**Partner for Technical Education**
| School | Vocational Training | University | Further Training

Christiani

est. 1931

## Technical Education & Training Systems

# TVET Catalogue

christiani-international.com

## International specialist consultation

Due to its practical orientation, the German education system is viewed globally as a success factor for a solid start to professional life. We support companies, colleges, universities and training centres in providing training and qualifying employees, trainees and students according to German standards abroad too. Have a chat with us!

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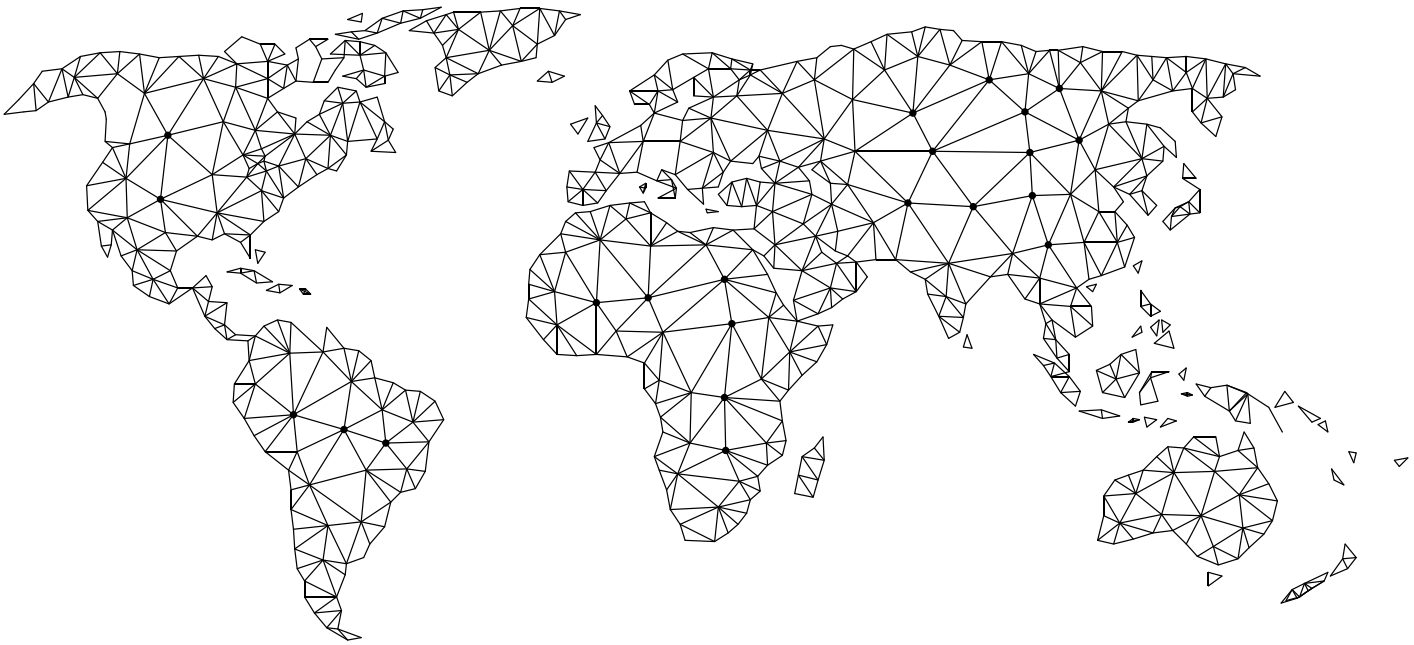


## Dear trainers and readers,

In this catalogue, we will guide you through the most important training content in metalworking, electronics, HVAC and automotive technology professions, as well as for school/STEM lessons. We would like to show you how your trainers and teachers can convey training content for training occupations in a didactically meaningful and practice-oriented way. A variety of learning media from our comprehensive product range is available to help you, from specialist books to digital applications to didactic teaching systems. To keep your company's trainers, teachers and specialists always up to date with technical expertise, our Christiani Academy trains your technical personnel in our teaching system – either in one of our Competence Centres or at your premises.

For 90 years now, Christiani has stood for expertise and quality in technical vocational and further training. Our many years of experience and strong network form the basis for the high quality of our Christiani products. As a result and thanks to our lasting commitment, we have become an important and reliable partner for anyone who values technical training as much as we do.

We will be happy to advise you on the teaching materials and learning concepts that best suit your aims and requirements in technical training.

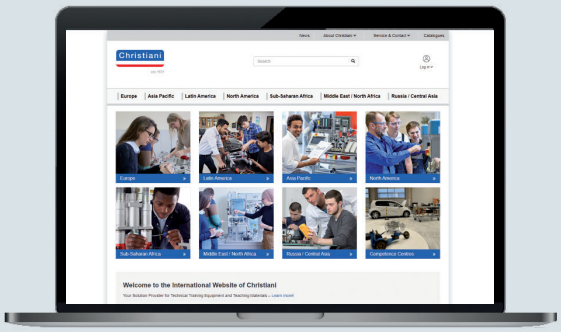
In Rheine, and now also NEW in Landsberg (near Munich), we will be delighted to show you our world of technical training. We would like to invite you to find out about our innovative product solutions in our Competence Centres and discover the latest trends and developments in technical education. We look forward to meeting you!

Kind regards,

*Ferdinand Ganser*

Ferdinand Ganser
Head of International Sales

**Follow us:**



## Christiani's full programme online

Quick to search with all products up to date plus extensive additional information.

**christiani-international.com**

## Visit us

in our Competence Centres in Rheine, as well as NEW in Landsberg (near Munich) and experience our learning concepts and teaching systems on site.

**christiani-international.com/competence-centres**


## Find out more about our Christiani training lab concepts:

**christiani-international.com/catalogues**

# German dual system is setting a benchmark worldwide

## Fit for the future with vocational training

**The German dual educational system is designed to bring together theoretical knowledge and practical content. Thanks to our teaching systems and learning materials, trainees and students benefit from a demonstrative and practical environment in which they gain the technical expertise required for their occupations. We support trainers in conveying learning content in a targeted and interesting way.**

**In short: At Christiani, you will have everything you need to teach your trainees and students theoretical and practical knowledge – both online and offline.**



### Success in professional life through technical and vocational education and training

High-quality technical and vocational education and training (TVET) that is aligned to the needs of the labour market increases the employability of trainees, students, and learners. The availability as well as the skills of these skilled workers play a vital role in both economic growth and prosperity development.

The education and training of trainers and teaching staff is a crucial first step in the development of a quality training system. Only with this qualified training staff is it possible to convey the required knowledge and know-how in a didactically meaningful way during vocational training.

The proven and versatile teaching systems and learning concepts from Christiani are suitable both for the qualification of trainers and teaching staff and for the training of trainees, students and learners. We aim to develop qualified and motivated skilled workers who enjoy using their skills, talents and interests and want to continuously develop their potential.

**Our mission: Lifelong learning with success and vision!**

# OUR SUCCESSFUL TRAINING CONCEPT

Model for complete action

**Christiani provides a balanced concept that combines technology, vocational training and modern media in a practical, well-tested package.**

- Practical, action-based training
- Promotion of social skills
- Optimum implementation of the curriculum
- Reduction in training costs
- Use of modern training media
- Preparation for working life

**Doing**

**Finding information** | **Checking**

**Planning** | **Evaluating**

**Decision-making**

**All of our teaching materials and learning media are based on the principle of complete action, bringing together knowledge and real-world scenarios:**

- Christiani reference tables
- Christiani specialist books
- Courses for vocational training
- Project work
- Learning cases
- Teaching and workstation systems
- Training boards
- Simulation software
- E-learning courses
- Mechatronic systems

**This brochure gives an overview of how you can be successful in conveying the requirements and content for vocational training thanks to the teaching systems and learning concepts that we provide.**

# The Christiani network: Industry and didactics – hand in hand

**In developing our innovative products, we work directly with well-known international partners from industry and trade. In order to create unique and innovative products we combine our didactic knowledge with the technical expertise of our industrial partners. The joint goal is to bring young people and trainees up to speed in technology matters and thus give them the best possible education.**

## SIEMENS

Together with Siemens we develop innovative software solutions for training purposes in CNC programming. One example is the new training software CNC4edu. Based on Siemens NX trainees learn how to programme CNC-machines using 3D-simulations.

## SMC

With SMC as a cooperation partner, Christiani is developing modern, hands-on teaching materials for the pneumatics sector.


## PHOENIX CONTACT

Phoenix Contact industrial components and Christiani didactic materials come together to create teaching systems for electrical engineering, electronics and automation.


# Your access to digital training – the Christiani learning portal

**Digital media often have crucial advantages for learning: Processes and workflows can be visualised more clearly on the screen than on paper, exercises and tests can be completed and evaluated more easily, and learning becomes networked and interactive.**

The well-proven Christiani specialist books, reference tables or vocational courses are also available in a digital version for PC or tablet. With the C-Learning App, you can conveniently control and use all digital content purchased from Christiani wherever you are – free of charge in the App store (Apple, Google, Microsoft).

## Via the C-Learning App, you have access to:

### Media library (MOLA)

Digital specialist books and tables
Digital vocational courses


### Learning portal

Christiani e-learning courses


### EXPLA

Platform for exam preparation

**For more information, go to:**
**christiani-international.com/digital-learning**

# Christiani Competence Centres

## Learning concepts and teaching systems – see, touch and try it for yourself

**Our Competence Centres are worth a visit for anyone involved in education. We would like to invite you to find out about our innovative product solutions for technical vocational and further training and discover the latest trends and developments in technical education.**

### Fully equipped showrooms, workshops and laboratories

Our technical teaching systems and fully equipped training labs across the world ensure that trainers can teach the required knowledge in ideal conditions. Take a look around, test it out and find out information for yourself.

### Your training lab – sophisticated from a teaching perspective and guaranteed to be practical

We keep the bigger picture in mind for training lab solutions. We plan and fully equip your rooms, from tools, media, teaching systems and training stands to teaching materials. The results are impressive!

### Tailored solutions need the best advice

Our specialist advisors will be happy to address your every question and request. We support you every step of the way in developing new rooms with valuable practical tips, and show you how you can use teaching aids and didactic materials in a targeted manner in training. Simply let us know what you need and we will be happy to help.



## 1 Competence Centre in Landsberg/Lech

Celsiusstraße 15
86899 Landsberg am Lech, Germany

## 2 Competence Centre in Rheine

Schulten Sundern 14
48432 Rheine, Germany

## 3 Berlin Office

Volmerstraße 5
12489 Berlin, Germany

## Contact:

International Sales Team
E-Mail: info@christiani-international.com
Phone: +49 7531 5801-110

**More information:**
**christiani-international.com/competence-centres**

# Metal Technology
## Basic Training

**As a trainer in the industrial metalworking professions, you can count on our support. A variety of learning media from our comprehensive product range is available to you, from specialist books to digital applications to didactic teaching systems. With every product, you can convey learning content in an easily understandable and visual way – from an individual learning medium to fully equipped training labs and training workshops.**

**We are your partner for technical vocational and further training.**

**Here is a practical overview of the most important learning media and teaching systems, covering key topics for training.**

- Reference tables and specialist books
- E-learning courses
- Courses for vocational training
- Project work
- Learning cases
- Workstation systems
- Simulation and training software

**Our teaching materials and teaching systems are perfect for conveying the following training content:**

- Material Processing
- CAD / CAM
- Transmission Technology
- Control Technology
- CNC Technology

### Metal Technology

- Basic Knowledge
- Material Processing
- Manual Material Processing
- Machine-based Material Processing
- Thermal Material Processing
- Transmission Technology
- Control Technology
- Pneumatics / E-Pneumatics
- Hydraulics
- PLC Technology
- CAD / CAM
- CNC Technology

**Tip: See how you can combine our teaching systems productively in one training lab**

**Find out now in our Training Lab Concepts catalogue!**


**Find out more at:**
**christiani-international.com/catalogues**

# Specialist books and digital materials

## Metal Technology


### Metal Trades Handbook English

Spanish also available!

| Article | Order-No. |
|---|---|
| Print | 97210 |
| Digital, Annual License | 41408 |

**More information at: christiani-international.com/97210**


### E-Learning Metal – Full Package English

Spanish also available!

| Article | Order-No. |
|---|---|
| Single User License for Schools/Companies | 46500000 |

**More information at: christiani-international.com/46500000**

# Basic principles of metal technology, digital

## E-learning courses as individual modules – English

NEW

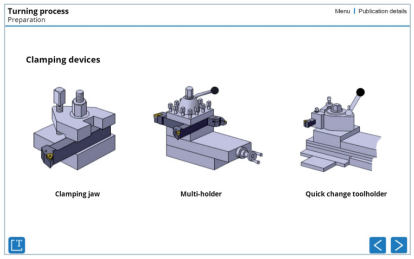
Christiani e-learning courses comprise 12 topic modules, which contain complete learning units.
**Duration:** Approx. 3–5 hours/module

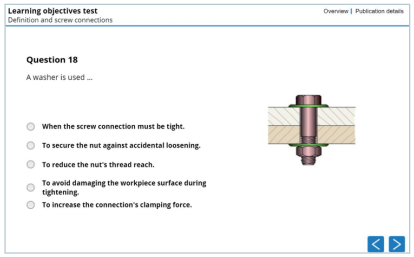
**Zur Demoversion und weiteren Infos im Video**

Spanish also available!

| Article | Order-No. |
|---|---|
| E-Learning Metal – Machining 1 | 46518 |
| E-Learning Metal – Machining 2 | 46519 |
| E-Learning Metal – Machining 3 | 46520 |
| E-Learning Metal – Machining 4 | 46521 |
| E-Learning Metal – Machining 5 | 46522 |
| E-Learning Metal – Machining 6 | 46523 |
| E-Learning Metal – Machining 7 | 46524 |
| E-Learning Metal – Joining 1 | 46525 |
| E-Learning Metal – Joining 2 | 46526 |
| E-Learning Metal – Checking 1 | 46527 |
| E-Learning Metal – Checking 2 | 46528 |
| E-Learning Metal – Work plan | 46529 |
| E-Learning Metal – Parting and forming | 46530 |

**More information at: christiani-international.com/46500000**



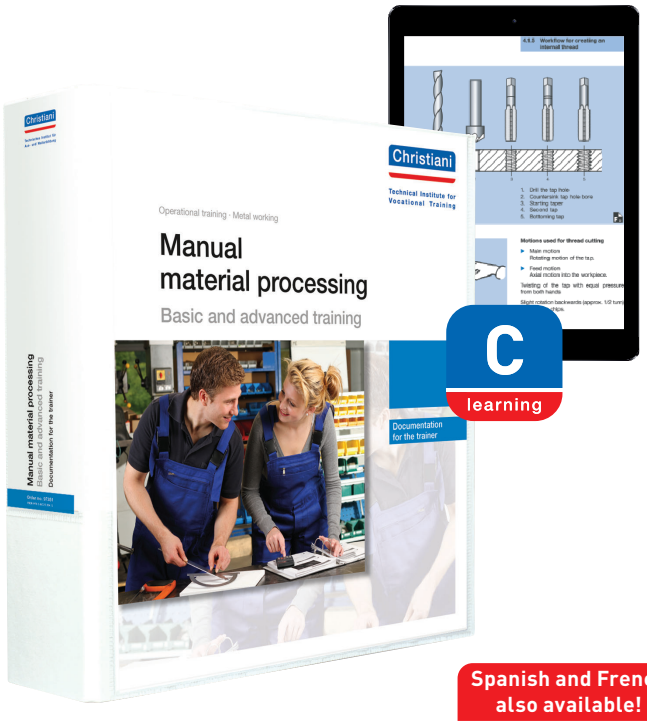
# Manual material processing

## Christiani courses as the perfect basis for the whole vocational training in metal

**The "Manual Material Processing" training course covers the manual cutting manufacturing process for metalworking professions. Basic skills, such as testing, measuring, filing and sawing, are covered here in detail. Trainees also learn how to handle simple tools correctly.**

**Content:**

- **Trainer manual**
  Accompanying materials with didactic and methodical explanations and concrete instructions that provide full support for the vocational training course
- **Sample solutions**
  Nearly all tasks and exercises can be followed and checked based on detailed sample solutions
- **Exercises for trainees**
  26 practical exercises with information sheets and forms for self-evaluation as well as learning success checks
- **107 slides as a download**
  The slides support understanding of complex connections
- **Textbooks**
  7 textbooks with information on the vocational training such as standards, regulations and legal texts, manuals for use of specialist books and reference tables




**Spanish and French also available!**

| | Print | Digital, Annual License |
|---|---|---|
| **Article** | **Order-No.** | **Order-No.** |
| Documents for the Trainer | 97351 | 41229 |
| Documents for the Trainee | 97352 | 41328 |
| Text Book | 97421 | 41393 |
| Material Kit | 68000 | |

**More information at: christiani-international.com/97351**

### Tip: We plan training workshops so that theory and practice always go hand in hand

#### Hexagonal Workbench

**More information at:**
**christiani-international.com/50984**

#### Foam Insert

**More information at:**
**christiani-international.com/50540**

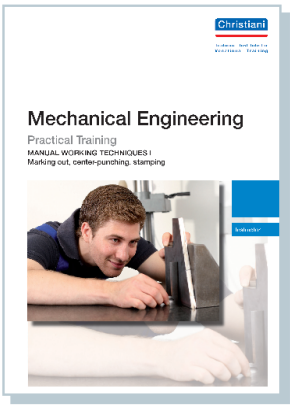
#### Toolbox

**More information at:**
**christiani-international.com/56207**

# Manual working techniques

## Introduction into the basics of mechaniccal engineering

**In the training, basic manual skills must be taught from the beginning. To achieve good work results, information and knowledge, but also practice are needed. The exercise books on manual skills in metal technology present the required training content in a didactically meaningful way. The exercise books focus on basic knowledge and content taught in the first year of training, which are combined with practical exercises. Structured by subject area, the exercise books provide comprehensive and effective basic training in the manual skills involved in metalworking.**

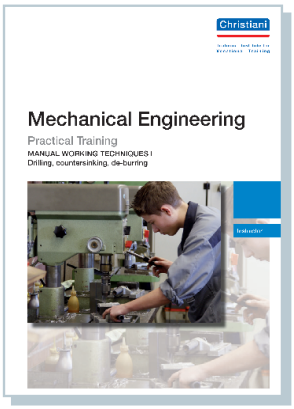



### Mechanical Engineering – Marking-out, Center-punching, Stamping

Arabic also available!

| Article | Order-No. |
|---|---|
| Documents for the Trainer | 99560 |
| Documents for the Trainee | 99579 |
| Material Kit | 99774 |

**More information at: christiani-international.com/99560**




### Mechanical Engineering – Drilling, Countersinking, De-burring

Arabic also available!

| Article | Order-No. |
|---|---|
| Documents for the Trainer | 99567 |
| Documents for the Trainee | 99586 |
| Material Kit | 99785 |

**More information at: christiani-international.com/99567**

**More exercise books and material kits are available for the following topics:**

Arabic also available!

| Titel | Trainer Order-No. | Trainee Order-No. | Material Kit Order-No. |
|---|---|---|---|
| Workbench, Work Safety, Technical Terms | 99578 | 99559 | |
| Thread Cutting | 99569 | 99588 | 99786 |
| Tapping Internal Threads | 99570 | 99589 | |
| Scraping | 99576 | 99595 | 99796 |
| Sawing, Chiselling, Filing to Shape | 99568 | 99587 | |
| Pipes, Bending Pipes, Pipe Fittings | 99577 | 99596 | |
| Matching, Touch-testing I | 99573 | 99592 | 99788 |
| Matching, Touch-testing II | 99574 | 99593 | 99789 |
| Matching, Push-and-slide Fitting | 99575 | 99594 | 99795 |
| Marking out with Marking Gauge; Files and Filing | 99561 | 99580 | |
| Hacksaws and Sawing | 99563 | 99582 | 99783 |
| Filing Smooth and Flat, Parallel Filing, Right Angles | 99566 | 99585 | 99784 |
| Filing Flats to Right Angles and Parallel in Bar Stock | 99572 | 99591 | 99787 |
| Drilling, Reaming, Tapping | 99571 | 99590 | |
| Cutting, Rough and Finish-filing, Right angles | 99565 | 99584 | |
| Cut-chiselling and Shear-chiselling, Chisels | 99562 | 99581 | 99776 |
| Chiselling with Flat Chisels, Cape Chisels, Grooving Chisels | 99564 | 99583 | |

# Project Work – learning working techniques in a straightforward and engaging environment

**Christiani project work has provided a solid basis for good, qualified training in many companies. Trainees use practical work to learn the various working techniques and manufacturing processes involved in metal technology. Based on project work, trainees learn to handle technical drawings, materials, tools and machines. The project work, designed as small, manageable projects, are particularly suited for an introduction to hands-on training. Each project comprises detailed project documentation with a work contract, guiding questions, full set of drawings and monitoring and evaluation questionnaires, as well as a complete material kit.**

**What makes Christiani project work special?**

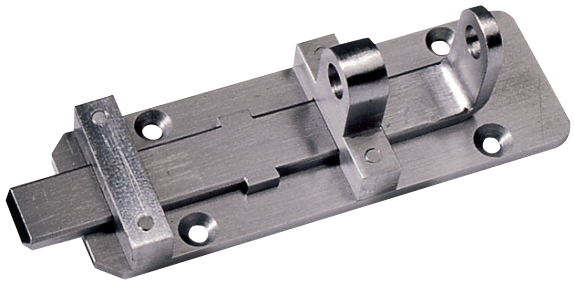
- **Support the requirements of complete action**
- **Project folders match the basic requirements in practice**
- **Impart basic knowledge and skills in a quick and hands-on manner**
- **Fulfil requirements in a wide variety of jobs**

## Scratch Gauge

Spanish also available!

| Article | Order-No. |
|---|---|
| Material Kit + Documents for the Trainee | 97804 |

**More information at: christiani-international.com/97804**



## Sliding Bolt

Spanish also available!

| Article | Order-No. |
|---|---|
| Material Kit + Documents for the Trainee | 97812 |

**More information at: christiani-international.com/97812**

## Angle Plate

Spanish also available!

| Article | Order-No. |
|---|---|
| Material Kit + Documents for the Trainee | 97818 |

**More information at: christiani-international.com/97818**

## Bevel Gauge

Spanish also available!

| Article | Order-No. |
|---|---|
| Material Kit + Documents for the Trainee | 68502 |

**More information at: christiani-international.com/68502**

## Tea Warmer

Spanish also available!

| Article | Order-No. |
|---|---|
| Material Kit + Documents for the Trainee | 68501 |

More information at: christiani-international.com/68501

## Drill Cassette

| Article | Order-No. |
|---|---|
| Material Kit + Documents for the Trainee | 88801 |

More information at: christiani-international.com/88801

## Helicopter

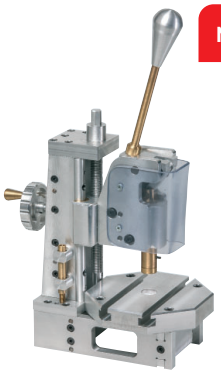
| Article | Order-No. |
|---|---|
| Material Kit + Documents for the Trainee | 99895 |
| Documents for the Trainer | 64089 |

More information at: christiani-international.com/99895

## Formula 1 Racing Car

| Article | Order-No. |
|---|---|
| Material Kit + Documents for the Trainee | 99897 |
| Documents for the Trainer | 64087 |

More information at: christiani-international.com/99897



NEW

## Press

| Article | Order-No. |
|---|---|
| Material Kit | 65741 |
| Documents for the Trainer | 42992 |
| Documents for the Trainee | 42993 |

More information at: christiani-international.com/42992

## Trike V2

| Article | Order-No. |
|---|---|
| Material Kit + Documents for the Trainee | 99898 |
| Documents for the Trainer | 67841 |
| Supplement Lighting | 99899 |

More information at: christiani-international.com/99898

# Machine-based material processing

## Training courses and e-learning courses

**This training documentation covers the mechanical cutting manufacturing process known as turning. Here, the different skills required for turning, such as centring, drilling, producing threads, taper turning, knurling and deburring, are covered in detail.**


### Machine-based Material Processing - Part: Turning

Spanish and French also available!

| Article | Order-No. |
|---|---|
| Documents for the Trainer | 74324 |
| Documents for the Trainer Digital, Annual License | 41233 |
| Documents for the Trainee | 74325 |
| Documents for the Trainee Digital, Annual License | 41332 |
| Text Book | 74326 |
| Text Book Digital, Annual License | 41360 |
| Material Kit | 68014 |

**More information at: christiani-international.com/74324**

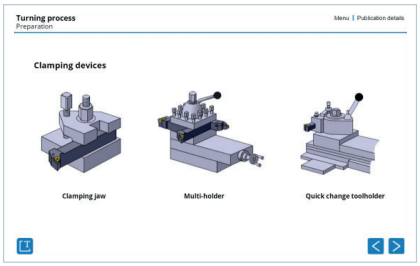
**The milling section of the vocational training course is specially designed for the various milling processes. Thanks to the training documentation, the trainee will become well acquainted with all milling processes and can use the processes with this newly acquired knowledge.**


### Machine-based Material Processing - Part: Milling

Spanish and French also available!

| Article | Order-No. |
|---|---|
| Documents for the Trainer | 72996 |
| Documents for the Trainer Digital, Annual License | 41231 |
| Documents for the Trainee | 97749 |
| Documents for the Trainee Digital, Annual License | 41330 |
| Text Book | 72998 |
| Text Book Digital, Annual License | 41361 |
| Material Kit | 68015 |

**More information at: christiani-international.com/72996**

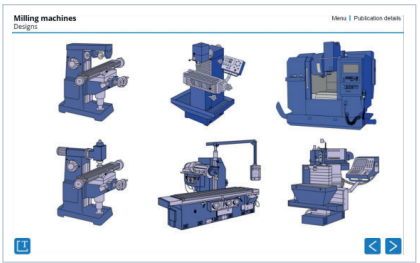



### E-Learning Metal – Machining 3 English

Spanish also available!

| Article | Order-No. |
|---|---|
| Single User License for Companies | 46520 |

**More information at: christiani-international.com/46520**




### E-Learning Metal – Machining 4 English

Spanish also available!

| Article | Order-No. |
|---|---|
| Single User License for Companies | 46521 |

**More information at: christiani-international.com/46521**

## See for yourself – on site!

**You can thoroughly test out our teaching principles in combination with our teaching system for the practical aspect in our Competence Centres in Rheine and now also NEW in Landsberg (near Munich).**

**christiani-international.com/competence-centres**

# Measurement technology

## ISO Trainer Metal Technology

**It has been proven that learning is most successful when learners can fully investigate both the theory and the practice of the object of their studies. With the ISO Trainer, you can teach the technical facts and practical skills clearly. The case is handy, compact and includes not only the different sample components and workpiece models, but also the supporting materials, manuals and software.**

### Metal Technology ISO Trainer

The ability to correctly test workpieces is one of the most important skills in industrial vocational training. Trainees and students can use the ISO Trainer to practice measuring and gauging on sample workpieces. The focus is put on the correct selection and use of test equipment and identifying and evaluating the required accuracies according to drawings.

