space required only approx. 1 m² (furled)
- 4 folding double workstations, each with 5 m² work space
- Can be used flexibly for a variety of different occupations that require training

ONLINE VIDEO

We inform you about the functions and the fields of application of the training system in our extensive product video online.

Video at:
www.christiani-international.com/77582

Properties:

- Four one-sided work areas on the body:
  Two rigid and two folding, with access to the internal cabinet for storage of work materials
- Four unfolding two-man working areas
- Lockable doors for the working areas
- Table tops, shelving, etc. can be fitted to any of the working areas.
- Mobile frame made from welded rectangular steel tube, 30 × 30 mm
- Lockable wheels for parking the unit in position
- Floor space required (folded) approx. < 1 m²
- Electronics hole pattern: For plastic dowels
- HVAC hole pattern: Combination hole pattern for M8 steel dowel and for plastic dowel
- Additional customised hole patterns can be produced (by agreement)
- Power supply duct, each side with 2 safety sockets (230 V), 1 CEE socket (400 V) and an emergency stop switch, 16 A motor overload protection, the entire electrical system can be locked using a key

Folding double work spaces

Application example: HVAC

Practical internal cabinet

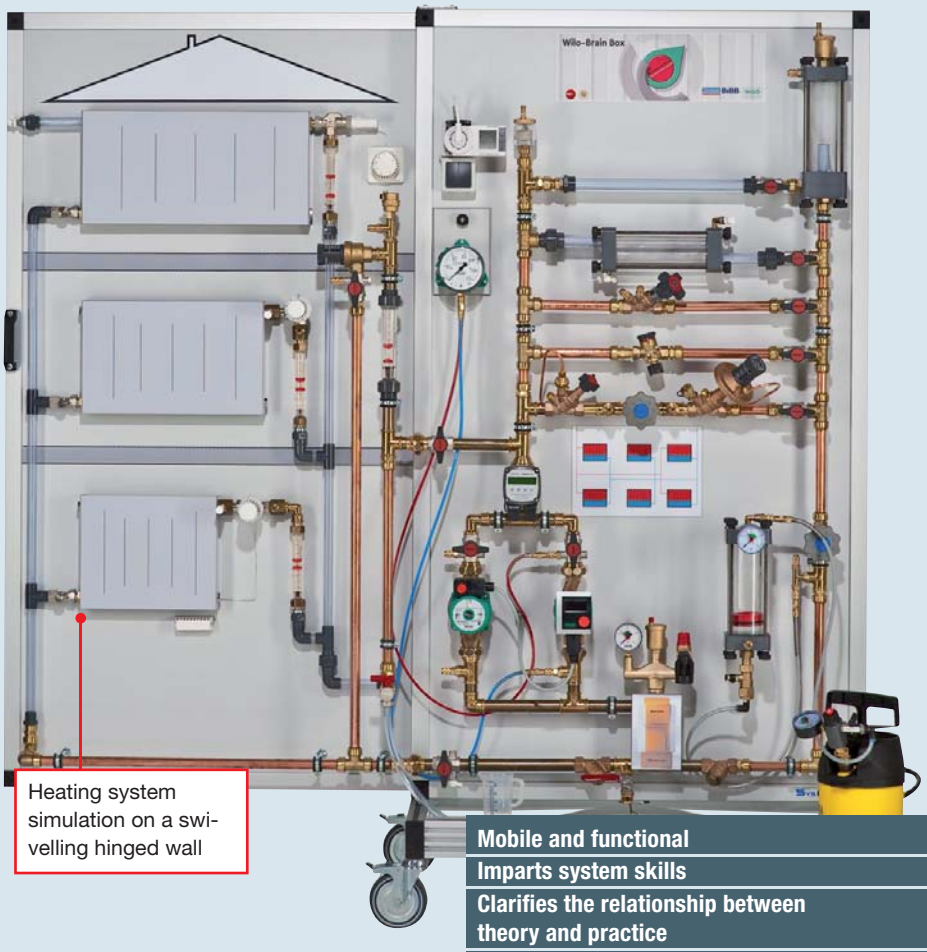
Article	Order-No.
Learning unit	77582
Steel dowel, 30 units	75482
Plastic dowel, 500 units	82187

More Information: www.christiani-international.com/77582

The clear model with building simulation – ideal for initial training

Wilo-Brain Box "Classic Plus"

The Wilo-Brain Box "Classic Plus" is the follow-up product to the tried-and-tested Brain Box "Classic". The heating system that was only represented in the form of pipe sections with control valves in the "Classic" model can now be recognised as a heating system in the new "Classic Plus" design. As a result, practical references to the real heating system are made significantly easier.
What's more, the new "Classic Plus" model still offers the tried-and-tested functionalities: At the function wall, using the system checklist as well as tips and tricks, students can discover and work out how components for heater systems affect one another, and can further develop their technical potential. This makes it clear and easy to understand how the collaboration between the components contributes to the optimal functioning of the system.



Heating system simulation on a swivelling hinged wall

Suitable for:

Vocational education and further training at
- **Vocational colleges**
- **Company and industry training centres**

Learning objectives/Skills:

According to the division of the system checklist in
- Pumps and controllers
- Hydraulics
- Pressure maintenance
- Ventilation
- In the Wilo-Brain Box, filling and bleeding of heating systems can be tested and demonstrated visibly and comprehensibly, how a membrane expansion tank works, for example, what it means for a pump when thermostat valves are not preset; what faults can be caused by air in the heating system, etc., and the measures that must be taken to ensure that heating systems are configured professionally and effectively.

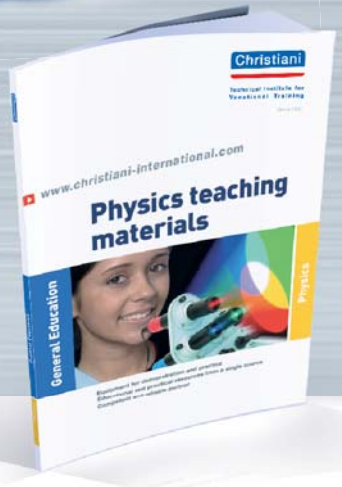
Technical data:
- **Dimensions (H/W/D in cm) when folded out in its working position:** 198/190/78
  when folded up: 198/100/78
- **Weight:** 80 kg

Mobile and functional
Imparts system skills
Clarifies the relationship between theory and practice
Describes the experiments with 19 examples
Provides scope for further individual experiments

Article	Order-No.
Wilo-Brain Box "Classic Plus"	58129

Science meets school:

Experiments, manuals, equipment – to make your classes lasting



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