**Order-No.**
50812

**More information at: christiani-international.com/50812**

**We offer selected tool machines for the training workshop – Talk to one of our advisors!**

### Bench Drill OPTIdrill B 24H Set

**More information at:**
**christiani-international.com/98872**

### Hydraulic Swing Frame Metal Band Saw BMBS 230 x 280 H-DG

**More information at:**
**christiani-international.com/54511**

### Precision Center and Turning Center Lathe OPTIturn TZ 4


**More information at:**
**christiani-international.com/98997**

### Milling Machine OPTImill MZ 4S

**More information at:**
**christiani-international.com/33860**

**Find more machines online:**
**christiani-international.com/machines**

# Thermal material processing

## Learning welding

**The vocational training courses on "Thermal material processing" cover the most important processes in thermal material processing, such as oxyacetylene welding, MIG/MAG welding and manual arc welding.**

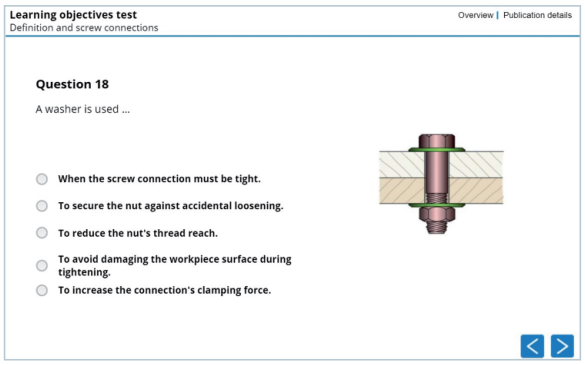

### Vocational course – Thermal material processing

Spanish also available!

| Article | Order-No. |
|---|---|
| Oxyacetylene Welding, Package | 33495 |
| Oxyacetylene Welding, Documents for the Trainer | 97358 |
| Oxyacetylene Welding, Documents for the Trainee | 97359 |
| Oxyacetylene Welding, Text book | 97509 |
| MIG/MAG Welding, Package | 33496 |
| MIG/MAG Welding, Documents for the Trainer | 97360 |
| MIG/MAG Welding, Documents for the Trainer Digital, Annual License | 41235 |
| MIG/MAG Welding, Documents for the Trainee | 97361 |
| MIG/MAG Welding, Documents for the Trainee, Digital, Annual License | 41362 |
| MIG/MAG Welding, Text book | 97510 |
| MIG/MAG Welding, Text book Digital, Annual License | 41363 |
| Manual Arc Welding, Package | 33494 |
| Manual Arc Welding, Documents for the Trainer | 97356 |
| Manual Arc Welding, Documents for the Trainee | 97357 |
| Manual Arc Welding, Text book | 97508 |

**More information at: christiani-international.com/33496**

**!** The package versions each contain 16 sets of documentation for the trainees, 16 textbooks and one set of documentation for the trainer.

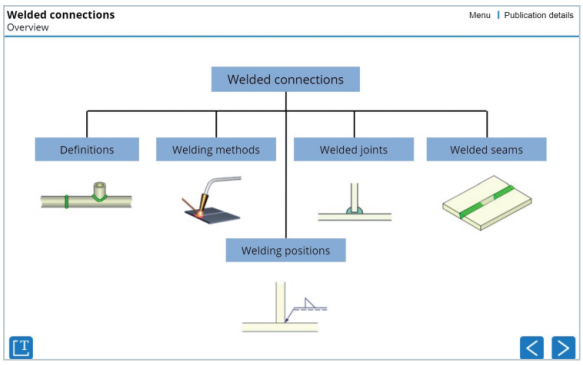



### E-Learning Metal – Joining 1 English

Spanish also available!

| Article | Order-No. |
|---|---|
| Single User License for Companies | 46525 |

**More information at: christiani-international.com/46525**




### E-Learning Metal – Joining 2 English

Spanish also available!

| Article | Order-No. |
|---|---|
| Single User License for Companies | 46526 |

**More information at: christiani-international.com/46526**

# Virtual welding

**Virtual welding training combines theory and practice. Using Soldamatic welding trainers, trainees and other learners learn practical skills as well as theoretical knowledge in welding in an entirely safe way, without interference from the surroundings and with no damage to health. The virtual welding trainer depicts processes during welding as close to reality as possible. To do so, the trainees have physical welding equipment and really do perform all hand movements – the welding process is simply simulated.**

### Simulation-supported training for vocational and further training

- Reduces training costs
- Prevents risks of physical harm
- Reduces environmental pollution
- Increases attractiveness of the training
- Increases motivation of participants
- Makes your company more competitive

It is possible to start the welding qualification straight away – candidates' aptitude can also be tested with the welding trainer. The integrated tasks are self-explanatory and can be completed independently at the individual's own speed. The exercises can be repeated until every movement is correct. Since the welding trainer is virtual, there is no set-up time or material consumption, yet it results in a great deal of successful learning. What's more, the time that the learners have to spend in the workshop is significantly reduced and a greater number of participants can be trained at the same time.

## Tip: Custom welding stations – we equip your welding rooms

### MIG/MAG Welding Machine PRO-MIG Synergie 311-4

More information at:
christiani-international.com/100796

### Training welding bench

More information at:
christiani-international.com/94271

# Didactic kits for transmission technology

**Gears are a fundamental unit in metalworking. The basic task of a gear is to control the ratio between speed and power. Due to the increasing number of technologies used in practice, prospective specialists must acquire in-depth and comprehensive knowledge of mechanical drive technology increasingly quickly. The demo cases from SEW are the ideal learning model for practical training in transmission technology. All tools and aids required for the work are integrated in the didactic kits. The detailed assembly instructions describe the assembly and disassembly process simply and clearly in illustrated work steps.**

## What are the advantages of the learning cases for you?

- Easily understandable introduction to the machine elements
- Theory is easier to understand thanks to practical review
- Assembly and disassembly can be practised as often as desired, without cost-intensive pressing tools

## Practical lab experiments:

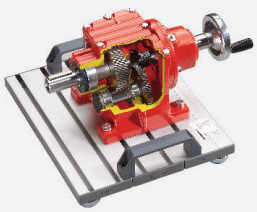
- Determine the gear ratio and torque with a fixed speed
- Interaction of the machine elements in a gear (shaft-hub connector)
- Preventive maintenance based on parts lists or individual components
- Design for Assembly
- Safe use of suitable assembly tools and assembly aids

## Applies to all construction kits:

- Can only be assembled and disassembled with standard industry tools
- Components, such as gearwheels, pinion shafts and tapered roller bearings, are corrosion-protected and therefore wear-free
- Integrated in two sturdy plastic cases or in a base cabinet
- The gear module has been developed for training purposes only

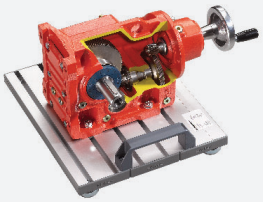
## Tip: Sectional models for basic understanding of transmission technology

### Spur Gear Unit



**More information at:**
**christiani-international.com/54739**

### Bevel Gear Unit

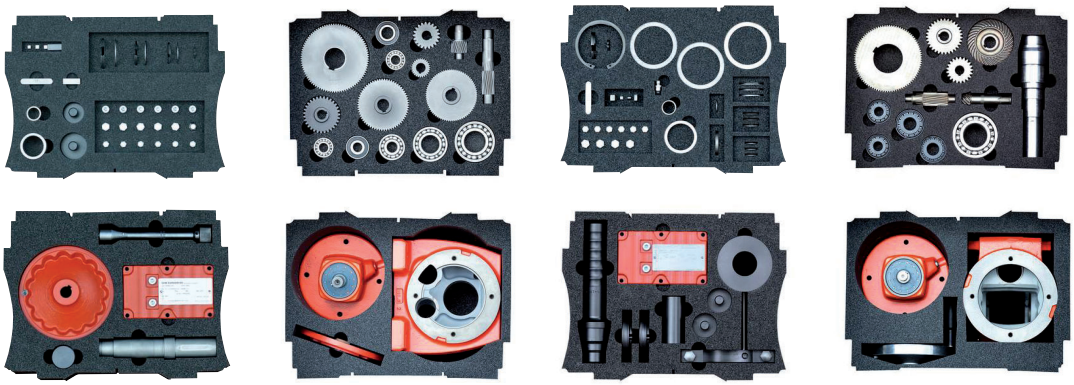


**More information at:**
**christiani-international.com/54740**

### Worm Gearbox

**More information at:**
**christiani-international.com/54741**

# Didactic kits



## Spur Gear Unit didactic kit

Whether in materials handling or in pumps, fans or agitators: Spur gear units are classical components of drive technology. In our didactic programme, we therefore provide real spur gear units as a machining kit.

**Order-No.**
50770

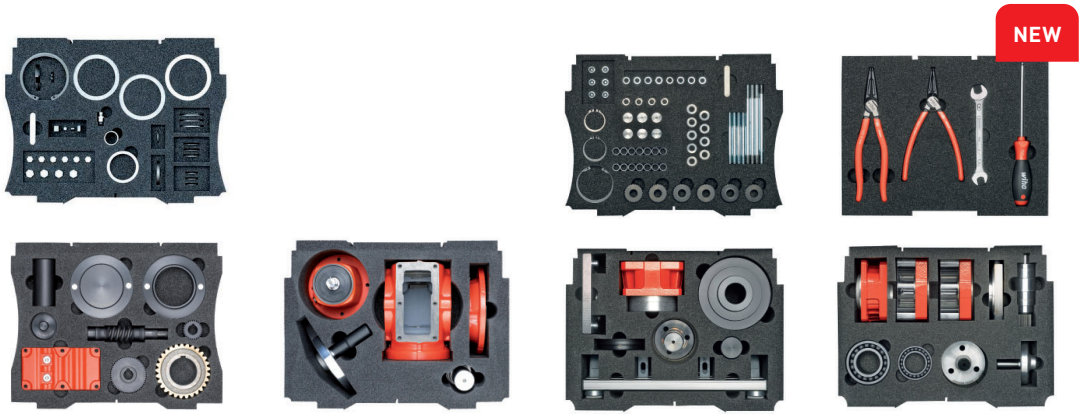
More information at: christiani-international.com/50770

## Bevel Gear Unit didactic kit

From the belt conveyor to hoists, scissor lifts and rack feeders: Whenever movements and forces have to be transferred at an angle, bevel gear units are used. Accordingly, we only use industrial bevel gear units in our didactic machining kit, to enable training in a realistic setting.

**Order-No.**
50771

More information at: christiani-international.com/50771




## Worm Gearbox didactic kit

Actuators, presses, rotary indexing tables or corner turntables: Simple machine and system applications demand simple and efficient drive solutions. Worm gearboxes are often the first choice here. Our worm gearbox didactic kit enables practical learning based on an industry-compatible worm gear.

**Order-No.**
50772

More information at: christiani-international.com/50772

## Servo Planetary Gear Unit didactic kit

From packaging machines to filling systems, handling portals or tool machines: If you need high speeds, large torques and maximum precision but only have a small amount of space for the drive technology, the servo planetary gear unit is indispensable. With our didactic machining kit, prospective specialists can learn the required knowledge.

**Order-No.**
32743

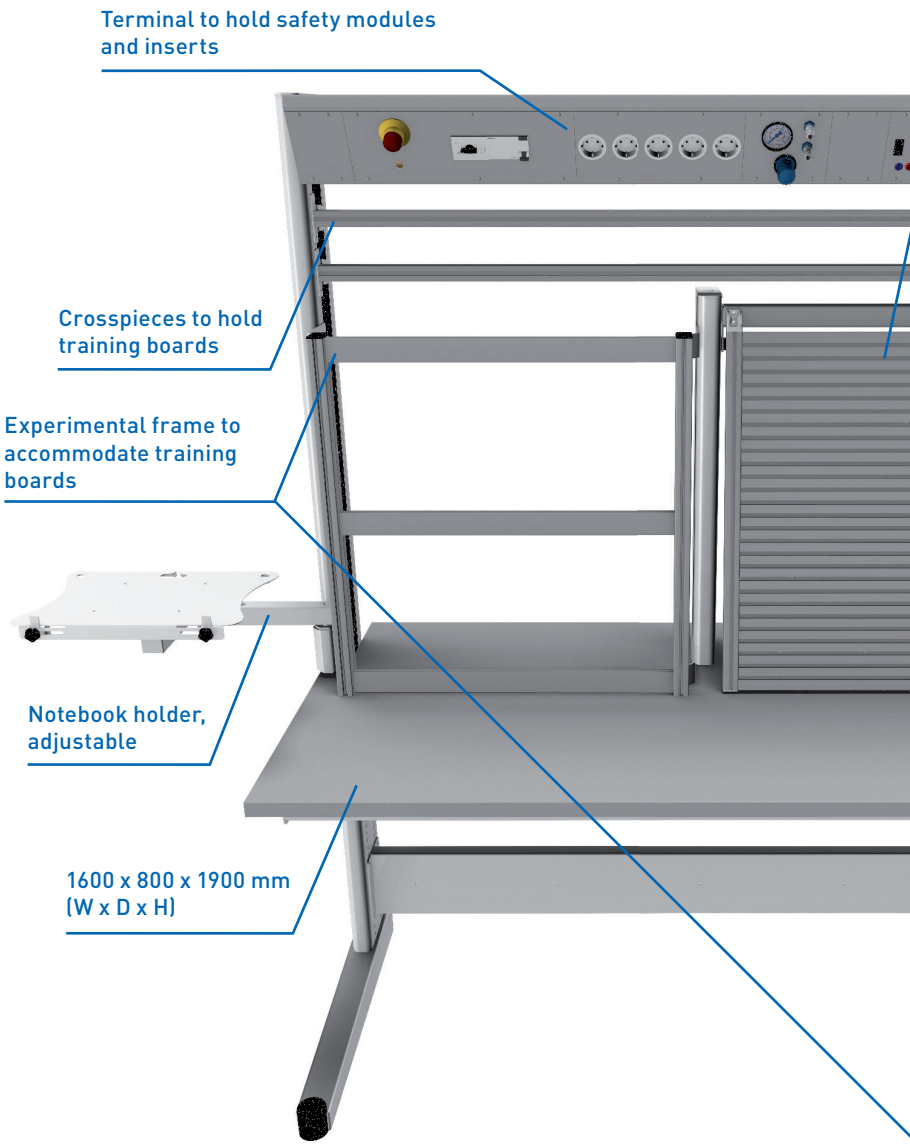
More information at: christiani-international.com/32743

**For more information, go to:**
christiani-international.com/transmission-technology

# MAPS Multifunctional Workstation System

## Learning with industrial components and didactic teaching material

**On the MAPS multifunctional workstation system from Christiani, almost all technologies for control technology for industrial-technical vocational training can be taught in a way that is oriented towards practical applications. The basic equipment includes a mobile desk, energy terminal, training board frame and a grooved plate that can be used on both sides and crosspieces. This means different components and parts can be used at the workstation. Thanks to extensive accessories, you can expand the multifunctional training desk system according to your exact needs, whether for pneumatics, electrical engineering or PLC training. Proven industrial components as well as didactic teaching materials are available as accessories.**




### System with many advantages

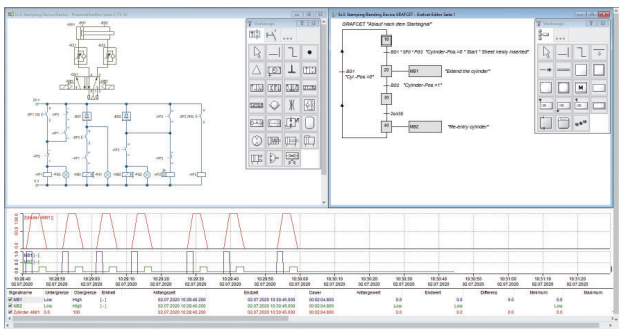
- Low entry price and modular design
- Can be used flexibly for a variety of different training occupations
- One-sided or two-sided versions
- Customer-specific adaptations
- Stable design with aluminium system profile
- Quick, easy and safe component assembly

| Article | Order-No. |
|---|---|
| MAPS Basic (single-sided) | 43406 |
| MAPS Basic (double-sided) | 43407 |
| MAPS Mechatronics (single-sided) | 43400 |
| MAPS Mechatronics (double-sided) | 43401 |
| MAPS Mechatronics (single-sided) | 43960 |
| MAPS Mechatronics (double-sided) | 43962 |
| MAPS Professional (single-sided) | 43410 |
| MAPS Professional (double-sided) | 43411 |

**More information at: christiani-international.com/43406**

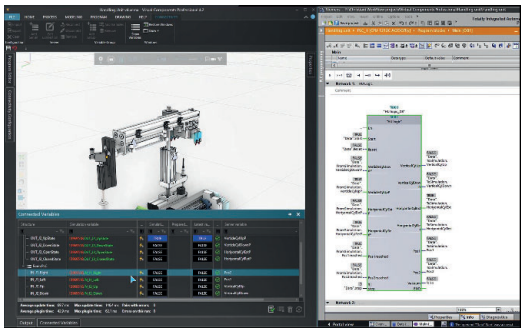
## Simulation software

**FlowLab4edu**



**More information on page 24/25.**

**mMS-Sim4edu**



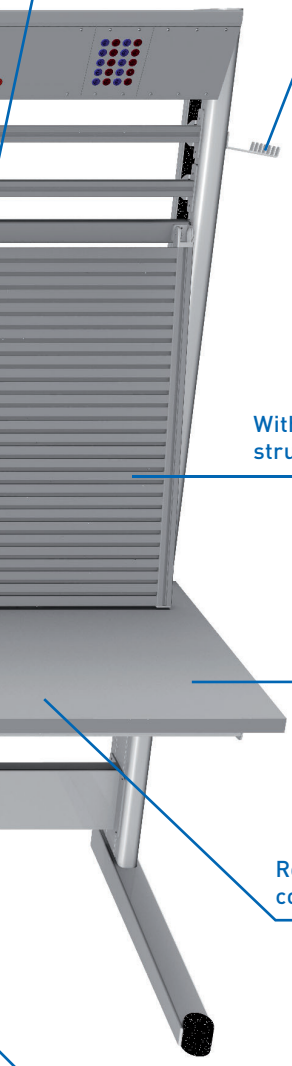
**More information on page 54/55.**

**BIBB Basic Pneumatic Kits and Electropneumatic Kits**

More information on page 23.

Pneumatic/electropneumatic component sets can be attached to the grooved panel as test set-ups.

Cable holder



**Sensor technology – basic assembly set + expanded set with case**

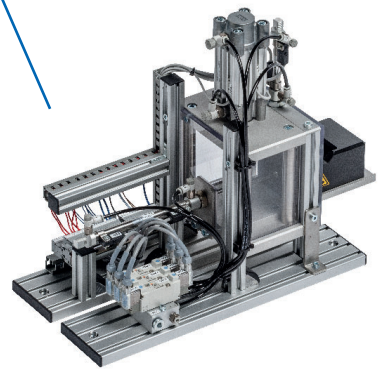
With this case, all basic sensors can be constructed and performed on the grooved plate.

More information on page 23.

Mechatronic and pneumatic processes are made easy to understand.

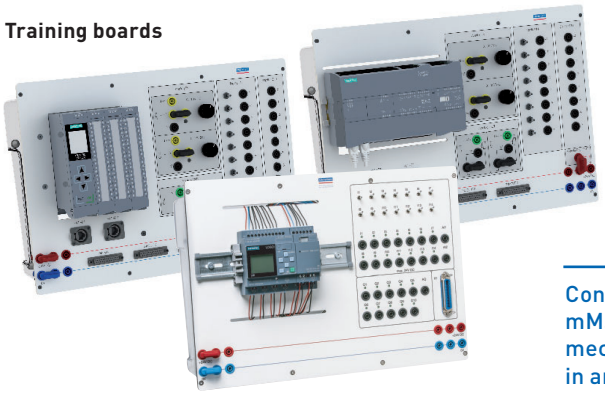
Robust base frame made of aluminium column profile and hard laminate desktop

**mMS functional units**



More information at:
christiani-international.com/69513

**Training boards**



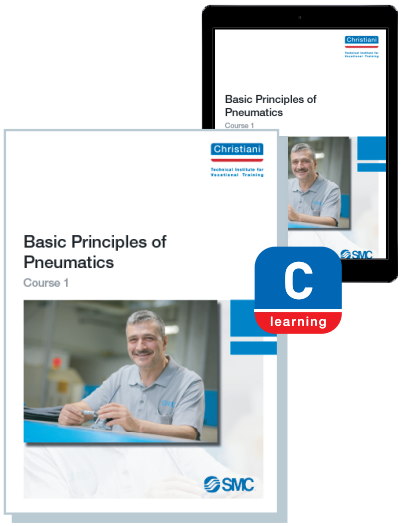
Connect the training boards to the mMS functional units to present the mechanical and pneumatic processes in an understandable way.

More information at:
christiani-international.com/teaching-systems-electrical-engineering

# Basic principles in control technology

## Exercises and courses for pneumatics and electropneumatics

**The area of control technology concerns design and implementation of various control systems. Technical occupations in the metal industry require evaluation of control technology documentation, as well as using the control technology. We provide the following learning material to fulfil these requirements.**

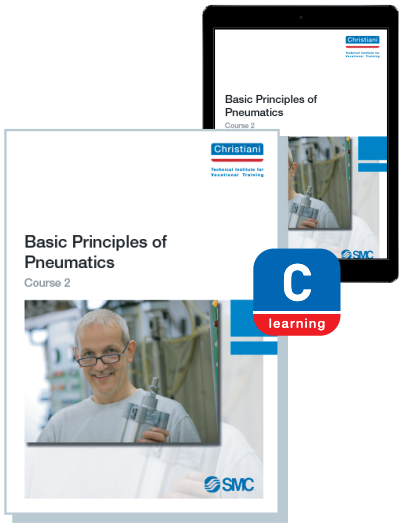



### Basic Principles of Pneumatics Course 1 English

Spanish also available!

| Article | Order-No. |
|---|---|
| Textbook | 97353 |
| Textbook Digital, Annual License | 41242 |

**More information at:**
**christiani-international.com/41242**

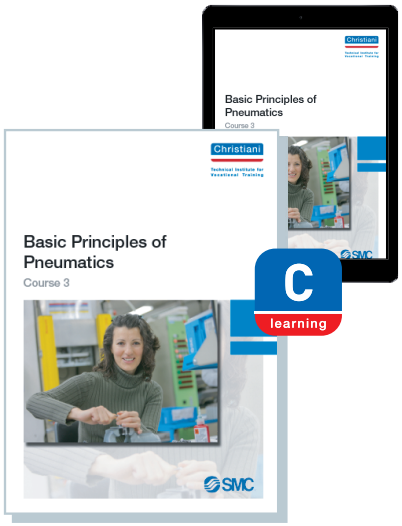



### Basic Principles of Pneumatics Course 2 English

Spanish also available!

| Article | Order-No. |
|---|---|
| Textbook | 97354 |
| Textbook Digital, Annual License | 41244 |

**More information at:**
**christiani-international.com/41244**




### Basic Principles of Pneumatics Course 3 English

Spanish also available!

| Article | Order-No. |
|---|---|
| Textbook | 97355 |
| Textbook Digital, Annual License | 41250 |

**More information at:**
**christiani-international.com/41250**

### BIBB Basic Pneumatic Kit

| Article | Order-No. |
|---|---|
| SMC | 95500 |
| Aventics | 67904 |

**More information at:**
**christiani-international.com/95500**

### Grooved Plate

| Article | Order-No. |
|---|---|
| Grooved Plate | 87532 |

**More information at:**
**christiani-international.com/87532**

### Sticky Symbol Case

| Article | Order-No. |
|---|---|
| Sticky Symbol Case | 61508 |

**More information at:**
**christiani-international.com/61508**

# Control technology in a learning case

## BIBB component kits for pneumatics and electropneumatics

**The increasing importance of pneumatic and electro-pneumatic systems is also reflected in training for many metalworking professions. The BIBB component kits offer a wide range of options for exercises and pneumatic circuits – perfect for practising circuit designs and for knowledge transfer.**

**BIBB component kits:**

- For pneumatics and electropneumatics
- Snap-in and
- Slide-In technology
- With industrial components from SMC and Aventics

### BIBB Basic Pneumatic Kit

| Article | Order-No. |
|---|---|
| SMC Components | 95500 |
| Aventics Components | 67904 |

More infromation at: christiani-international.com/99500

### BIBB Electropneumatic Extension Kit

| Article | Order-No. |
|---|---|
| SMC Components | 95501 |
| Aventics Components | 59088 |

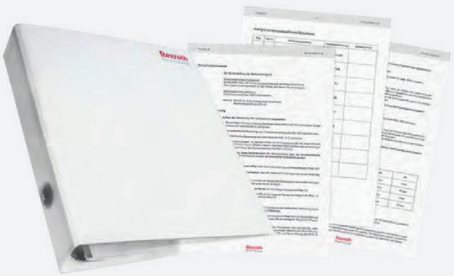
More infromation at: christiani-international.com/99501

### Tip: The right teaching materials for the BIBB component kits

**Pneumatics - Manual / Pneumatic Control**

| Article | Order-No. |
|---|---|
| Trainer's Manual | 99858 |
| Trainee's Manual | 99864 |

More infromation at: christiani-international.com/99858



# FlowLab4edu

## Simulate, create and control fluid technology

Exclusively at Christiani

**FlowLab4edu is comprehensive software for creating, simulating and controlling pneumatic and electropneumatic circuits. Using the intuitive editor, any desired pneumatic and electropneumatic control systems can be created.**

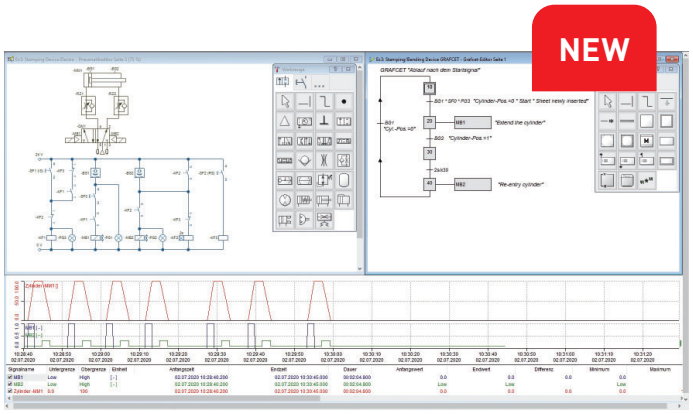
**Real pneumatic components can be connected and operated via the electrical control systems or GRAFCET. Use the process visualisation and create your own process images so that you can observe and operate simulated or real systems.**

### Main features:

- Graphical design of pneumatic circuits
- Symbols corresponding to the standard DIN ISO 1219-1
- Simulation and testing of designed pneumatic diagrams
- Design and simulation of electropneumatic circuits
- Description of circuit with GRAFCET
- Creation of control systems with GRAFCET
- Data logging and analysis
- Process visualisation
- Detailed documentation and help
- Independent study and work
- Includes introductory tasks and examples

**More information in the video**

NEW



**Test the free demo version now at:**
**christiani-international.com/34700000**

### FlowLab4edu Simulation Software

| Article | Order-No. |
|---|---|
| Single User License for Companies | 34700 |
| SIngle User License for Schools | 34701 |

**More information at: christiani-international.com/34700000**

### FlowLab4edu Simulation Software Update and Maintenance Pack

| Article | Order-No. |
|---|---|
| for Companies | 41527 |
| for Schools | 41529 |

**More information at: christiani-international.com/41527000**

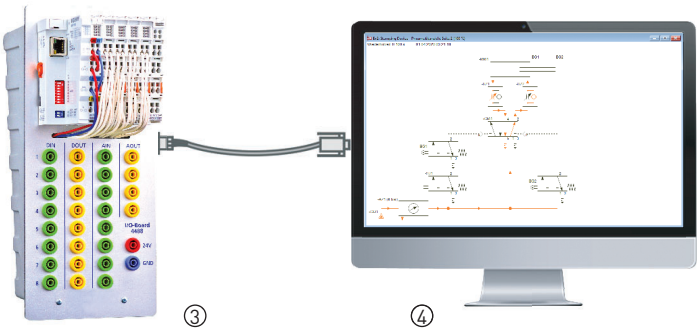
### Controlling practice circuits and real systems

Together with the I/O board, electropneumatic practice structures and real systems can be controlled directly via FlowLab4edu. There is an Ethernet connection to the PC. All signals are connected via 4 mm safety laboratory sockets.

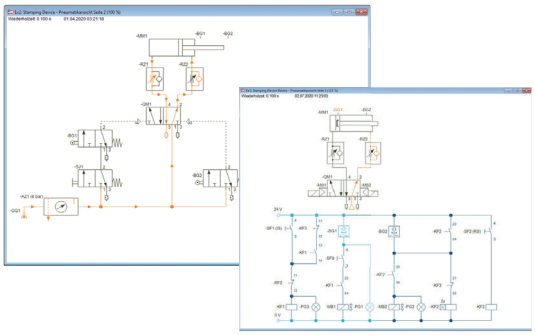
1. BIBB electropneumatics component kit
2. Measuring lines
3. I/O board
4. PC with FlowLab4edu screenshot

①

②

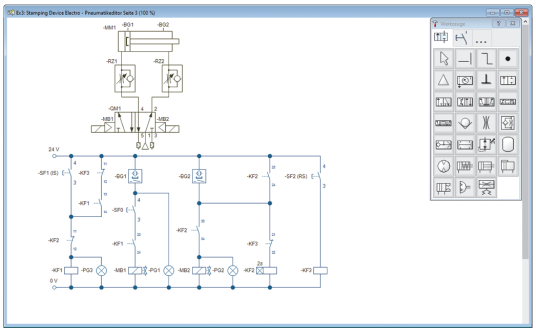


③ ④



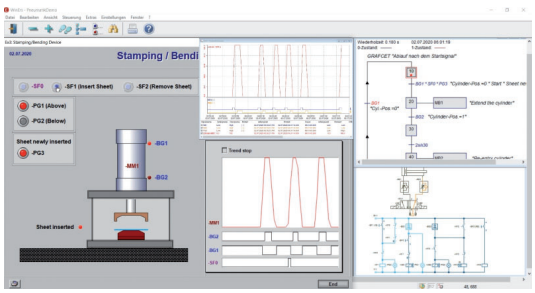
### (E-)pneumatics simulation

Testing the behaviour of pneumatic circuits in the simulation or connecting real electropneumatic elements.



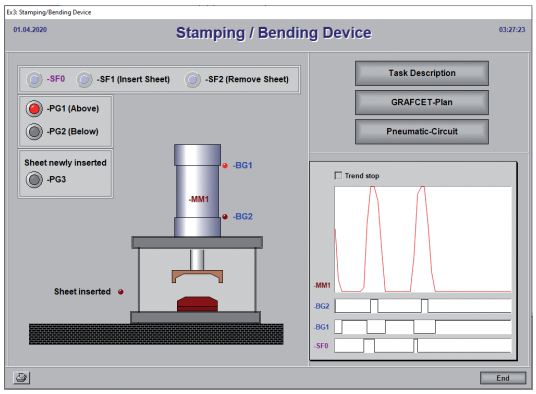
### (E-)pneumatics editor

The editor, which is intuitive to operate, has a comprehensive library of pneumatic components and electronic elements. A variety of settings can be configured for individual components.



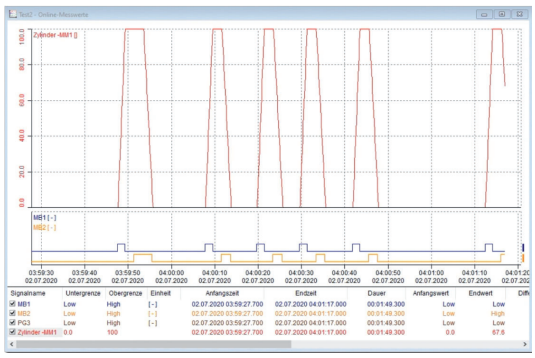
### GRAFCET

Process description of the pneumatic circuits developed with GRACET. Control systems for systems and pneumatic circuits. Monitoring and observing control system processes in the GRAFCET view.




### Process visualisation

Create your own process images so that you can observe and operate simulated or real systems. Create your own individual process images with the process visualisation.



### Data logging and storage

Data recording, storage and analysis of all positions, switching states, pressures, etc., as measured values.

! In addition to existing process images, there is the option to create your own process visualisations. On request, individual process images can be created.

**More information at:**
**christiani-international.com/flowlab4edu**

# Vocational training in industrial sensor technology

**Sensors are some of the most important components in modern manufacturing and process automation. The topic of sensor technology is now required in the curriculum for many technical professions, such as metalworking and electronics professions, and the learning content is designed with this in mind. Our training system for vocational and further training in industrial sensor technology brings together the latest industrial components with the functionality available from a modern training station. A variety of options are available, from material identification to switching frequency measurement and distance determination. The components can be connected to the MAPS multifunctional workstation system or our grooved plates.**

## Sensor technology device sets

Functional principles and possible applications of inductive, capacitative, optoelectronic, magnetic field and ultrasound sensors can be taught using the basic components set.

The expanded set is ideal for teaching in-depth and advanced knowledge of sensor technology based on real industry products.

| Article | Order-No. |
|---|---|
| Basic Sensor Kit | 98282 |
| Material Sample Kit Sensors | 93068 |
| Basic and Extension Sensor Kit | 50442 |

**More information at: christiani-international.com/98282**


## Training system for "Sensor Technology – Basics"

The detailed exercise documentation for "Sensor Technology – Basics" contains practical exercises for both the basic sensor kit and the extension sensor kit.

| Article | Order-No. |
|---|---|
| Solution handbook | 89590 |
| Exercise handbook | 89588 |

**More information at: christiani-international.com/89588**

# Introduction to hydraulics

## Workstations and matching tasks

**Constantly increasing requirements even for entry-level employees in metalworking professions have made it necessary to adapt vocational training. This practice module helps to consolidate existing knowledge of hydraulics.**

### XITE Hydraulix 300 workstation

For training in on/off hydraulics, proportional hydraulics and control hydraulics.

| Article | Order-No. |
|---|---|
| Workstation (single-sided) 230 V / 50 Hz | 95977 |
| Workstation (double-sided) 230 V / 50 Hz | 95981 |

More information at: christiani-international.com/95977

### XITE Hydraulix 200 workstation

For training in the basics of hydraulics.

| Article | Order-No. |
|---|---|
| Workstation (single-sided) 230 V / 50 Hz | 95700 |
| Workstation (double-sided) 230 V / 50 Hz | 95701 |

More information at: christiani-international.com/95700

**!** On request, the XITE workstations are also available in 400 V/50 Hz and 230 V/60 Hz versions.

### XITE Hydraulix 201 device set

- On/Off Hydraulics – Manual Operation (according to BIBB)
- For the XITE Hydraulix 200/300 workstation

Learning the basics of hydraulics on the basis of practical exercises with industrial components specially prepared for the training area.

| Order-No. |
|---|
| 99802 |

More information at: christiani-international.com/99802

Spanish also available!

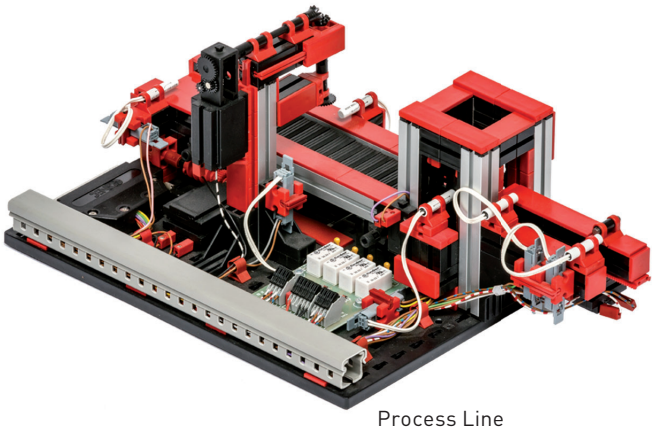
| Article | Order-No. |
|---|---|
| Basic Principles and Components of Fluid Technology<br>The Hydraulic Trainer, Volume 1, English | 73021 |
| Proportional and Servo Valve Technology<br>The Hydraulic Trainer, Volume 2, English | 73023 |
| Planning and Design of Hydraulic Power Systems<br>The Hydraulic Trainer, Volume 3, English | 73018 |
| Logic Element Technology<br>The Hydraulic Trainer, Volume 4, English | 73017 |

More information at: christiani-international.com/73021

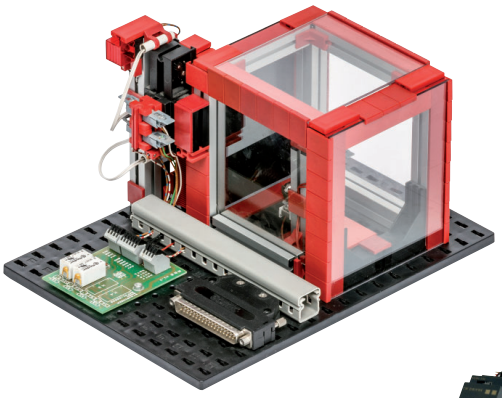
# Basic principles of PLC technology

## Complete tasks on training boards and models

**Being able to ensure or improve the functionality of machines and systems by controlling, regulating and monitoring work movements and their auxiliary functions is an additional requirement that trainees must be able to fulfil.**

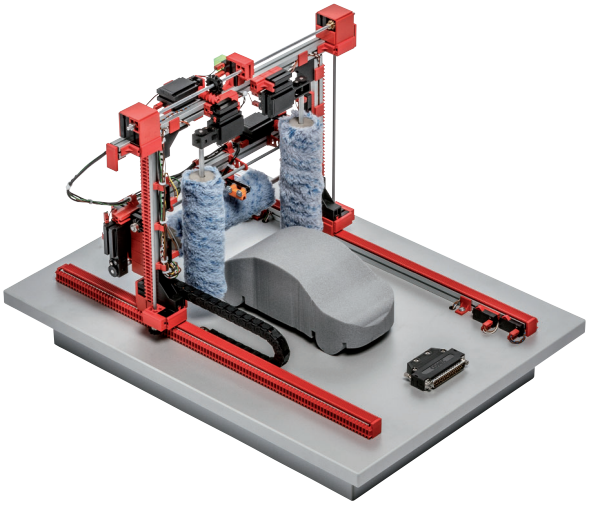


Process Line



Kiln

LOGO! Control

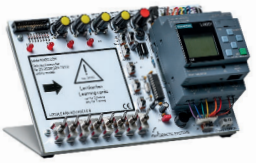


Car Wash Line

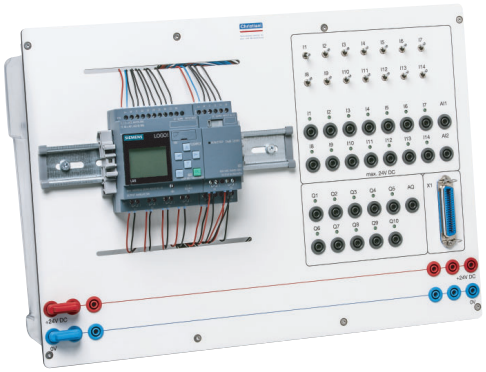
### PLC Starter Kits

**Our sets contain:**

- Industry model
- LOGO!Learn PLC trainer
- Remote control, cable
- Software, Teachware



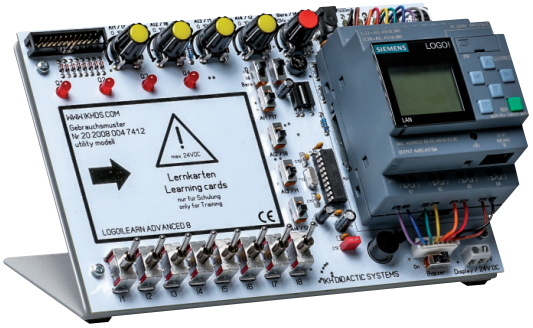
| Article | Order-No. |
|---|---|
| Christiani Industry Model PLC Starter Kit | 14827 |
| Christiani Industry Model PLC Starter Kit 2 | 43544 |
| Christiani Industry Model PLC Starter Kit 3 | 43545 |



### LOGO! 8 Training Board

| Order-No. |
|---|
| 59817 |

**More information at: christiani-international.com/59817**




### LOGO!Learn Advanced

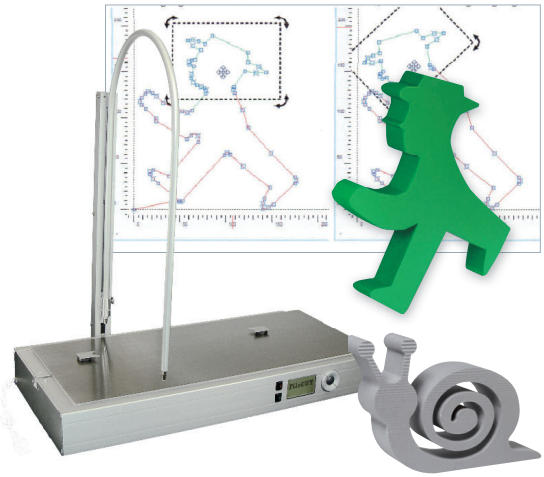
| Order-No. |
|---|
| 58037 |

**More information at: christiani-international.com/58037**

# Getting started with CAD/CAM: Cutting with hot wire

**The FiloCUT system is a very easy-to-use CNC fusion cutting system for polystyrene foam. For trainees or students, it is the tool that will motivate them to acquire future-oriented skills. With the easy-to-use FiloCUT3 fusion cutting machine and the pedagogically structured, configurable FiloCAM programme, you can gain hands-on and productoriented experience of modern production technology.**

- The FiloCAM programme provides direct reference to mathematical principles (coordinate system and geometric design with parameters).
- Trainees and students can take their first programming steps with plain text commands, as well as in advanced logo programming (with repetitions and procedures) as well as CNC (G-Code). The programme they create is displayed immediately in the draw area.
- Synchronised parameter-based drawing and programming makes the connections transparent and can lead to "CNC drawing".
- In addition to many other specifications, you can use the programme's configuration options to determine whether your trainees and students are only allowed to perform CNC programming and/or CNC drawing.



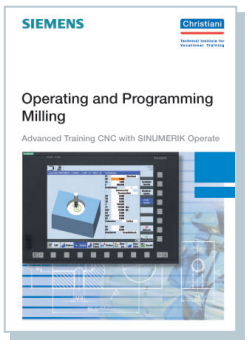
**More information at: christiani-international.com/19763**

**For more information on the FiloCUT system and on how to use it, see the video – accessible via this QR code:**

# Introduction to CNC technology

## Basic principles and training software

**Operating and programming CNC machines requires specialist knowledge, which is necessary primarily in industrial companies and manufacturing companies. CNC control system improves flexibility for production processes and increases the accuracy of tool machines. The basic principles of CNC technology in technical vocational training can be ideally conveyed using the hands-on training documentation.**

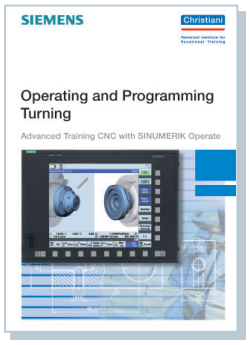



### Operating and Programming Milling

Spanish also available!

| Order-No. |
|---|
| 12870 |

More information at: christiani-international.com/12870

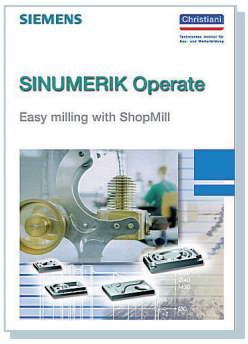



### Operating and Programming Turning

Spanish also available!

| Order-No. |
|---|
| 12871 |

More information at: christiani-international.com/12871




### SINUMERIK Operate - Millling

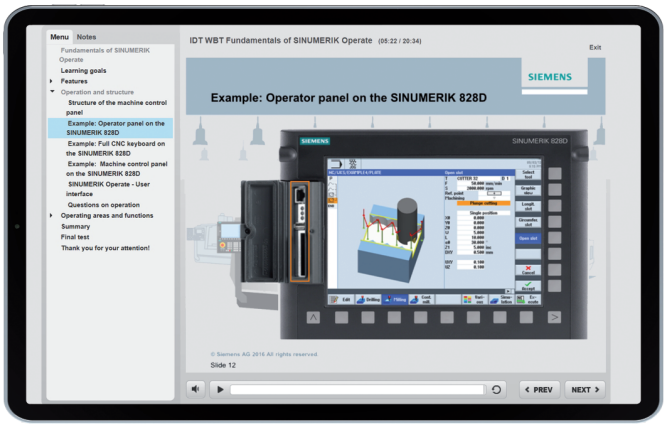
| Order-No. |
|---|
| 11967 |

More information at: christiani-international.com/11967


### SINUMERIK Operate - Turning

| Order-No. |
|---|
| 11968 |

More information at: christiani-international.com/11968




### E-Learning Basic Training in CNC Technology – Complete Package – English

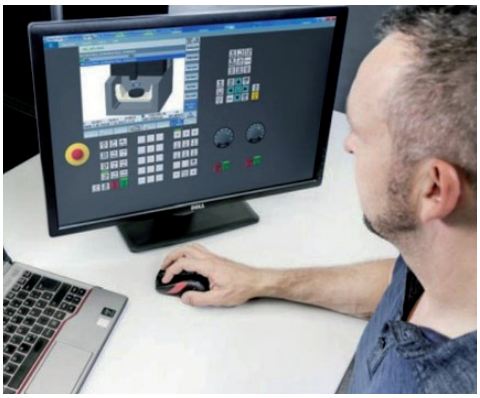
| Article | Order-No. |
|---|---|
| Annual License<br>Starting from 1 User for Companies | 95943000 |
| Annual License<br>Starting from 5 Users for Schools | 95949000 |

More information at: christiani-international.com/95943000

# CNC simulation software

## SINUMERIK Operate from Siemens

**SinuTrain for SINUMERIK Operate uses the same CNC software as the controller. Like SINUMERIK Operate, SinuTrain for SINUMERIK Operate is cross-technology. Turning and milling machines are supported, as are turning/milling and milling/turning machines with 3, 3+2 and 5-axis simultaneous technologies in single and multi-channel applications. By licensing, the "SinuTrain for SINUMERIK Operate" basic version becomes a full version. You can import the machine data of your real machine tools into the full version.**



! Supported operating system: MS Windows 10 (64-bit)
Not supported: Mobile, mobile enterprise, S-editions

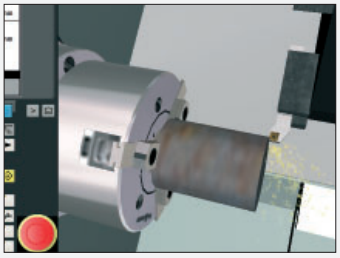
### SinuTrain for SINUMERIK Operate – licence types

| Article (upgrades on request) | Order-No. | Software maintenance per year** Order-No. |
|---|---|---|
| SinuTrain for SINUMERIK Operate<br>Complete package 4.93 single workstation licence | 43350 | 43360 |
| SinuTrain for SINUMERIK Operate<br>Complete package 4.93 classroom licence, 18 workstations | 43351 | 43361 |
| SinuTrain for SINUMERIK Operate student version 4.93*<br>Single workstation licence incl. software maintenance | 43367 | – |
| SinuTrain for SINUMERIK Operate student package 4.93*<br>20 licences incl. software maintenance | 43368 | – |
| SinuTrain for SINUMERIK Operate trainer package 4.93*<br>6 licences and 40 student licences | 43355 | 43365 |
| SinuTrain for SINUMERIK Operate trainer package 4.93*<br>18 licences and 40 student licences | 43359 | 43366 |

! * Note: Licensing restrictions apply. Please download the licensing agreement from www.christiani-international.com for the respective product, sign and stamp it and then submit it together with your order. No sales to private individuals. Not for commercial training.

** Sale only with software maintenance for one year, incl. Siemens support.

### SYMplus for CNC-Training



#### SYMplus PALplus Turning

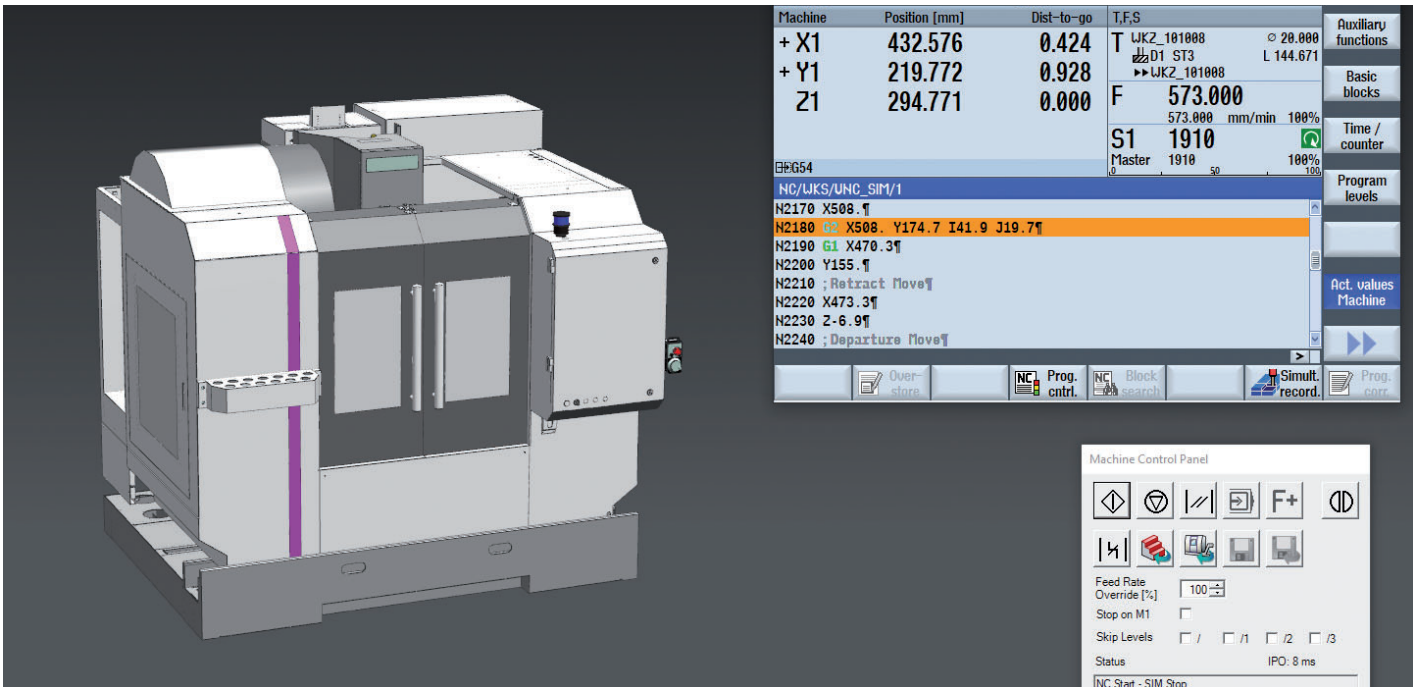
| Article | Order-No. |
|---|---|
| SYMplus PALplus Turning | 10890000 |
| Expansion Module: Powered Tools | 11953 |
| Expansion Module: Virtual Workshop | 10905 |

**More information at:**
**christiani-international.com/10890000**

#### SYMplus PALplus Milling

| Article | Order-No. |
|---|---|
| SYMplus PALplus Milling | 10891000 |
| Expansion Module: Tilted Milling | 11954 |
| Expansion Module: Virtual Workshop | 10904 |

**More information at:**
**christiani-international.com/10891000**

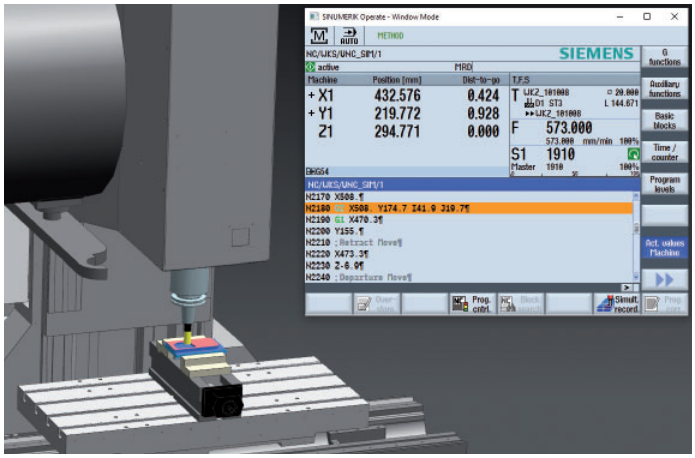



# CNC simulation with the Digital Twin

**The Digital Twin is a realistic digital copy of a real tool machine, as would also be used in the workshop, and includes all machine geometries, fixtures and tools as well as the control system and all parameter settings used in the real machine. By using CNC simulation at the virtual machine, trainees can be trained risk-free and cost-effectively – without damaging your machines. With a Digital Twin of your machines, exact conclusions can be drawn about the tool paths and movements running on the machine.**

## Digital Twin for training on CNC machines

**Run MyVirtual Machine** by Siemens provides the ideal platform for creating an operating a Digital Twin. Training at virtual machines has proven particularly advantageous in the field of vocational training. Trainees can test and optimise their NC programmes risk-free, without causing damage to the real machines. With the Digital Twin, almost any machine type and any kinematics can be simulated.




Our tip

## Use the Digital Twin of your CNC machine

The Digital Twin is already available for the OPTIMUM CNC milling machine OPTImill F150 HSC and OPTImill FU5 as well as the OPTIturn L44 CNC lathe.

**Other CNC machines can be created and adapted on request!**

The Digital Twin includes a virtual copy of the machine from the original machine data with animated tool change as well as the VNCK (virtual NC core). Tools and clamps can be managed by the machine operator.

# The Optimum for CNC training

**Future-proof CNC training guarantees a high industry standard in the training workshop. With Stürmer CNC tool machines, we offer you the optimum for your training workshop. All machines are equipped with user-friendly Siemens SINUMERIK control systems. Our concepts for vocational and further training are individual, sustainable and comprehensive – from the training machine to the didactic training material and the virtual machines.**


## CNC Milling Machine OPTImill F 150HSC

CNC milling machine with Siemens SINUMERIK 828 D control system, also available with fourth and fifth axis.

| Order-No. |
|---|
| 97496 |

More information at: christiani-international.com/97496


## CNC Lathe OPTIturn L 44

Premium CNC lathe with Siemens control system SINUMERIK 828D Basic

| Order-No. |
|---|
| 94121 |

More information at: christiani-international.com/94121

## Tip: For your CNC workstation, we can offer the right solutions

### Box Workbench T750 R24-24

- 1 Hinged Door | 4 Drawers
- 2.000 x 750 x 859 mm

| Order-No. |
|---|
| 52413 |

More information at: christiani-international.com/52413

### CNC Hinged Door Cabinet T500 R 36-16

- 980 x 500 x 1.838 mm

| Order-No. |
|---|
| 94851 |

More information at: christiani-international.com/94851

### CNC Garage / CNC Trolley

- Garage: lockable
- Trolley: 6x CNC tool holder

| Article | Order-No. |
|---|---|
| CNC Garage | 50981 |
| CNC Trolley | 50979 |

More information at: christiani-international.com/50981

**All machine models are available online at christiani-international.com/machines**

# Electrical Engineering

## Principles of electrical engineering

**Are you looking for practical solutions to make technical vocational training in electrical engineering efficient and interesting? Do you need digital applications for the training? Do you want to prepare trainees successfully for the examinations?**

**Then we are your first point of contact.**

**Here is a practical overview of the most important learning media and teaching systems, covering key topics for training.**

- Specialist books
- Training software
- Courses for vocational training
- Project work
- Laboratory tables
- Training boards
- Mechatronic systems

**Our teaching materials and teaching systems are perfect for conveying the following training content:**

- Basic knowledge
- Control technology
- Machines and drive technology
- Automation technology

### Electrical Engineering

- Basic Knowledge
- Control Technology
- Machines and Drive Technology
- Automation Technology
- Industry Models
- modular Mechatronics System (mMS)
- Industry 4.0

**More information on page 46/47.**

# Specialist books and project work

## Electrical Engineering



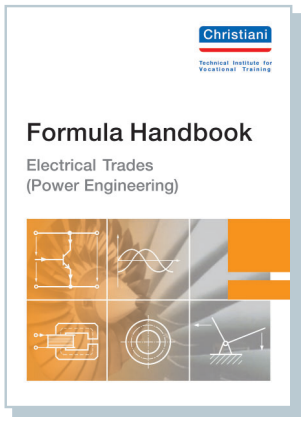
**Convey the topics of electrical engineering in an understandable and visual way – perfect for school vocational training. The principles of theoretical and practical training are combined with accompanying project work, representing a great deal of practical relevance. Basic knowledge can be consolidated practically with the switch cabinet training concept. Independent planning, implementation and assessment – important requirements for trainees – are supported by the project work.**


### Christiani - basics Electrical Engineering

Spanish also available!

| Article | Order-No. |
|---|---|
| Text Book | 41172 |
| Text Book Digital, Annual License | 41315 |

More information at: christiani-international.com/41172




### Formula Handbook Electrical Trades (Power Engineering)

| Order-No. |
|---|
| 100144 |

More information at: christiani-international.com/100144


### Training Concept Switch Cabinet – Basic Module

Spanish also available!

| Article | Order-No. |
|---|---|
| Training Concept Switch Cabinet – Basic Module | 65992 |
| Documents for the Trainer | 93366 |
| Documents for the Trainee | 93367 |

More information at: christiani-international.com/65992

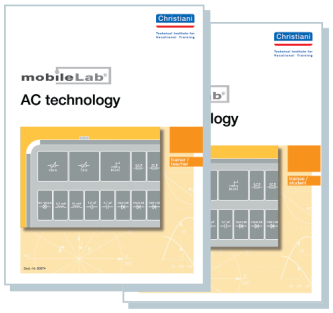
# Complete teaching and learning system

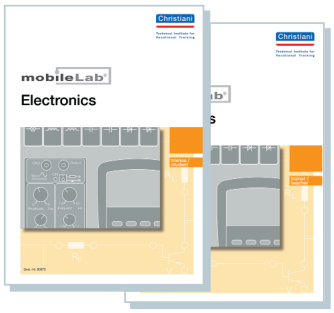
## For the basic principles of electrical engineering, electronics and digital technology

**Using experimentation, the mobileLab® teaching system enables you to impart basic knowledge of electrical engineering. 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.**

### Features of the mobileLab system:

- Independent of mains electricity thanks to internal battery. If the battery is flat, the cases can continue to be operated using the mains power adapter provided.
- Integrated, controllable voltage source. The AC case also includes a function generator.
- Operation with low voltages, therefore completely safe, even for beginners.
- The overload protection on the integrated functional units and the dimensions of the plug-in elements ensure that nothing can be damaged, even if used incorrectly.
- A template is provided for each of the predefined experiments; this template defines the circuit exactly.
- All necessary plug-in elements, jumpers and wires are included.
- Up to eight cases can be stored and charged in the optional charging and storage cabinet.
- Individual cases can also be charged without the charging cabinet using the mains power adapter provided.
- The mains power adapter provided contains an EU, UK, US and AU adapter plug.




### mobileLab AC case for AC technology

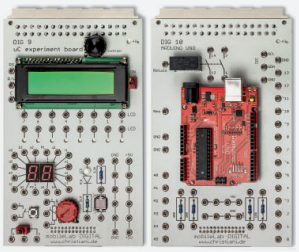
Spanish also available!

| Article | Order-No. |
|---|---|
| mobileLab AC Case for AC technology | 76806 |
| mobileLab AC Technology Experiment Instructions Documents for the Trainee | 80973 |
| mobileLab AC Technology Experiment Instructions Documents for the Trainer | 80974 |
| mobileLab Electronics Experiment Instructions Documents for the Trainee | 80975 |
| mobileLab Electronics Experiment Instructions Documents for the Trainer | 80976 |

**More information at: christiani-international.com/76806**

### Tip: Also part of the comprehensive teaching system:

**Microcontroller Expansion Set**



**More information at: christiani-international.com/50940**

**Charging and Storage Cabinet**

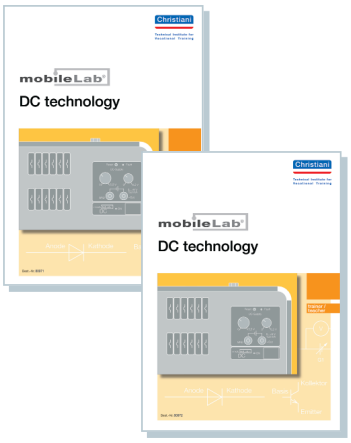
**More information at: christiani-international.com/42947**

## mobileLab DC case for DC technology

Spanish also available!

| Article | Order-No. |
|---|---|
| mobileLab DC Case for DC technology | 76801 |
| mobileLab DC Technology Experiment Instructions Documents for the Trainee | 80971 |
| mobileLab DC Technology Experiment Instructions Documents for the Trainer | 80972 |
| mobileLab DC Technology Experiment Instructions – Supplement Documents for the Trainee | 94456 |
| mobileLab DC Technology Experiment Instructions – Supplement Documents for the Trainer | 94457 |

**More information at: christiani-international.com/76801**

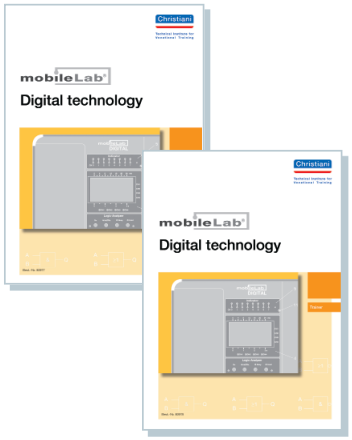



## mobileLab Digital case for digital technology

Spanish also available!

| Article | Order-No. |
|---|---|
| mobileLab Digital Case for digital technology | 93710 |
| mobileLab Digital Technology 1 + 2 Experiment Instructions Documents for the Trainee | 93924 |
| mobileLab Digital Technology 1 + 2 Experiment Instructions Documents for the Trainer | 93925 |
| mobileLab Digital Technology 1 Experiment Instructions Documents for the Trainee | 80977 |
| mobileLab Digital Technology 1 Experiment Instructions Documents for the Trainer | 80978 |
| mobileLab Digital Technology 2 Experiment Instructions Documents for the Trainee | 89239 |
| mobileLab Digital Technology 2 Experiment Instructions Documents for the Trainer | 89238 |

**More information at: christiani-international.com/93710**




**More information at:**
**christiani-international.com/teaching-systems-electrical-engineering**

# The Christiani Learning Unit

## The mobile and flexible workstation system for vocational and further training

**The learning unit is the flexible solution to practical lessons in electrical engineering, metal and HVAC. When folded out, the mobile workstation system provides space for up to eight trainees with a work surface of approx. 20 m² and, when folded in, has a footprint of just 1 m² for space-saving storage. The learning unit is available in standard versions, but can also be customised and equipped according to your wishes!**

### Basic design:

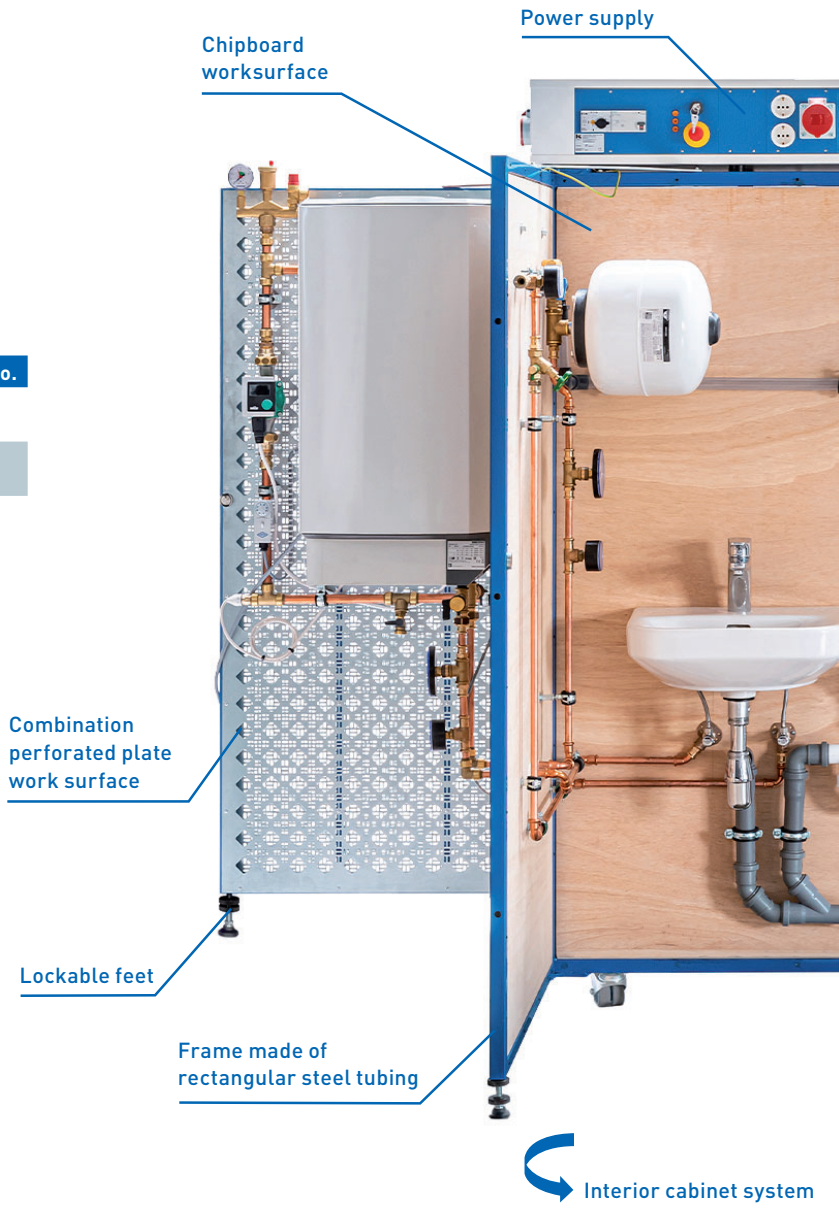
- Welded body on rollers
- Two-sided work surfaces of steel plates and chipboards
- Four folding double work stations

### Individual configuration:

- Power supply
- Compressed air connection
- Data sockets (RJ45)
- Internal cabinet systems
- As floor model or on rollers
- Individual height and width
- Additional doors
- Special colours (all RAL colours)

| Article | Order-No. |
|---|---|
| Learning unit with Combination Perforated Plates with Power Supply and Interior Cabinet | 19919 |
| Learning unit with Steel Plate with Power Supply and Interior Cabinet | 77582 |
| Learning unit with Chipboard with Power Supply and Interior Cabinet | 31839 |

**More information at: christiani-international.com/19919**



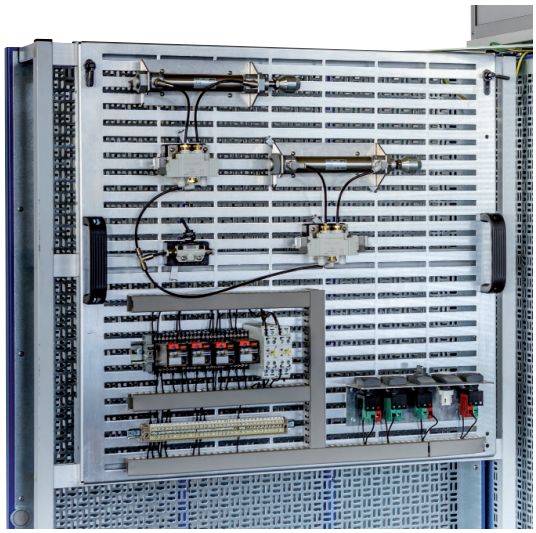

### Application example: Electrical engineering

The experiments for the course "Basic principles of electrical engineering and electronics Part 1: Electrical engineering" with the corresponding material kit can be fully constructed and performed on the learning unit. Training boards are straightforward and easy to insert into the experimental frame.

**Find more information on the course on page 40**

**Power supply**

The power attachment is available in a standard version, but custom configurations and fittings are also possible.



**Application example: Metal technology**

You can install pneumatic/e-pneumatic attachments on the assembly plates and easily secure them on the optionally available experimental frame on the learning unit. The device sets enable trainees to prepare very well for examinations and examination situations.

**More information on our BIBB device sets on page 23**


NEW

Additional work surface (optional)

**The interior cabinet system**

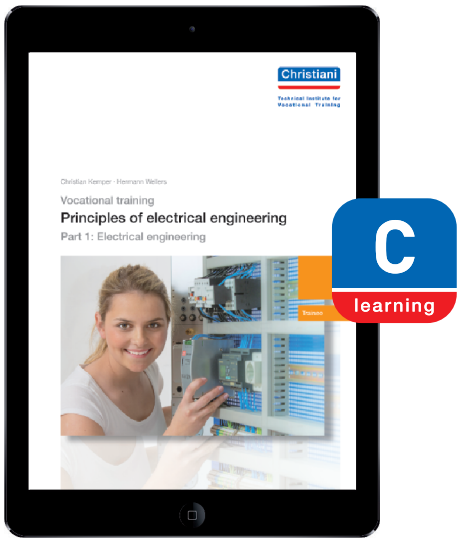
The left side of the cabinet system comprises drawers of different sizes for storing small parts, assembly material, etc., as well as three shelves on the right that you can position where you want. The other side of the cabinet system provides a large, full-length storage area for storing bulkier materials, such as pipes, etc.

# Solid basis for the whole training process

## Courses for practical vocational training with documentation for trainers and trainees

**The "Basic principles of electrical engineering" courses cover important skills that trainees should be taught over the course of the training. The requirements range from installing and connecting electrical operating equipment to checking key data and functions of functional units.**

**In this training course, trainees learn all they need to know about commissioning systems according to the German standard. Therefore, this course focuses in particular on acquiring the relevant background information. Proper preparation for the measurements and the ability to evaluate the results in the context of the specific system at hand are central qualification criteria.**





### Principles of Electrical Engineering

**Part 1: Electrical Engineering**

| Article | Order-No. |
|---|---|
| Documents for the Trainer Digital, Annual License | 41256 |
| Documents for the Trainee Digital, Annual License | 41258 |
| Text Book Digital, Annual License | 41351 |

| Material Kits | Order-No. |
|---|---|
| Mounting Plates | 97640 |
| Power Supply - Small Distributors | 97641 |
| Main Materials | 97642 |
| Consumable Materials | 97643 |

**More information at: christiani-international.com/41256**

### Comissioning as per DIN VDE 0100-600*

| Article | Order-No. |
|---|---|
| Documents for the Trainer | 41197 |
| Documents for the Trainer Digital, Annual License | 41224 |
| Documents for the Trainee | 41198 |
| Documents for the Trainee Digital, Annual License | 41225 |
| Text Book | 41199 |
| Text Book Digital, Annual License | 41349 |

**More information at: christiani-international.com/41197**

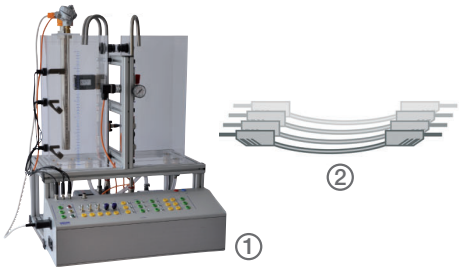
### * Good to know:

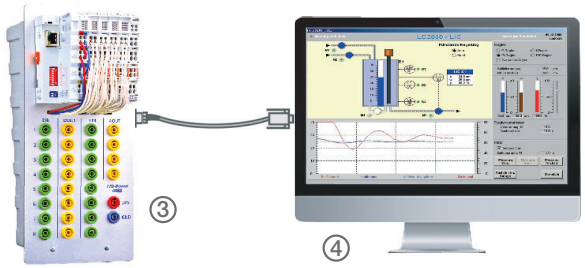
In Germany, the Deutsche Institut für Normung e.V. (German Institute for Standardization, DIN) and Verband der Elektrotechnik, Elektronik und Informationstechnik e.V. (German Association for Electrical, Electronic and Information Technologies, VDE) play an important role in technical training. The aim of the DIN and VDE organisations is to develop standards and norms for increased safety within Germany and to promote global trade in goods.

One of the most well-known examples of norms globally is certainly the DIN dimensions (e.g. DIN A4). This norm is an international convention and, amongst other things, ensures that paper fits into every printer or photocopier.

# Instruction with workstations and training boards

**The workstation offers a wide selection of training options, ranging from simple control system tasks through to PID feedback control of various controlled systems and provides optimum support for your lessons on control systems.**



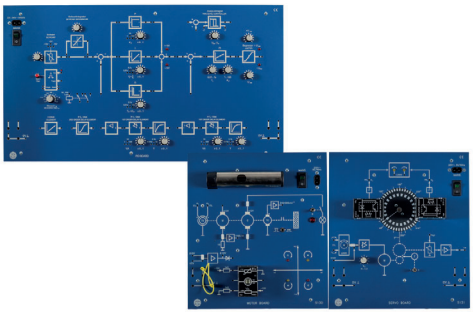




1. Workstation
2. Test lead set
3. I/O interface ADIOS
4. PC with WinErs, GRAFCET Lab or LC2030 process automation training software

## Practical Training System Control Engineering/Process Automation

| Article | Order-No. |
|---|---|
| Full Equipment | 69777 |

More information at: christiani-international.com/69777



## Teaching System Control Technology

The teaching system, comprising three training boards, has been specially developed for basic and advanced experiments with control technology.

- Basic principles of control technology
- Measurement technology
- Control processes
- Controllers
- Control loops
- Electronic load
- Temperature control
- Position control
- Speed control

| Article |
|---|
| 54798 |

More information at: christiani-international.com/54798

## Control Technology Training Course

Simulation software for the basic principles of control technology.

**Applications:**

- Investigation of controller behaviour
- Fill level control
- Temperature control
- Delayed temperature control
- Control of stirred tanks in series
- Investigation of PTN control systems with P, I, PI and PID controllers

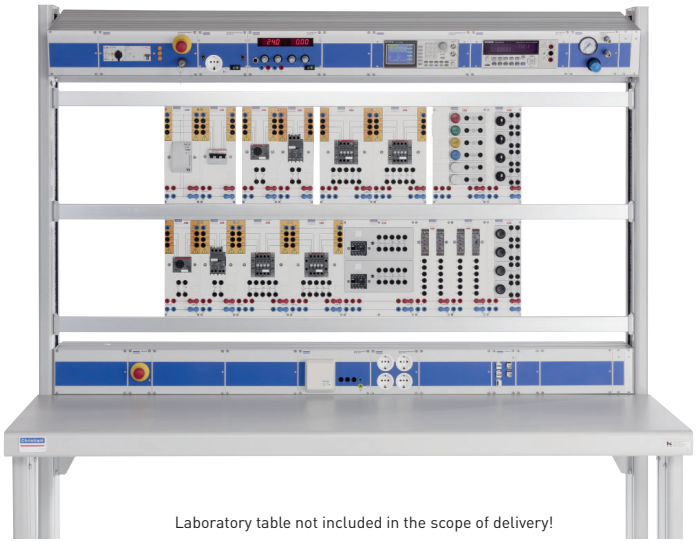
| Article | Order-No. |
|---|---|
| LC2030 Training | 58689000 |
| Control Engineering Practical Training I | 53858000 |
| Control Engineering Practical Training II | 53860000 |

More information at: christiani-international.com/58689000

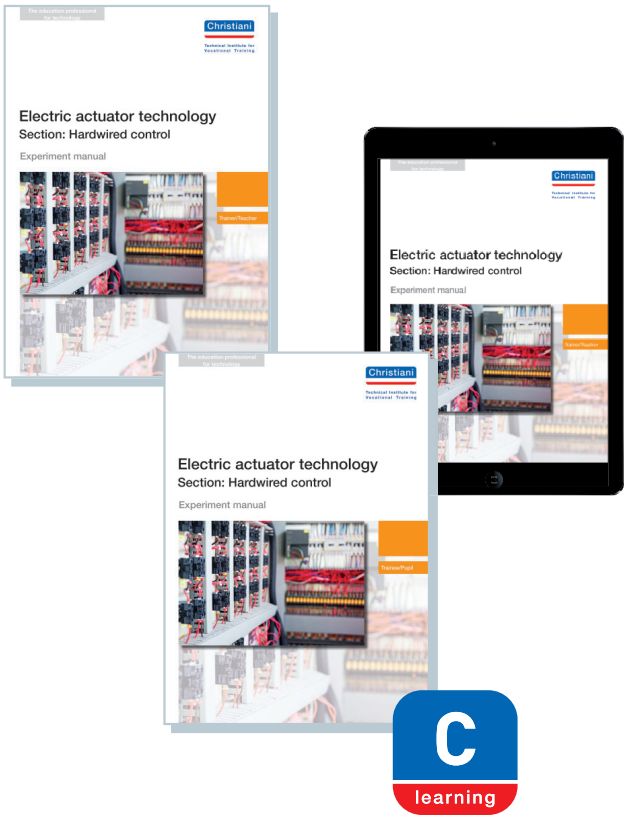
**More information at:**
**christiani-international.com/teaching-systems-electrical-engineering**

# Teaching system for hard-wired control

**With this modular teaching system, you can teach the basic principles of drive technology and hard-wired control units. Thanks to the highly modular design and selection of components, a wide range of experiments can be carried out.**



Laboratory table not included in the scope of delivery!



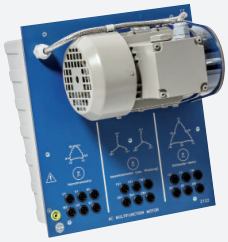

**Spanish also available!**

| Article | Order-No. |
|---|---|
| Teaching System Hardwired Control | 19600 |
| Electric Actuator Technology – Section: Hardwired Control Experiment Instructions for the Trainer, English | 19601 |
| Electric Actuator Technology – Section: Hardwired Control Experiment Instructions for the Trainee, English | 19602 |
| Electric Actuator Technology – Section: Hardwired Control Experiment Instructions for the Trainer, Digital, Annual License | 48356 |
| Electric Actuator Technology – Section: Hardwired Control Experiment Instructions for the Trainee, Digital, Annual License | 48357 |
| Laboratory Table Cockpit | 41543 |

**More information at: christiani-international.com/19600**

## Tip: Also part of the comprehensive teaching system:

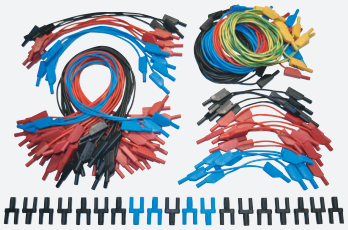
### Motors



**More information at: christiani-international.com/52782**

**More information at: christiani-international.com/52757**

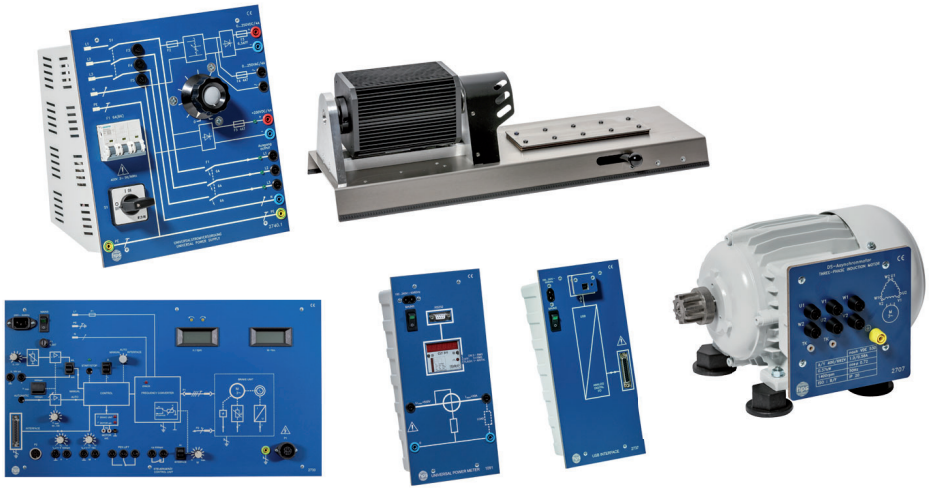
### Cable Set



**More information at: christiani-international.com/98141**

# Teaching system for electrical machines

**The principles of electrical machines, such as construction and operating characteristics, are taught here. Connecting a machine can be practised, experiments can be performed and electrical machines can be tested during operation and the characteristic curves can be recorded.**



| Article | Order-No. |
|---|---|
| Training Board Set Electrical Machines (AC) | 52821 |
| Training Board Set Electrical Machines – Extension Set (DC) | 52822 |

**More information at: christiani-international.com/52821**

## SINAMICS G120 frequency converter as training board

For exercises for pumping, ventilating, compressing, moving or processing: The SINAMICS G120 is also the universal drive for many applications in training.

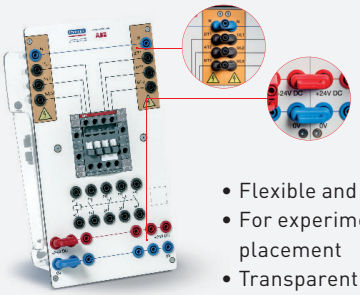
The corresponding three-phase squirrel cage motor can quickly be connected.

| Article | Order-No. |
|---|---|
| Training Board SINAMICS G120 | 40720 |
| 3-Phasen Käfigläufermotor | 48464 |

**More information at: christiani-international.com/40720**

## The design principle of the training boards – safety, clear arrangement and fast set-up

The transparent desk housing ensures better visibility, which means you can look at the components, how they are attached, wire colours and cross-sections, as well as the wiring.



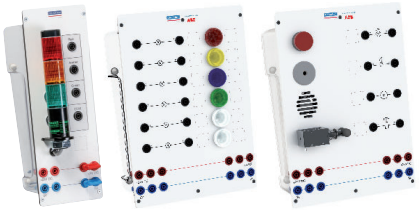
- Flexible and modular
- For experimental frames or table placement
- Transparent desk housing
- Clear arrangement and safety

# EDUSAFE – Machine safety teaching system

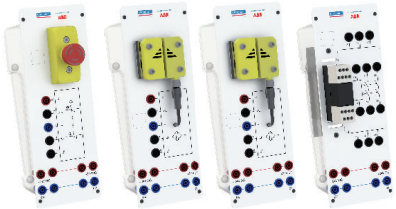
## Safety technology according to DIN EN ISO 13849-1

**Optimal aid during lessons about machine safety. With the new TriSafe training boards, we put the focus of the system on a programmable safety switchgear. This gives you a high degree of flexibility and you can combine a variety of training boards with each other and effortlessly implement simple to very complex safety circuits.**

Basic components

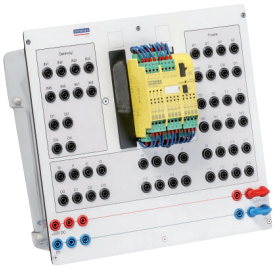


Output elements



Protective monitoring dynamic signal

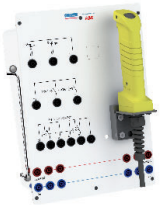
AOPD light curtain



TRISAFE

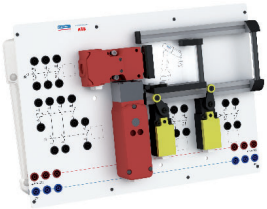
INCA1

Safeball



JSHD4

MCS



Mkey

| | |
|---|---|
| ! | All modules also available individually |

| Article | Order-No. |
|---|---|
| EDUSAFE complete set | 33625 |

**More information at: christiani-international.com/33625**

### Tip: The right laboratory tables for our teaching systems

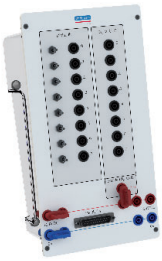
Our high-quality and functional laboratory tables make training more practical. Training boards for different topics can be suspended in the laboratory tables – for safe learning in laboratory conditions.

**More information on page 47.**

# Our new PLC training board series

**The new PLC training board series is the ideal development of our existing automation concept. By using products such as components that are already used in our mechatronic models, we achieve an excellent level of compatibility with our modular mechatronic system.**


Training board Power

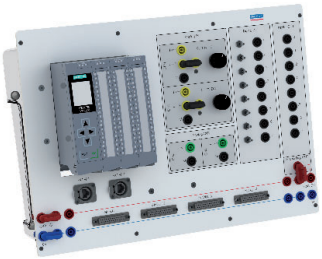


Training board Di-DQ expansion

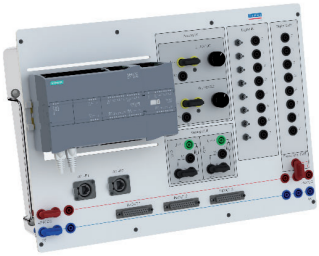
Training board SmartLight

Training board TP700

Expandable sockets

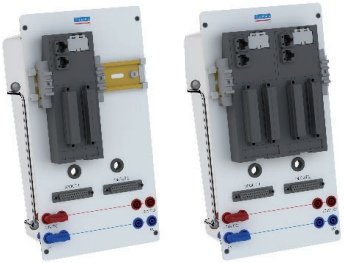


Training board PLC-1512C



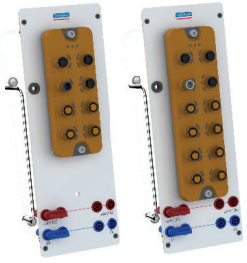
Training board PLC-1215C

Expandable communication level



Training board PN module

Training board Router



Training board I/O-Link master (four port/eight port)

| Article | Order-No. |
|---|---|
| Training board Power | 43316 |
| Training board Di/DQ expansion | 43317 |
| Training board PLC-1512C | 43315 |
| Training board PLC-1215C | 43379 |
| Training board PN module | 43318 |

| Article | Order-No. |
|---|---|
| Training board TP700 | 59829 |
| Training board IO-Link master four port | 43320 |
| Training board IO-Link master eight port | 43321 |
| Training board Router | 43322 |
| Training board SmartLight | 43319 |

**More information at: christiani-international.com/43316**

# Training in electrical engineering under laboratory conditions

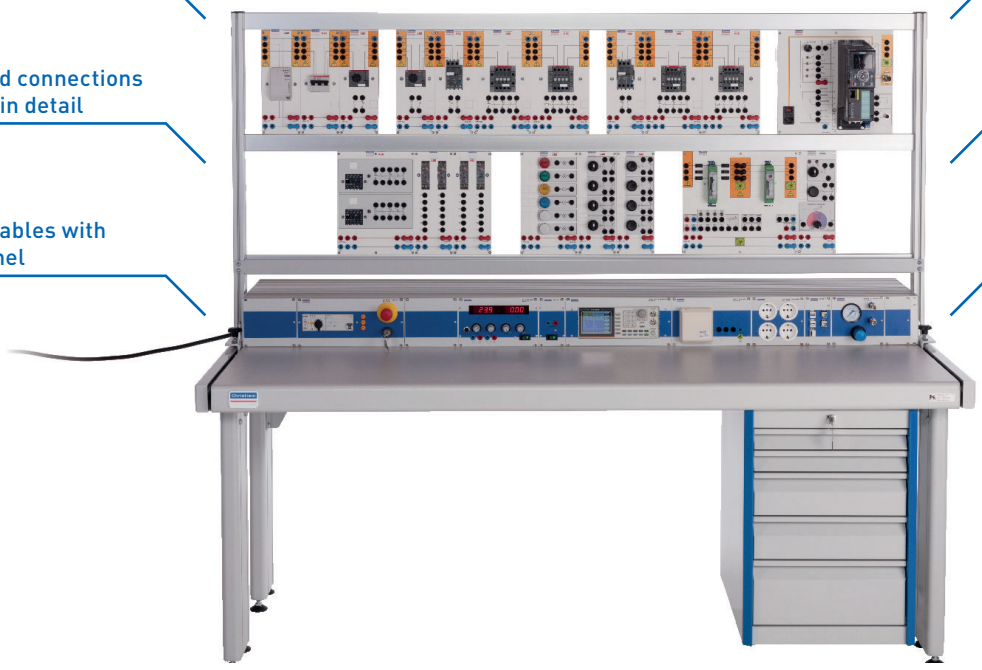
**Laboratory tables and workstation systems belong in every training lab for practical vocational and further training. With KARL, we are able to offer premium products that exactly meet the requirements of technical training: These modern workstation systems are characterised by high-quality processing, outstanding functionality and sophisticated ergonomics. They are practical in daily use and versatile in terms of equipment.**

A combination of laboratory tables and training boards has proven the best solution for functional and safe use in the electrical engineering laboratory. Using original industrial components, the trainees learn everything they need to know for later application in practice.

Training boards for different topics can be suspended in the laboratory tables. In a safe laboratory environment, apprentices and other trainees learn the basics of machine safety, hard-wired programmed control systems, PLC, and many other electrical engineering topics.

## High-quality laboratory tables

- High-quality processing, outstanding functionality, sophisticated ergonomics
- The tables meet a variety of requirements in applications and safety provisions
- Wide range of models and options
- Optimisation of processes and workflows, ergonomic working
- Modern, sleek design, can be colour-adapted
- Made in Germany since 1935




Laboratory table is delivered without training boards.

## Laboratory Table Electronics

| Order-No. |
| --- |
| 43963 |

**More information at: christiani-international.com/43936**

## Straight laboratory table

**Everything a laboratory table needs**

The straight laboratory table is designed as a direct route to electrical engineering under laboratory conditions, equipped with an experimental frame for training boards in DIN A4 format, a supply channel and a drawer block.

**Order-No.**
41540

**More information at: christiani-international.com/41540**

## Pivot Rail laboratory table

**Laboratory table with lowerable supply module**

The highlight of the Pivot Rail laboratory table: The supply module can be lowered into the table top at the push of a button. This means all connections are safely stowed away. The experimental frame can be moved to any position in the smooth-running sliding rail.

**Order-No.**
41542

**More information at: christiani-international.com/41542**

## Quadro-Twin SL laboratory table

**Laboratory table for ergonomic working**

The guide rail means the experimental frame can be easily positioned at the desired distance. This ensures accessibility of all components as well as ergonomic working. In addition, the table is height-adjustable by up to 20 mm. This means unevennesess in the floor can be compensated for and stability of the laboratory table is guaranteed.

**Order-No.**
41548

**More information at: christiani-international.com/41548**

## Quadro Basic laboratory table

**The cost-effective alternative for your laboratory**

The Quadro Basic laboratory table is our cost-effective solution for your lab equipment. The guide rail means the experimental frame can be easily positioned at the desired distance. This ensures accessibility of all components as well as ergonomic working.

**Order-No.**
41547

**More information at: christiani-international.com/41547**

# Christiani Industry Models

## More comprehensive than you'd think!

**Christiani industry models are built from individual fischertechnik parts and represent different processes and applications. All models are stabilised with aluminium profiles and use original industrial sensors. The open system makes it possible to connect any 24-volt control system with sufficient inputs and outputs. Christiani industry models come fully wired and are supplied on a robust platform.**

### What can you do with Christiani industry models?

Trainees learn how to programme and commission systems on Christiani industry models. From simple programming through to control circuits, and from the basics through to highly complex processes, you can carry out a wide range of tasks using the models based on real-world systems – completely risk-free:

- Selecting the right control system
- Wiring the control system with the model
- Programming and tests
- Commissioning the system/application
- Abstract process thinking
- Troubleshooting

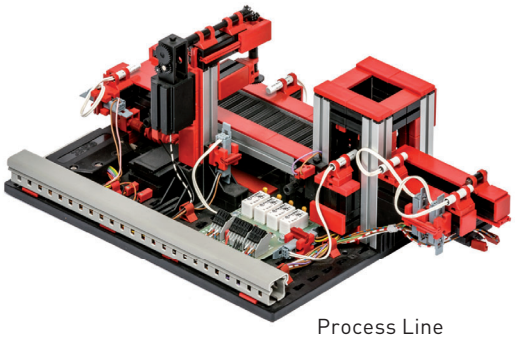
### Advantages of Christiani industry models:

- Robust
- Can be used in many different ways
- Optimal price-performance ratio
- Based on industry
- Directly deployable
- Hands-on training with no risk of causing expensive production shutdowns
- Compatible with all 24 V control systems
- Range of models available
- Whole production lines can be constructed with combinable models

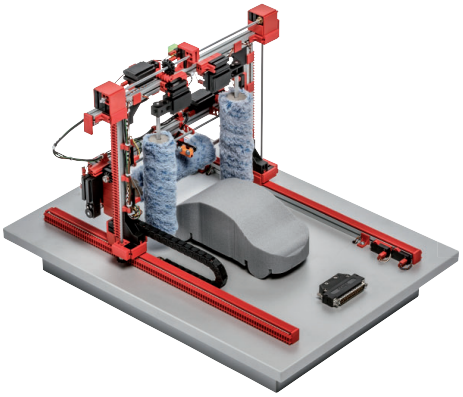
**More information at:**
**christiani-international.com/industry-models**

### Our automation solutions at a glancev

| Learning objectives | mMS system | Christiani Industry Models |
|---|---|---|
| Pneumatics/e-pneumatics | • | |
| Mechatronics | • | • |
| Sensors | • | • |
| Electrical engineering | • | • |
| Industrial processes | • | • |
| Industry 4.0 | • | |
| PLC programming | • | • |
| Network communication | • | |
| RFID | • | |
| IoT | • | |
| Maintenance and troubleshooting | • | • |
| **Technical data** | | |
| 24 V | • | • |
| PLC control | • | • |
| Arduino | | • |
| Industry 4.0 | • | |
| HMI | • | |
| Web-enabled | • | • |
| Modular | • | • |



Process Line



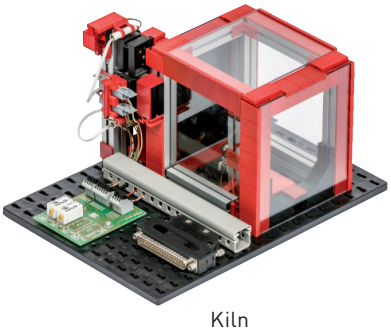
Car Wash Line

## PLC Starter Kits

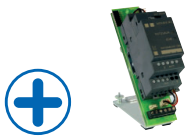
### Our sets contain:

- Industry model
- LOGO!Learn PLC trainer
- Remote control, cable
- Software, teachware

| Article | Order-No. |
|---|---|
| Christiani Industry Model PLC Starter Kit | 14827 |
| Christiani Industry Model PLC Starter Kit 2 | 43544 |
| Christiani Industry Model PLC Starter Kit 3 | 43545 |



Kiln



LOGO! Control

# Stand-alone models

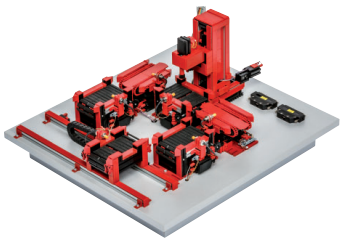
**The Christiani stand-alone models represent closed processes. You can choose between finished bundles or larger models, such as the process line. Teach commissioning for industrial process simply and based on real-world systems.**

## Christiani Industry Model Elevator

**Order-No.**

14807

**More information at:**
**christiani-international.com/14807**

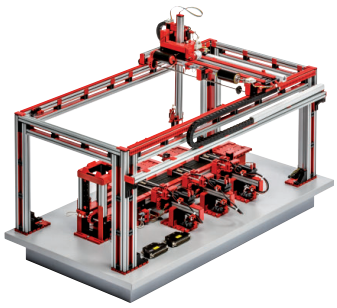


## Christiani Industry Model Processing Unit

**Order-No.**

14816

**More information at:**
**christiani-international.com/14816**



## Christiani Industry Model Transport and Sorting Line

**Order-No.**

14832

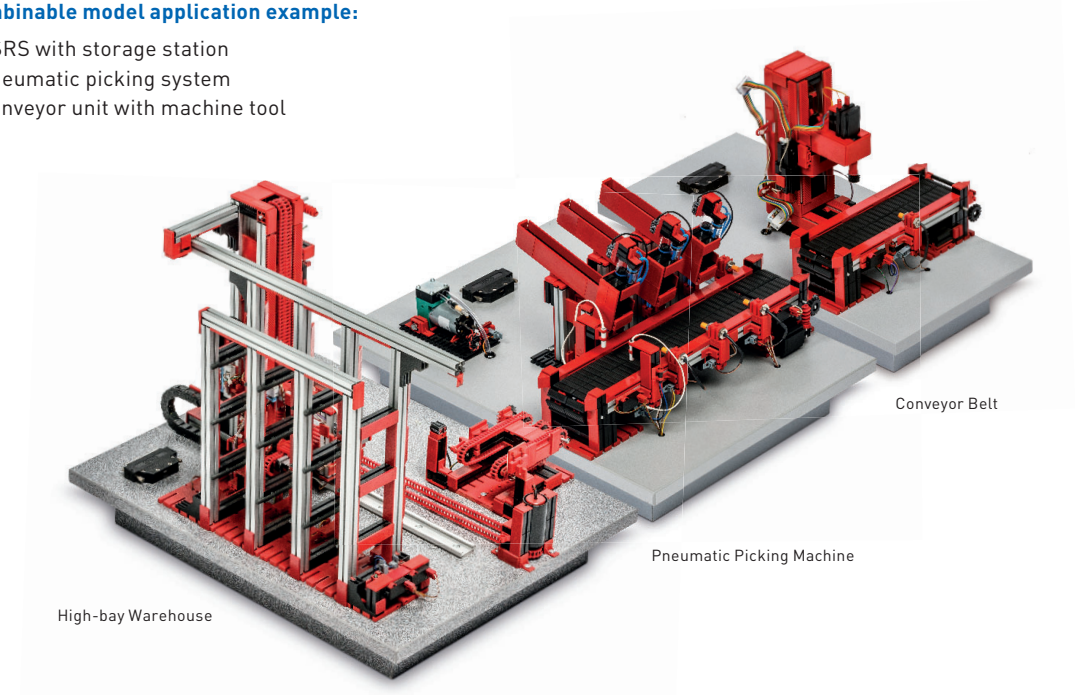
**More information at:**
**christiani-international.com/14832**

# Combinable models

**The "combinable models" product range is a modular model system. These industry models can be combined, from individual stations to complete factory simulation. Conveying, processing, sorting, transferring, storing: Put together your own automated model system using the combinable models. This means that you can reconstruct processes just like they take place in real life.**

**Combinable model application example:**

- ASRS with storage station
- Pneumatic picking system
- Conveyor unit with machine tool




## Christiani Industry Model High-bay Warehouse

**Order-No.**

19156

**More information at:**
**christiani-international.com/19156**

## Christiani Industry Model Pneumatic Picking Machine

**Order-No.**

14825

**More information at:**
**christiani-international.com/14825**

## Christiani Industry Model Conveyor Belt

**Order-No.**

14811

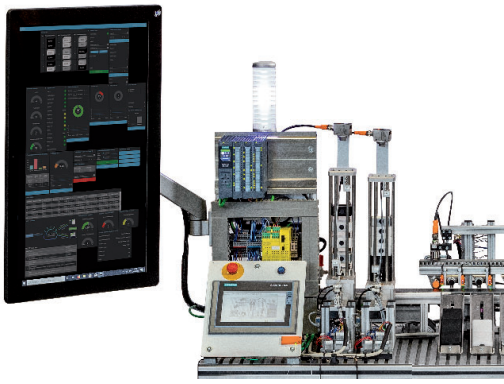
**More information at:**
**christiani-international.com/14811**

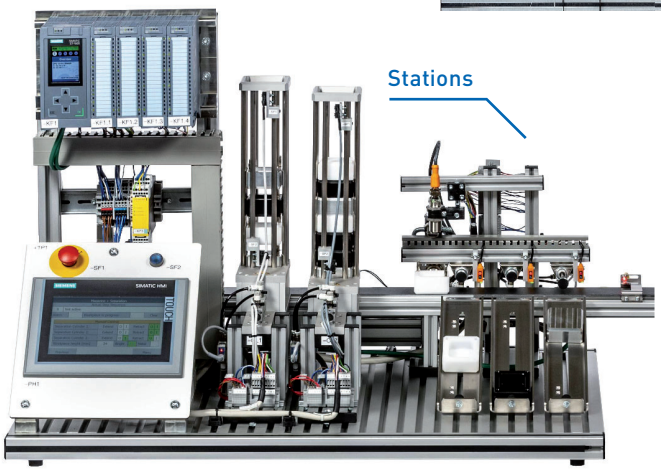
# A comprehensive concept from functional unit to SmartFactory

**The modular mechatronic system is ideally tailored to the demands and requirements of technical training. It is multifunctional, which means that very different learning content can be taught, from assembly to programming and commissioning and even complex IoT technologies. The functional units and other components of the system can also be effortlessly supplemented and extended at a later time.  All information is available in the digital media library.**

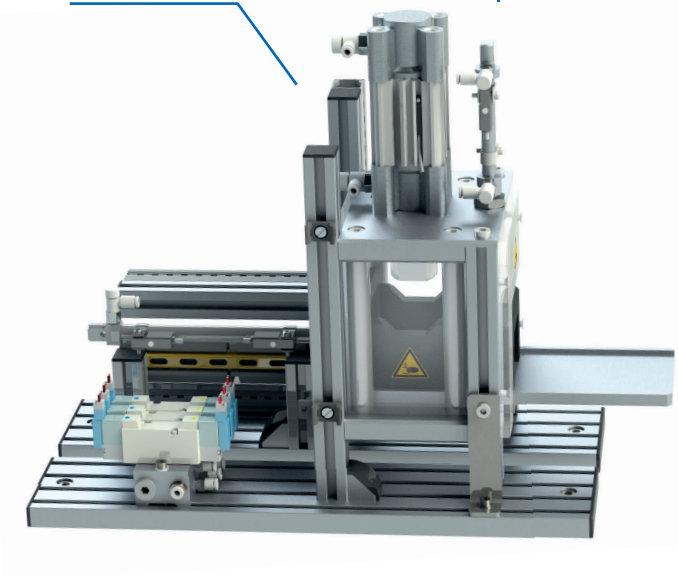
**Take a look at our video for the SSC 4.0!**

**More information at:**
**christiani-international.com/sorting-system-compact**





Functional units



Stations

## Pneumatics, electrics, mechanics in one system

As a machining kit, assembly kit or finished device: Functional units of the modular mechatronic system offer all possibilities for modern vocational and further training. For example, as project work in the field of mechatronics, as a clear functional unit for PLC programming or within a station or system. For a flexible and modular start!

**More information from page 52 onwards**

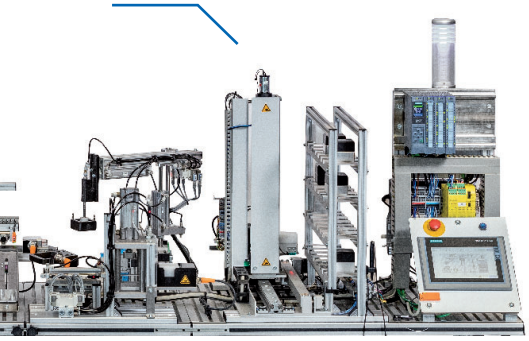
## Modular, flexible stations

The mMS functional units can be combined and come together to form a station. Our modular concept therefore gives you the option of either developing and building your own customised station, or using our standard systems.

**More information from page 53 onwards**

SmartFactory

Systems



## Sorting System Compact 4.0

The SSC 4.0 is a ready-to-use system, composed of several stations. In this finished system, cube halves undergo a complete Industry 4.0 process – from machining through to storage as assembled cubes. Thanks to the connection to the SQL database, Node-RED and MES, trainees are introduced to all processes of an Industry 4.0 system. The dashboard makes it easy to monitor and analyse all parameters in a structured manner.

**More information from page 56 onwards**

## SmartFactory

Building on our Sorting System Compact 4.0, the SmartFactory combines all the advantages of our modular mechatronic system. Several systems are combined to form the SmartFactory. Thanks to the modular system, there are no limits to both spatial and technological scalability. The open and flexible concept of the mMS systems ensures that all required skills can be taught step-by-step, from automation to Industry 4.0. This ensures optimal utilisation of the system from the first training year.

**More information from page 58 onwards**

# Modular Mechatronic System (mMS)

**Functional units, stations and systems from Christiani are based on the specially developed modular mechatronic system (mMS). This in-house development by Christiani is perfectly tailored to the requirements of technical training. The system can be used for all processes, from metal machining to mechatronics to control and programming. Our functional units can be operated as stand-alone units but they can also be combined with each other. Do you want to develop and build your own training system as a project? The media library included in the scope of delivery contains all the necessary information, instructions, plans and more.**

### Advantages:

- Robust and durable
- High-quality industrial components
- Easy connection via terminal blocks
- Detailed information available on each functional unit, including comprehensive mMS media library
- Extendible, combinable, modular
- Future-proof
- Functional units are free-standing and can be used individually
- Everything on board for pneumatics, mechanics and electronics
- All commercially available control systems (with 24 VDC signals) are suitable

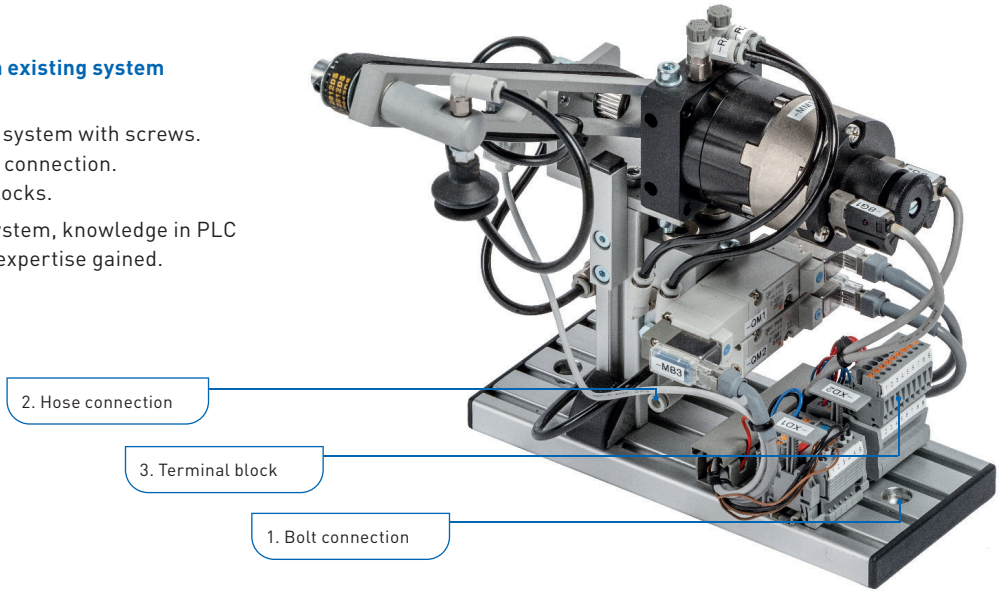
### The mMS modular mechatronic system is perfectly tailored to the requirements of training:

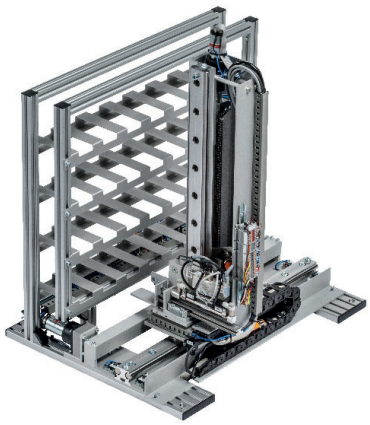
- Greatest flexibility on the market
- Can be used from day 1 until long after training
- Develop your own systems together with your trainees and students
- We only use high-quality industrial components
- Comprehensive product and project library for every functional unit
- Can be configured however you want for any need

### Components can be added to expand an existing system in three simple steps:

1. Mount the components to the existing system with screws.
2. Connect compressed air using a hose connection.
3. Connect electronics using terminal blocks.

Together with the appropriate control system, knowledge in PLC programming can be taught, as well as expertise gained.

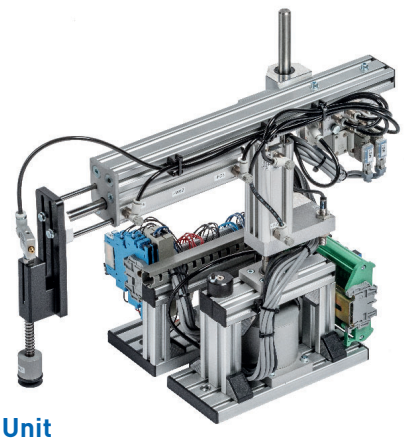


## ASRS

| Article | Order-No. |
|---|---|
| Manufacturing Kit | 69626 |
| Assembly Kit | 69522 |
| Fully Assembled | 69523 |

**More information at: christiani-international.com/69523**



## Handling Unit

| Article | Order-No. |
|---|---|
| Manufacturing Kit | 69516 |
| Assembly Kit | 69517 |
| Fully Assembled | 69518 |

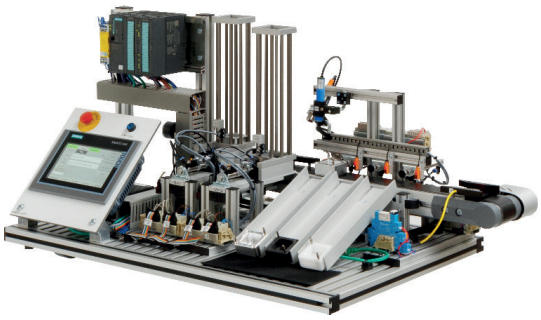
**More information at: christiani-international.com/69518**

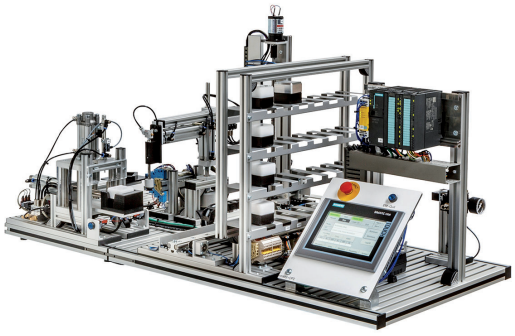
# Simply switch it on and get going

## mMS – a mechatronic system for practical training

**Why use mMS?**
**The mMS modular mechatronic system is perfectly tailored to the requirements of training.**

- **Highly flexible, modular system**
- **Can be used to teach anything from individual skills to complex technologies (IoT)**
- **Comprehensive concept**
- **Individual functional units are easy to remove and can be used separately**
- **Open concept with freely accessible learning panels and functional units**
- **Short set-up times, Plug & Play**
- **Original industrial components**
- **Robust and durable**





### Mechatronic VerSort system for separating and sorting as a ready-to-use system

| Article | Order-No. |
|---|---|
| VerSort | 39666 |

| Assembly kits | Order no. |
|---|---|
| Functional unit Magazine unit type 1 | 30541 |
| Functional unit Magazine unit type 2 | 30544 |
| Functional unit Sorting unit as an assembly kit | 69510 |

**More information at: christiani-international.com/39666**

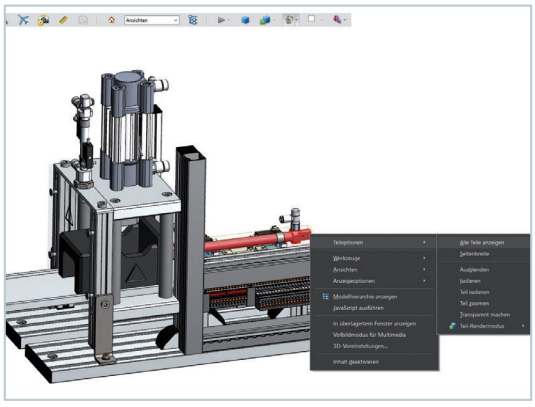
### Mechatronic BeLag system for processing and storing as a ready-to-use system

| Article | Order-No. |
|---|---|
| BeLag | 39667 |

| Assembly kits | Order no. |
|---|---|
| Functional unit with automatic assembly machine as an assembly kit | 69513 |
| Handling unit functional unit as an assembly kit | 69517 |
| ASRS functional unit as an assembly kit | 69522 |

**More information at: christiani-international.com/39667**

### Our mMS media library



- A great deal of additional data and information
- 3D models
- PLC programs
- Circuit diagrams
- Data sheets and much more
- Original EPLAN data and PLC programmes as open data for further editing
- Included in the scope of delivery of all functional units
- Contains all information specific to the product and project
- Designed based on the model of complete action

# mMS-Sim4edu – 3D mechatronic simulation for vocational training

## More productive – more networked – simplified

**Design, test and create simulations with the 3D mechatronic software. This software has been specially designed for vocational and further training. It is supplied with a prepared library to facilitate quick use in training. We display our established modular mechatronic system in 3D and relay tasks and activities from the real environment to the digital one. Have your trainees develop, test and simulate manufacturing solutions in a networked environment. With mMS-Sim4edu, you can provide customised and practice-oriented training.**

### What does mMS-Sim4edu offer?

- Component library prepared for teaching
- Project documents (digital)
- Virtual commissioning
- Transferable to real mMS functional units
- PLC connection (hardware/software PLC) OPC UA
- Siemens PLC connectivity plugin for SIMIT
- Quick process comprehension
- Layout configuration

### Plan your solutions

Plan and simulate your own mechatronic system with your trainees

### Virtually reviewing changes

Design, test and simulate changes in the virtual environment before you put them into practice on the real systems.

### Quick integration of all stakeholders

Trainees can present their solutions as a video, 3D PDF file, 2D drawings or in VR models. Gaps in knowledge are eliminated and communication barriers are prevented.

### Predictable performance

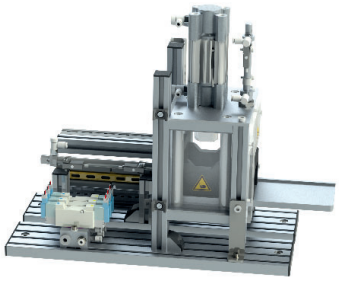
The software supports complex processes and workflows. This means that your trainees can learn everything step-by-step, from simple to complex processes.

### Optimised concept design

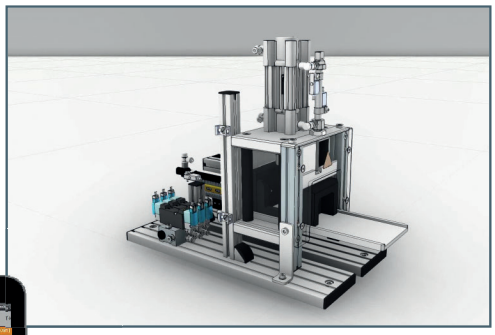
Make use of the comprehensive library with ready-to-use components to create designs more quickly.

### Project-centred approach

With the right hardware, you can guide your learners to success in a project-oriented manner.

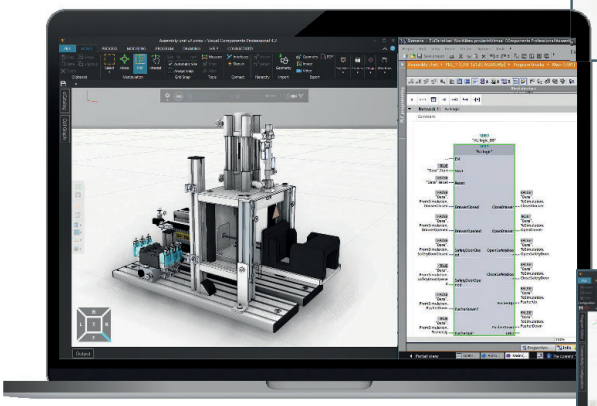


Automatic assembly machine

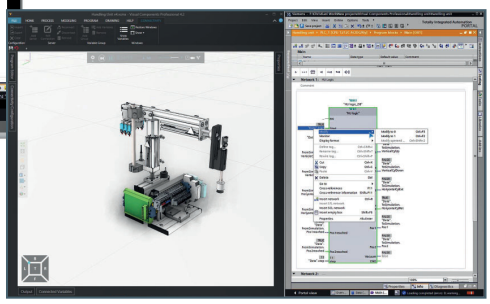


**mMS automatic assembly machine animated**

The fully simulated model of the automatic assembly machine. All physical limits of the real functional unit are presented.



**mMS automatic assembly machine simulation in automatic mode**

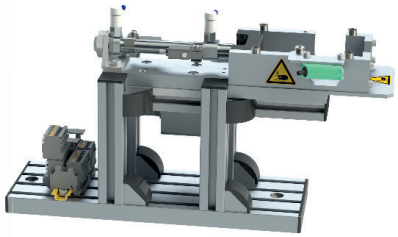


**mMS handling unit**

Programme the systems with a hardware PLC here S7-1212C or a SoftPLC.

Valve terminal

Magazine unit



Clamping unit

## mMS-Sim4edu 3D Mechatronics Simulation

| Licence model | |
|---|---|
| **Article** | **Order-No.** |
| Single User License | 43930 |
| 5 Users | 43931 |
| 10 Users | 43932 |
| 20 Users | 43933 |

| Annual maintenance contract incl. software and didactic updates | |
|---|---|
| **Article** | **Order-No.** |
| Single User License | 43934 |
| 5 Users | 43936 |
| 10 Users | 43937 |
| 20 Users | 43938 |

**More information at: christiani-international.com/mms-sim4edu/**

# Switch on and get stared

## With the Sorting System Compact 4.0

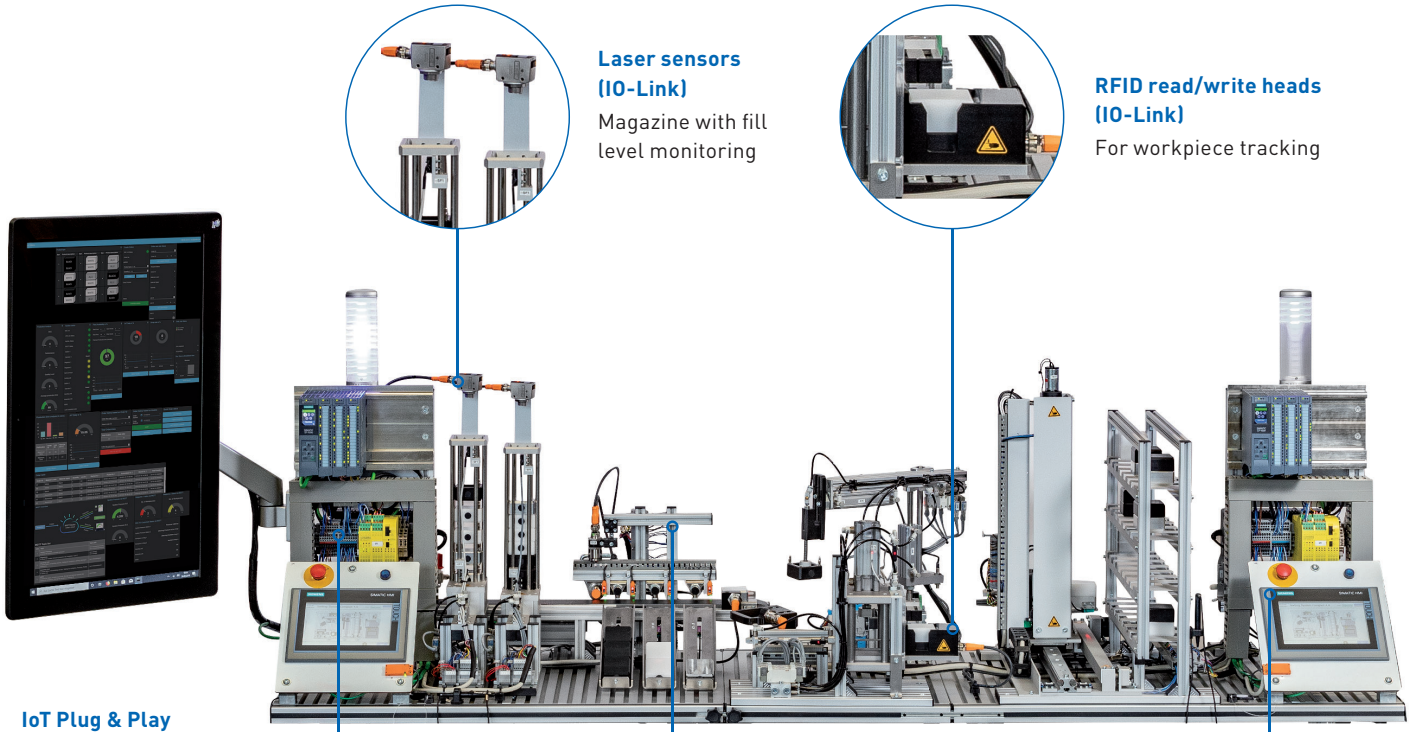
**With the Sorting System Compact 4.0 modular mechatronic system, you can teach automation and mechatronics from the basics right up to complex Industry 4.0 topics in a very small space. The specially developed dashboard makes it easy to record and analyse data. Combined with the intuitive operating concept, the system offers the best conditions for successfully passing on expertise.**

- 11 functional units incl. storage and dispensing station
- Category 4 safety functions
- OEE functionality as standard
- WiFi antennas included
- Technical remote maintenance
- With original components from well-known manufacturers
- Mini PC with dashboard, Manufacturing Execution System (MES) and system wiki
- Can be divided into two separate stations
- Plug & Play: Ready to use

**Take a look at our video for the SSC 4.0!**

**More information at:**
**christiani-international.com/sorting-system-compact**

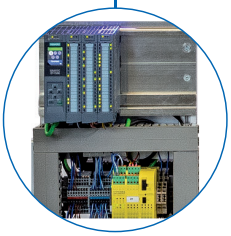
**Upgradeable to SmartFactory, see page 58.**



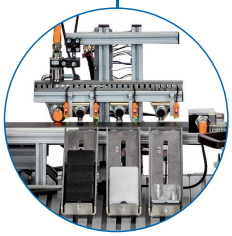
**Laser sensors (IO-Link)**
Magazine with fill level monitoring

**RFID read/write heads (IO-Link)**
For workpiece tracking

**IoT Plug & Play**
Mini-PC with touchscreen pre-configured with dashboard and system Wiki



**Open control concept with SIEMENS industry PLC**
With additional configurable safety switchgear



**Sorting unit with workpiece inspection**
Widely used industrial sensors can be found throughout the entire system


**HMI with SIEMENS industry touchpanel**
Intuitive and graphical operating concept

| Article | Order-No. |
|---|---|
| mMS Sorting System Compact 4.0 | 32900 |

**More information at: christiani-international.com/32900**

# mMS stations for automation

**The robotics station UR3e can be used as a stand-alone training station or integrated in a Christiani mMS system. The UR3e from Universal Robots is equipped with an HRC-capable electrical parallel gripper. Since both robots and grippers have integrated safety elements, HRC applications can be designed, taught and trained, in addition to conventional robotics applications.**

**Learning objectives:**

- Commissioning and set-up of robots
- Parameters of robots
- Designs of robots, special articulated arm robots
- Kinematics of articulated arm robots
- Manual guidance of robots
- Learning, checking and adapting of positions
- Safety with robotic systems
- Use of external sensors and control systems for external components through the robot controller
- Path planning
- Interface checking


## mMS Station Robotics UR3e

| Article | Order-No. |
|---|---|
| mMS Station Robotics UR3e | 39980 |

**More information at: christiani-international.com/39890**

**Use the mMS Pick-to-Light station as a stand-alone or integrated into a Christiani mMS system. In the factory of the future, humans are still an important part of the system. Our in-house developed Pick-to-Light application integrates an assembly workstation into an existing system. The workstation has programmable light signals, acknowledge buttons and monitored compartments. The Pick-to-Light station can help to increase product diversity in Christiani mechatronic systems.**

**Learning objectives:**

- Recipe variants
- User control
- Assembly speed
- Process optimisation
- Employee motivation
- Node-RED programming
- Automation without PLC


## mMS Station Pick-to-Light

| Article | Order-No. |
|---|---|
| mMS Station Pick-to-Light | 39889 |

**More information at: christiani-international.com/39889**

## View mechatronic systems on site

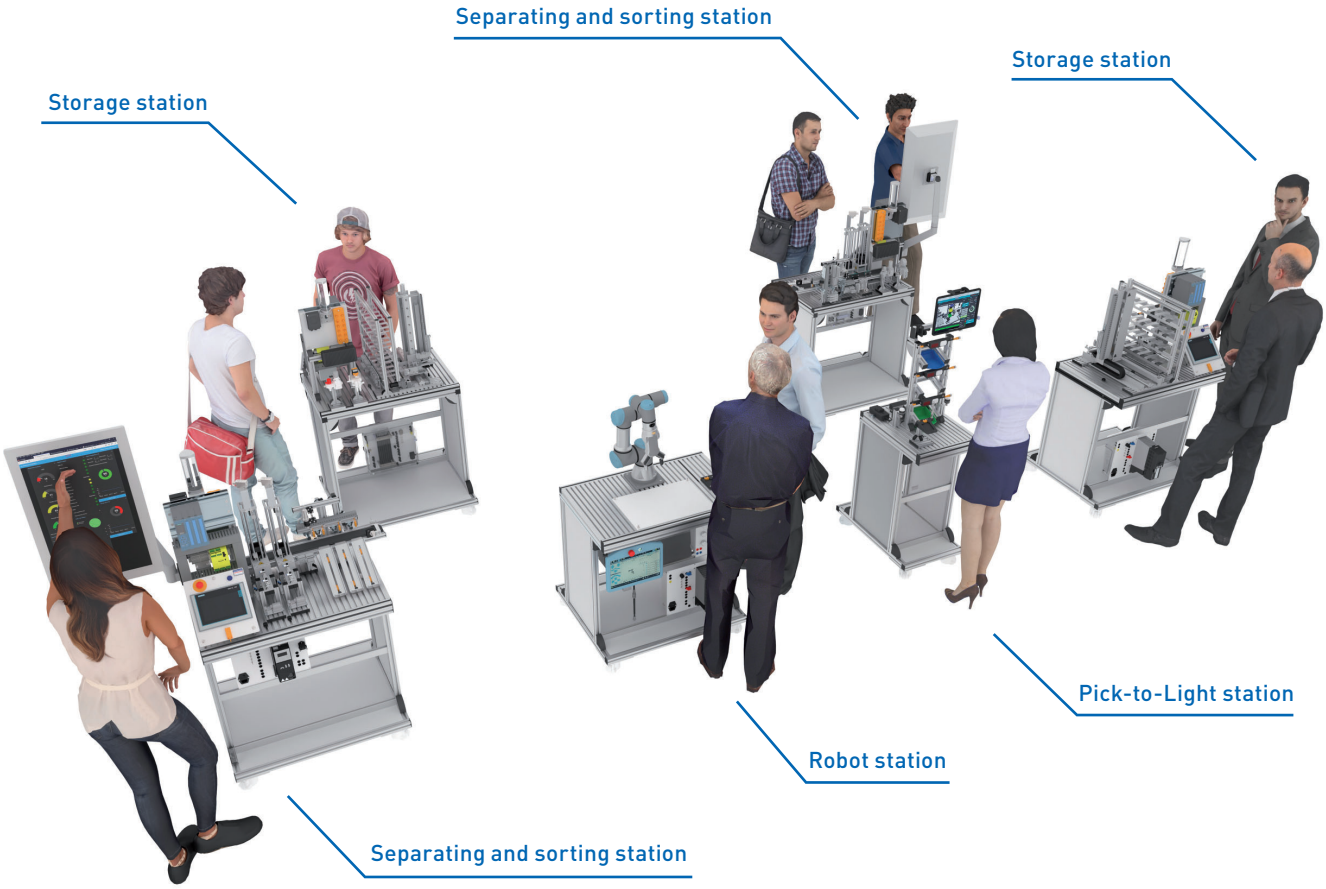
**Find out how modern teaching of technical learning content works with teaching systems and teaching materials. In our Competence Centres in Rheine and Landsberg, we can show you our world of technical training – see, touch and try it out for yourself.**

**Find out more information on pages 6/7**

# The most flexible learning factory for Industry 4.0 applications

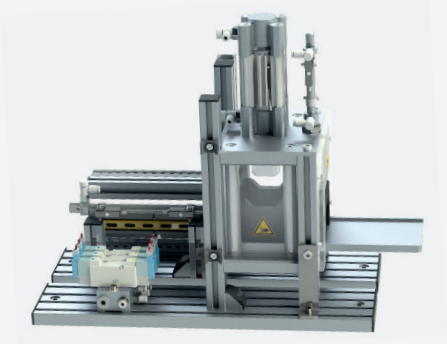
## mMS SmartFactory

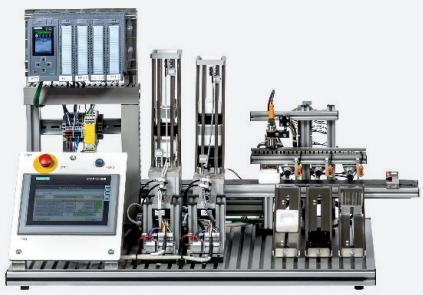
**Digitalisation and Industry 4.0 are the hot topics in automation technology. The move towards increasingly connected systems necessitates constant development and adjustment to fulfil the requirements of Industry 4.0. Our modular mechatronic system (mMS) is perfectly tailored to the needs of vocational and further training. The SmartFactory combines all the advantages of our modular mechatronic system and is consistently designed as a modular system. This paves the way for spatial and technological scalability.**




All stations work in a group, can be combined with each other or can also be used physically separated as a stand-alone application. As a result, learners can observe and understand each station for themselves. The SmartFactory provides optimal support, whether for group work or integrated teaching.

**Functional units** → **Stations**

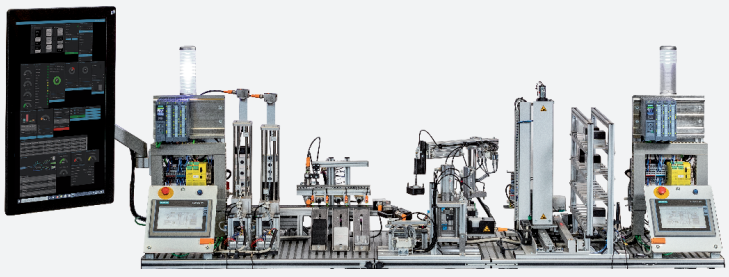




**When constructed to work as a group, a cohesive production process is executed within the system. Learners monitor the system status, influence production or stop production in the system. Give your learners tasks to optimise the system or troubleshoot. In the SmartFactory learning environment, experiments can be performed risk-free, or new technologies can be tested. Understanding processes within systems or understanding program logic is a crucial part of professional life.**

We can achieve the greatest possible transparency thanks to the control system design with no switch cabinet. All installed training boards are freely accessible and can be used for training purposes. It is also no trouble at all to integrate further training materials (training boards). The most important aspect for training is having a system available which uncompromisingly fulfils spatial and technical requirements. In addition, the system should be available at the push of a button with no set-up time necessary. The open and flexible concept of all of our mMS systems ensures that all required skills can be taught step-by-step. This ensures optimal utilisation of the system from the very first day.

**Systems** → **SmartFactory**



# Renewable Energies and HVAC

## Basic Training in Renewables and HVAC

**Practical, sophisticated teaching systems and solutions, combined with training material that has been prepared for teaching, form the foundation of successful training in renewable energies and HVAC.**

**Using our products, you can teach your trainees the required course content in an easily understandable and visual way. We provide the right solution, from the basics right through to complex teaching systems.**

**We are your partner for successful vocational and further training!**

**Here is a practical overview of the most important learning media and learning systems, covering key topics for practical training.**

- Training stands
- Teaching systems
- Experiment manuals (in various languages)
- Learning cases
- Workstation systems

**Our training stands and teaching systems are perfect for conveying the following training topics:**

- Photovoltaics
- Solar Thermal Energy
- Heating Technology
- Heating Hydraulics
- HVAC / Sanitation Technology

**Renewable Energies and HVAC**

- Basic Knowledge Renewable Energies
- Photovoltaics
- Heat Pump / Biomass
- Energy Management
- Basic Knowledge HVAC
- Heating Hydraulics / Wilo-Brain

Please note that our products are designed for the EU market and meet CE requirements. They may be subject to country-specific configurations, such as adaption to local voltage.

**Tip: See how you can combine our teaching systems productively in one training lab**

**Find out now in our Training Lab Concepts catalogue!**


**Find out more at:**
**christiani-international.com/catalogues**

# Learn the basic principles of renewable energies in an easy and understandable way

**Thanks to the pedal-powered and solar-powered teaching systems, the basic principles of photovoltaics and energy technology can be introduced in a fun way. Basic principles, such as current, voltage, power and energy are brought to life for learners through application and experience-oriented knowledge transfer. In addition to hardware, appropriate experiment manuals are a major constituent in the overall didactic concept.**


## Generator Bike

Spanish and more languages available!

| Article | Order-No. |
|---|---|
| Basic Configuration | 75637 |
| Basic Configuration with USB Interface | 93800 |
| Documents for the Teacher | 76634 |
| Documents for the Students | 82806 |

More information at: christiani-international.com/75637


## Solar Power Case

Spanish and more languages available!

| Article | Order-No. |
|---|---|
| Basic Configuration | 75636 |
| Extended Basic Configuration | 76704 |
| Documents for the Teacher | 76632 |
| Documents for the Students | 82805 |

More information at: christiani-international.com/75636

## Energy Trainer

| Article | Order-No. |
|---|---|
| Training Case | 97437 |
| Cable Winch as an Energy Storage Unit | 77493 |

More information at: christiani-international.com/97437

## Solar Work Case

| Article | Order-No. |
|---|---|
| Material Kit Unprocessed | 94920 |
| Material Kit Prepared and Ready for Installation | 94921 |
| Ready for Use | 94922 |

More information at: christiani-international.com/94920

# The Solar Power Laboratory

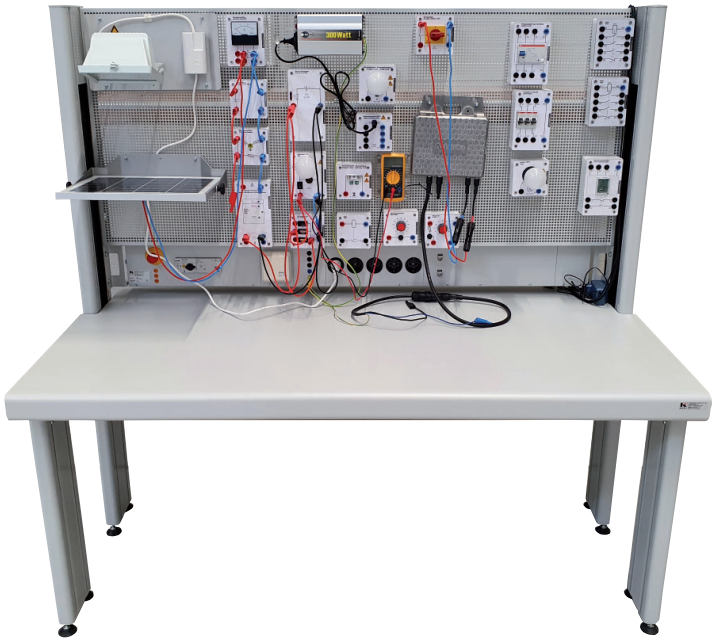
## Learning photovoltaics like the professionals

**The solar power laboratory, developed by solar specialists and teachers, can be used to convey learning content about off-grid technology and on-grid technology in a way that is practical and easy to understand. Detailed experiment manuals for trainers and students are the perfect addition to the overall didactic concept.**

Working with the individual modules, trainees and students gain an insight into the commonly used circuits in photovoltaics. The solar power laboratory modules are state-of-the-art in photovoltaic technology, comply with relevant requirements (VDE 0100 Part 712) and are equipped with standardised and easy to understand symbols.

### Learning objectives:

- Basic fundamentals of photovoltaics
- Components and functional principles of PV off-grid systems and on-grid PV systems
- Different circuits and system concepts
- and many more



| Article | Order-No. |
|---|---|
| Solar Power Laboratory<br>incl. Compontents for Off-grid and On-grid Systems | 82371 |
| Compontents for Off-grid Systems | 76970 |
| Compontents for On-grid Systems | 76971 |

**More information at: christiani-international.com/82371**


### Experiment manuals:

Besides basic information on climate protection and renewable energy, the experiment manuals provide an introduction to off-grid and on-grid technologies. A key part of the manuals comprises practice tasks, which can be performed at the solar power laboratory. The solutions for these tasks can be found in the trainer's edition.

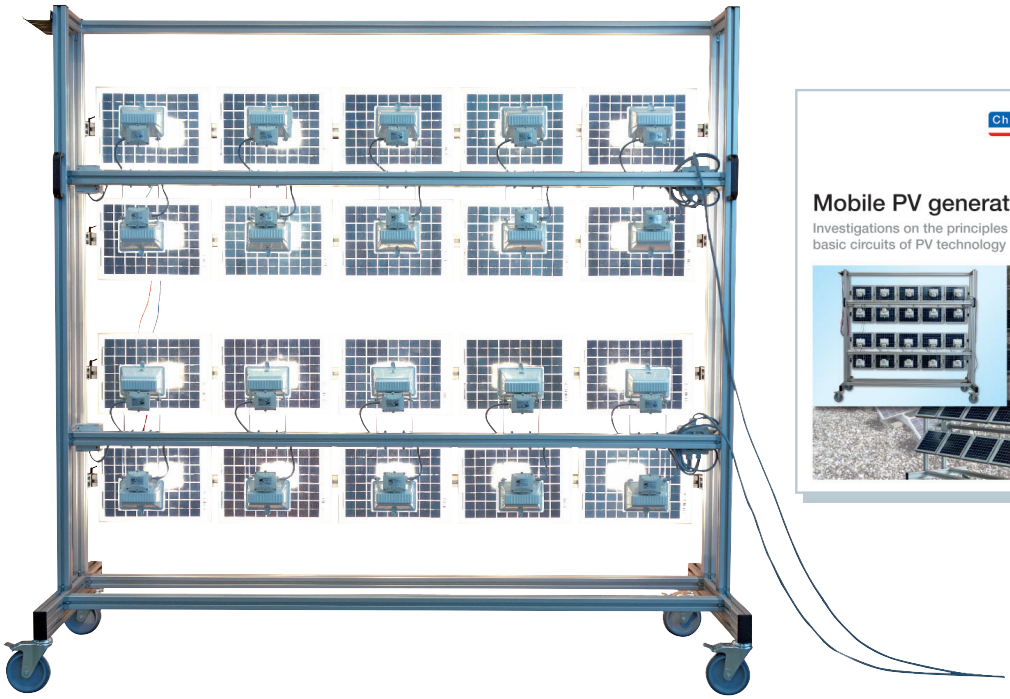
**Spanish and more languages available!**

| Article | Order-No. |
|---|---|
| Documents for the Teacher | 82017 |
| Documents for the Students | 82807 |

# Understanding photovoltaics string by string

## With the mobile photovoltaics teaching system

**Experience the basic principles and basic circuits of photovoltaic technology in a demonstrative and practical way. The aim of the teaching system's didactic and method concept is to convey the knowledge and skills that a PV expert needs in a way that is as close to reality as possible. The model teaches trainees how to design, test, commission and optimise PV systems. The model is operated with halogen headlights as solar simulation or with real sunlight.**






| Article | Order-No. |
|---|---|
| Mobile Teaching System PV Generator | 98385 |

**More information at: christiani-international.com/98385**

**Learning objectives:**

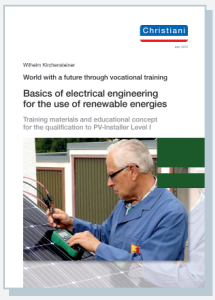
- Basic knowledge of the physical processes involved in generating electricity from light
- Understanding of the system conditions for photovoltaic systems
- Knowledge of the physical operating conditions of PV generators
- Knowledge of safety-related installation conditions of PV modules
- and many more

### Matching this: From basic knowledge of electrical engineering to expert knowledge in photovoltaics

**Basics of electrical engineering for the use of renewable energies**

Training folder with information on basic principles, tasks and solutions

**More information at: christiani-international.com/100861**



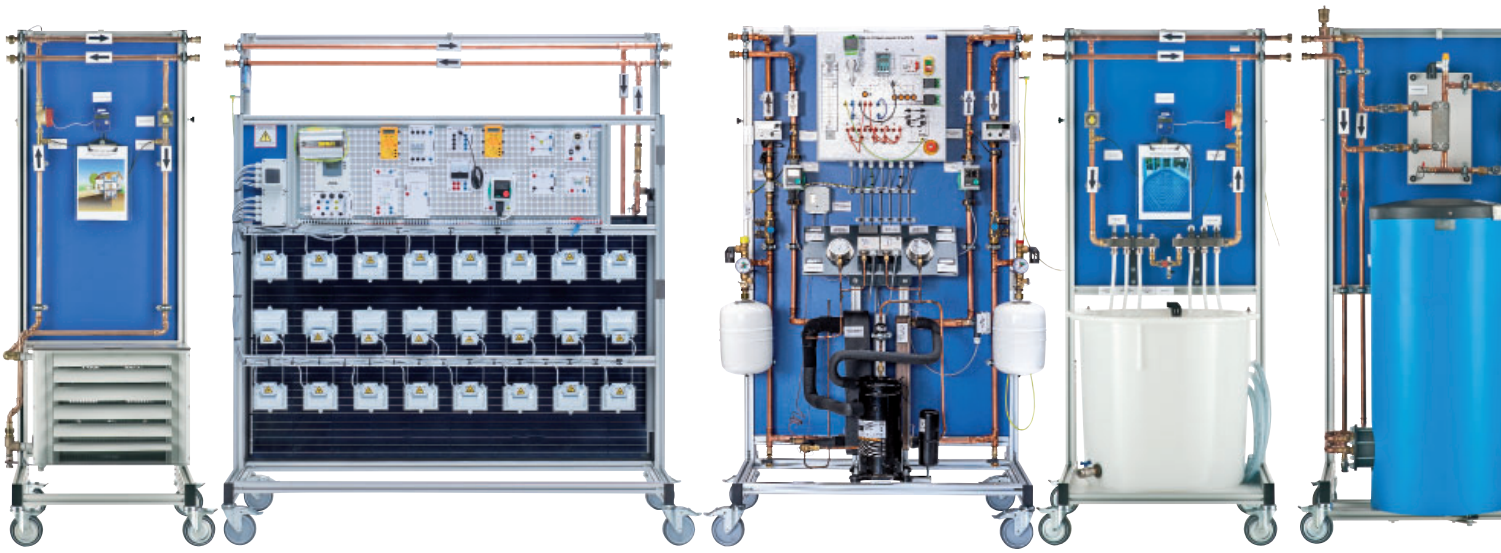
# The complete system for heating technology with renewable energies

## Hands-on teaching system with solar thermal energy, photovoltaics and pellet heating

**This hands-on teaching system with original components enables you to provide teaching about solar thermal technology, heat pumps and biomass and pellet heating systems. The training stands for the modular teaching system can be individually combined depending on the technology to be taught. In addition to providing technical training in basic principles, the teaching system can also be used to impart specialist knowledge of electrical and hydraulic systems. A key part of the teaching system is activity-based and independent work by learners.**

**Learning objectives:**

- Understanding of system conditions of heating systems with renewable energies in general, heat pump heating systems, wood pellet heating systems, solar thermal systems and hybrid collector systems in particular.
- Knowledge of electrical, hydraulic and control operating conditions in various heating system concepts with renewable energies
- Knowledge of the physical processes in various heating technologies
- Skills in planning, installation, commissioning and maintenance of various heating technologies with renewable energies.
- And many more



S2 S6 S5 S1 S4

| Article | Order-No. |
|---|---|
| Teaching System Heating Technology with Renewable Energies<br>Training Stands S1, S2, S3, S4, S5, S6, S7 | 96431 |
| Teaching System Heat Pump with Solar Thermal Energy and Photovoltaics<br>Training Stands S1, S2, S3, S4, S5, S6 | 85394 |
| Teaching System Heat Pump with Solar Thermal Energy<br>Training Stands S1, S2, S3, S4, S5 | 83855 |
| Teaching System Heat Pump<br>Training Stands S1, S2, S3, S4, S5 | 96429 |
| Teaching System Pellet Heating<br>Training Stands S1/S2, S4, S7 | 96430 |
| Teaching System Solar Thermal Energy<br>Training Stands S1/S2, S3, S4 | 96428 |

**More information at: christiani-international.com/96431**

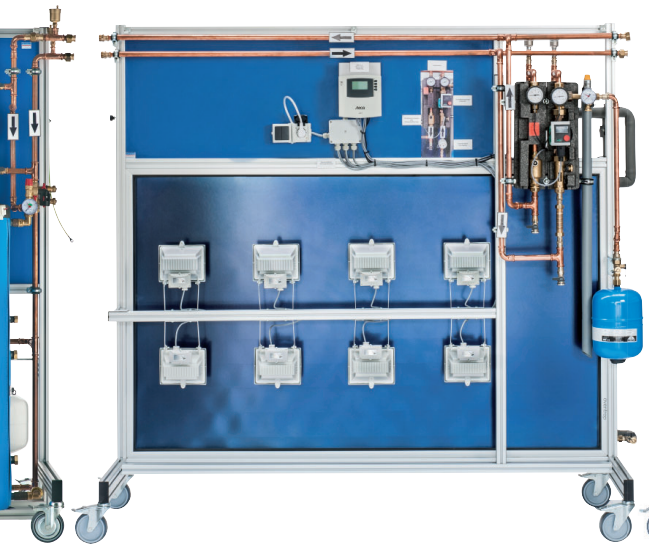
| Article | Order-No. |
|---|---|
| Training Stand Geothermal Heat Source or Underfloor Heating<br>Training Stand S1 | 82125 |
| Training Stand Fan Coil as Source or Sink<br>Training Stand S2 | 82126 |
| Training Stand Solar Thermal Energy with Solar Simulation<br>Training Stand S3 | 82127 |
| Training Stand Coupling Component Hydraulic Switch, Plate Heat Exchanger and Buffer Storage<br>Training Stand S4 | 82128 |
| Training Stand Heat Pump<br>Training Stand S5 | 82129 |
| Training Stand Hybrid Collector with PV Components<br>Training Stand S6 | 85317 |
| Training Stand Pellet Heating<br>Training Stand S7 | 98380 |

**More information at: christiani-international.com/82125**

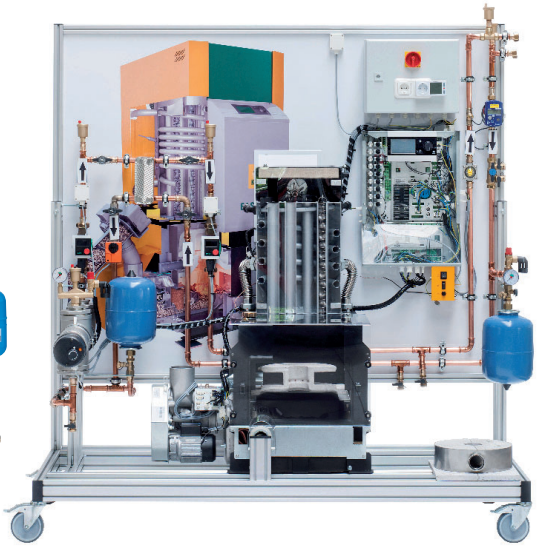
**Experiment manuals:**

Experiment manuals are a major constituent of Christiani's overall didactic concept. They contain an information section and an exercise and solution section. In the teaching system for heating technology, experiment manuals are included with the heat pump and pellet heating training stands.


NEW Digital Data Logging on Page 66



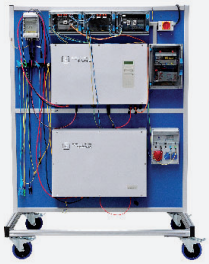
S3



S7

## Tip: Expand the teaching system to include building energy management

### Energy Management for Grid-connected Systems



More information at:
christiani-international.com/19931

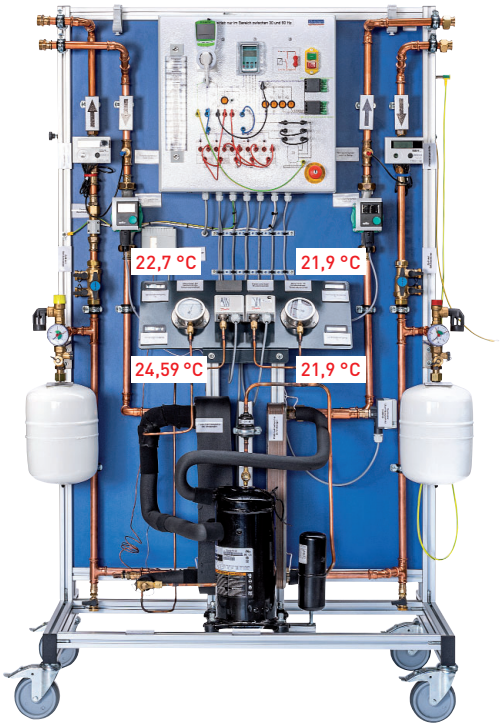
### Energy Management for Off-grid Systems

More information at:
christiani-international.com/33327

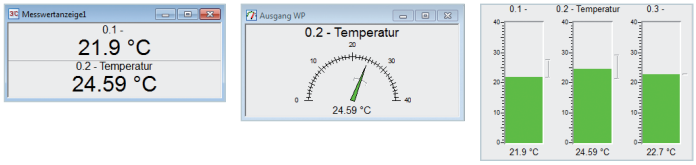
# Digital data logging and display

## Log, display and evaluate data accurately

**Digital data logging allows for fast, automated and precise logging and display of measured values (temperature, pressure and much more). In addition to data logging and display, an in-depth understanding and the ability to evaluate the measured values logged are a key component of the didactic concept. With digital data logging, you are well equipped for future didactic and technical developments.**




### Display of data logged sensors




| Article | Order-No. |
|---|---|
| Digital Data Logging Basic Equipment | 19687 |
| Digital Data Logging Advanced Basic Equipent | 19688 |
| Digital Data Logging Comfort Equipment | 19689 |

**More information at: christiani-international.com/19687**

# Training stands for optimal HVAC training

## Training stand bathroom installation and more

**From planning a bathroom to assessment of the order: This teaching system allows you to teach all aspects of bathroom installation technology – technical expertise in electronics as well as skills in conventional sanitary engineering.**

### Learning objectives:

- Planning and set-up of bathrooms
- Preparation of assembly work
- Development of planning proposals
- Documentation of plans
- Creation of basic drawings and outline sketches
- and many more

### Workflow for customer orders:

- Order analysis
- Order planning
- Order implementation
- Order assessment

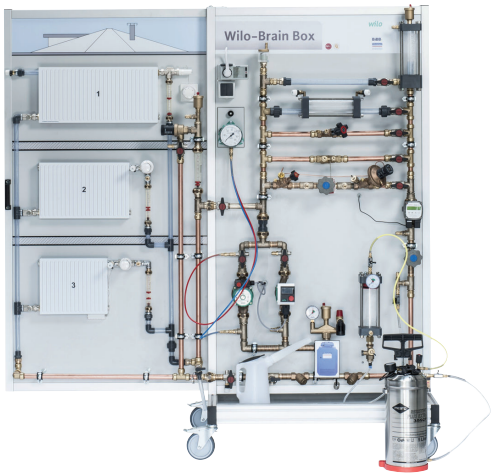
| Article | Order-No. |
|---|---|
| Training Stand Bathroom Installation | 95741 |
| Training Stand Gas Technology | 95740 |
| Training Stand Drinking Water DIN EN 1717 | 95743 |

**More information at: christiani-international.com/95741**

# Wilo-Brain Box classic plus – The heating system on a small scale

## The mobile test stand – ideal for initial training

**The Wilo-Brain Box allows you to see what usually remains hidden behind insulation and plaster. The test stand shows all the essential components of a heating system on a small scale. The heating process is almost completely replicated with partly transparent components. This allows you to demonstrate faults and facilitates professional fault elimination.**




| Article | Order-No. |
|---|---|
| Wilo-Brain Box classic plus with Micro Bubble Deaerator and Sludge Separator | 95485 |
| Wilo-Brain Box classic plus | 58129 |

**More information at: christiani-international.com/95485**

# Demonstrate connections for heating hydraulics

## Training stand heating hydraulics

**Use the mobile training stand to teach connections in heating hydraulics in a demonstrative and practical way. Radiator simulations are equipped with thermostat valves and flow meters to measure the radiator output temperature.**

**The training stand can also be combined with the teaching system for heating technology with renewable energies (see p. 64) or an existing heat generator.**

| Article | Order-No. |
|---|---|
| Training Stand Heating Hydraulics | 97177 |

**More information at: christiani-international.com/97177**

### Tip: To complement this, we recommend:

**Heat generator as expansion of the heating hydraulics training stand**

- Heat generator (< 3 kW)
- Circulation pump
- Diaphragm expansion vessel
- Connections for flow/return pipe

**More information at: christiani-international.com/14562**

# Automotive Technology

## Basic Training and Advanced Training in Automotive Technology

**Are you looking for hands-on solutions for technical training in automotive technology? With our training stands and functional models from well-known manufacturers, together with modern teaching and learning media for conveying basic principles and specialist knowledge, we can provide you with everything you need for successful training.**

**We are your partner for future-oriented technical vocational and further training!**

**Here is a practical overview of the most important learning media and learning systems, covering key topics for practical training.**

- Specialist books
- E-Learnings
- Training stands
- Teaching systems
- Functional models
- Cutaway models

**Our training stands and teaching systems are perfect for conveying the following training topics:**

- E-Mobility / High Voltage Technology
- Engine Technology
- Drive Technology
- Chassis Technology
- Brake Systems
- Vehicle Electrics / Electronics
- Safety Systems
- Vehicle Diagnostics

**Automotive Technology**

- Basic Knowledge
- High Voltage Technology
- Engine Technology
- Vehicle Electrics
- Brake Systems
- Drive Technology

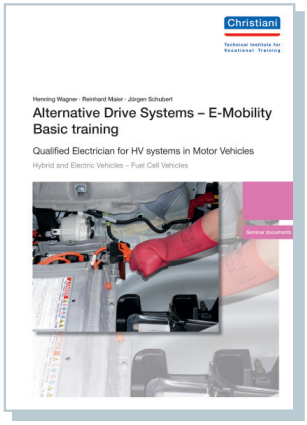
**Tip: See how you can combine our teaching systems productively in one training lab**

**Find out now in our Training Lab Concepts catalogue!**

**Find out more at:**
**christiani-international.com/catalogues**

# Basic principles and specialist knowledge

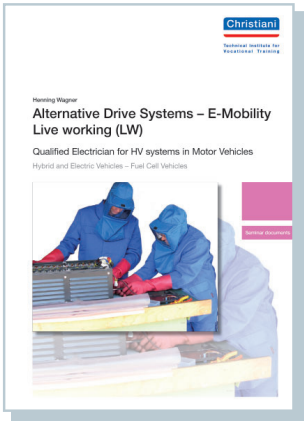
## E-mobility




### Alternative Drive Systems – E-Mobiliy Basic Training

| Order-No. |
|---|
| 19760 |

More information at: christiani-international.com/19760




### Alternative Drive Systems – E-Mobiliy Live Working

| Order-No. |
|---|
| 19770 |

More information at: christiani-international.com/19770

# Basic principles of automotive technology – digital

## E-learning courses as individual modules or as a package

### E-Learning Automotive Technology – Full Package

E-learning courses comprise topic modules, which form complete learning units and each have a learning outcome check at the end of each unit.

NEW

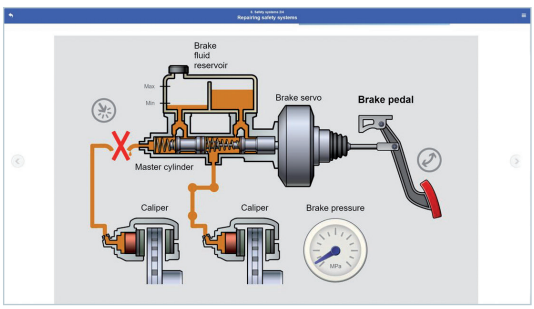

**Go to the demo version and additional information**

### E-learning courses as school and company licenses

Spanish also available!

| Article | Order-No. |
|---|---|
| Full Package | 34423000 |
| Electric & Hybrid Cars | 34195000 |
| Passenger Cars | 34197000 |
| Vehicle Diagnostics | 34194000 |
| Collision Repair | 34193000 |
| Heavy Vehicles | 34196000 |

More information at: christiani-international.com/34423000



# Electrical drives and high-voltage technology in training

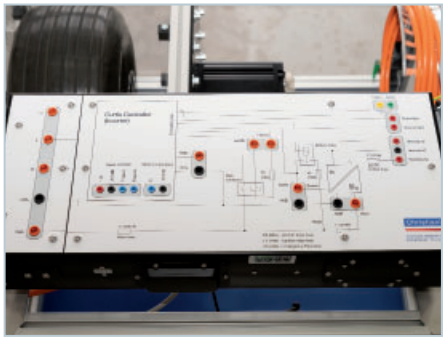
## Christiani HV Trainer – The concept for a safe introduction into e-mobility

**E-mobility and, in particular, high-voltage technology, are the hot topics in automotive technology. The switch from combustion engines to alternative drives requires good training in the field of high-voltage technology and electric drives. With Christiani's training concept, your personnel will be equipped for e-mobility. The combination of realistic training models and didactic documents communicates practical knowledge and theoretical content from one single source.**

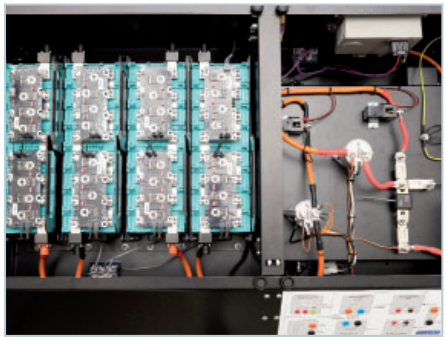
The functional model E-drives and HV systems in motor vehicles consists of a drive module and a power supply and control module. The HV system operates with an operating voltage of 96 volts. A complete power supply unit with electronic battery management (BMS), an integrated charger for the HV battery, a control unit with motor management system, all necessary safety components, Mennekes charging connection (type 2) are built on. The HV system can be enabled either via a service disconnect in the 12V circuit or via a service disconnect in the HV circuit (in the HV battery). In addition, the training system has a rescue disconnection point to represent the disconnection of an accident-damaged vehicle. The HV battery, with 96 volts nominal voltage, is equipped with 32 LiFePO4 / 40Ah cells. The battery management system has a Bluetooth interface. The status (voltage, temperature, balancing rate during the charging process) of each individual battery cell can be displayed via an associated app (Android).

Drive module

Control and energy supply module



Motor control measuring field



HV battery

Operator panel

# The Christiani HV Trainer

## The training system for e-drives and HV systems in vehicles

- Complete, didactically prepared electric drive train with all required controls
- All training content and qualification levels required according to the framework curriculum and DGUV (German Social Accident Insurance) can be implemented
- HV battery with battery management system (BMS), Bluetooth interface and Android app incl. tablet for data evaluation
- Real vehicle-specific functions. No simulation!
- 26 error circuits via app/tablet
- High safety in handling and during practical exercises
- CE-certified

| Article | Order-No. |
|---|---|
| Christiani HV Trainer | 45861 |

More information at: christiani-international.com/45861

# In safe hands for HV Training

## Safety equipment and accessories

### CATU High Voltage Package

| Order-No. |
|---|
| 96891 |

More information at:
christiani-international.com/96891


### AVL DiTEST HV Safety 2000

| Order-No. |
|---|
| 95880 |

More information at:
christiani-international.com/95880

### Multimeter METRAHIT IM E-Drive

| Order-No. |
|---|
| 33812 |

More information at:
christiani-international.com/33812

**Tip: To go with this, we recommend**

### E-Learning Automotive Technology – Electric & Hybrid Cars

Spanish also available!


Find out more at:
christiani-international.com/34195000

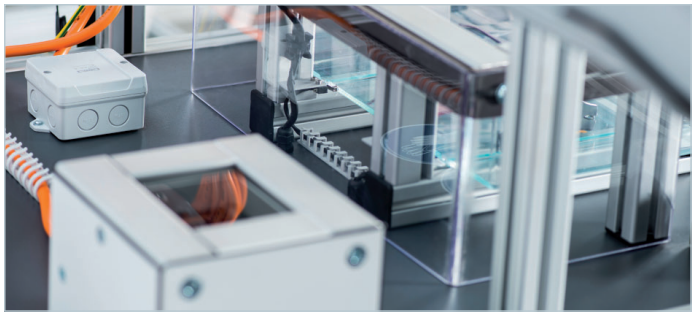
# Working safely with high-voltage technology

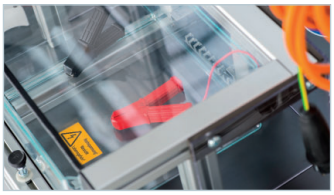
## Training Stand HV hazards and accident prevention

**Working on high-voltage systems in motor vehicles entails dangers that require special qualifications of all persons who may be exposed to them in their daily work. Particularly important in this context is compliance with the safety regulations in electrical engineering. The training stand "Dangers and Accident Prevention" shows several dangers when working on high-voltage systems, teaches how to recognise danger zones, how to learn safety regulations when working and how to handle protective equipment.**
**Der mobile Schulungsstand HV-Gefahren besteht aus fünf Schulungsmodulen, welche Auszubildende und Fachkräfte im Umgang mit der HV-Technik sensibilisieren sollen.**

### The training modules cover the following topics:

- Hazards when rescuing injured persons
- Hazards when severing HV cables
- Consequences of electric shocks from electric current
- Disconnection trainer for HV systems in vehicles
- Measurement exercises for insulation resistance and potential equalisation



### Training Stand HV Hazards and Accident Prevention

| Order-No. |
|---|
| 13497 |

**More information at: christiani-international.com/13497**

### Tip: For working safely on high-voltage systems in vehicles

#### CATU High Voltage Set

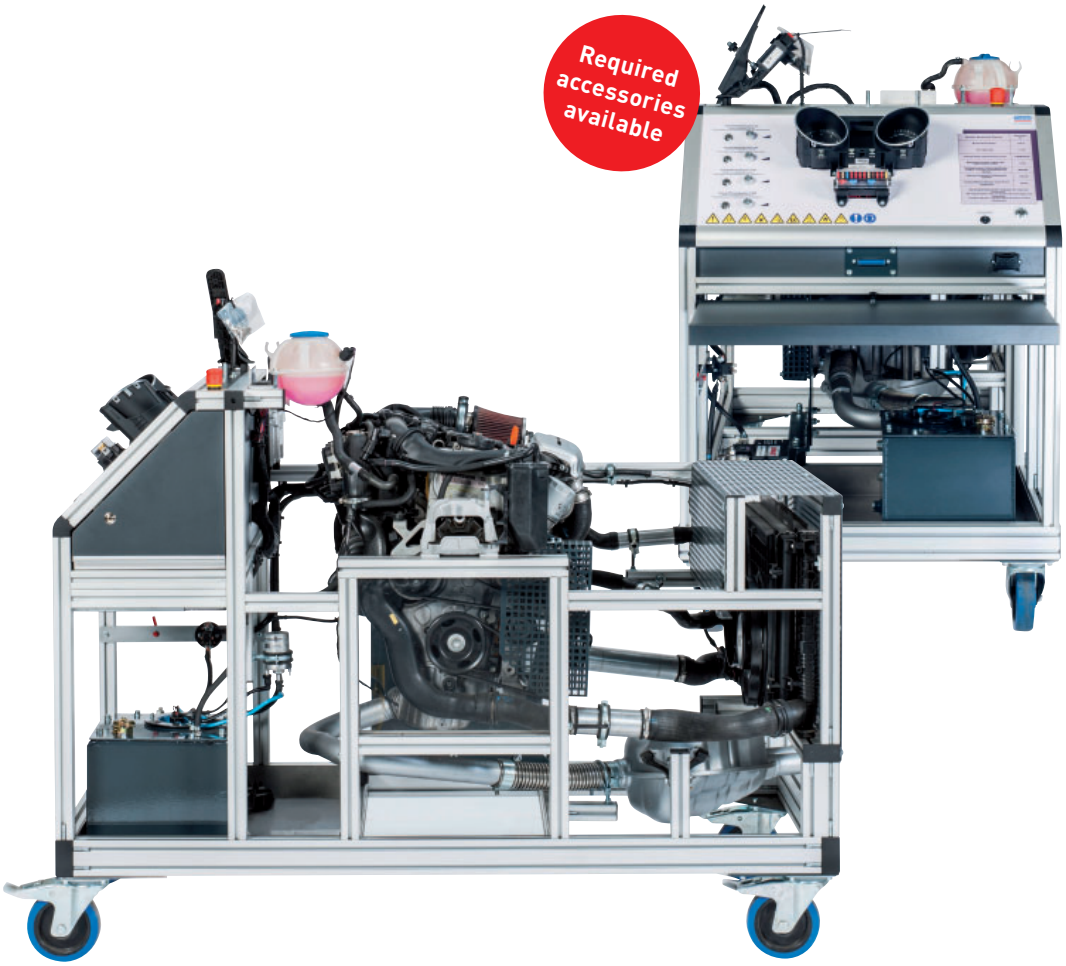
**More information at:**
**christiani-international.com/96892**

#### Portable Rescue Kit

**More information at:**
**christiani-international.com/14776**

# Original motors for practical training

**The component simulation of Christiani functioning engines make them perfect for displaying various operating statuses and emergency running characteristics. Manipulating individual sensors allows trainees to follow the reaction of the engine management system visually, for example by evaluating measured value blocks or fault code entries. The fitted and lockable fault circuit allows 24 different electrical faults to be connected within the engine. The resulting malfunctions enable training to be very realistic. The functioning engines are mounted on a mobile frame and are composed of original components.**




## Functional Engine VW 1.5 TSI OPF Golf 7 with Particle Filter

| Order-No. |
|---|
| 34296 |

More information at: christiani-international.com/34296

## Functional Engine VW 2.0 TDI-CR Blue Motion Golf 7 with SCR-Sytem

| Order-No. |
|---|
| 13859 |

More information at: christiani-international.com/13859

You can find other functional engines and corresponding accessories at:
christiani-international.com/engine-technology

# Provide training in engine technology in a clear and targeted manner

## Christiani training stands with original components

**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. The objective of this training stand is to train the IPO principle (Input-Processing-Output) in a targeted manner and to create visible examples of this. The built-in components are colour-coded according to their respective tasks. The system components are connected and labelled according to the original VW circuit diagram. The front is laminated with a printed foil and can be written on with water-soluble pens.**


**Learning objectives:**

- Working with maintenance schedules, wiring diagrams, symbols, connections etc.
- Naming electricals and electronic components, functional units and systems
- Selecting and using electrical measuring and testing equipment
- Measuring and evaluating electrical variables and signals
- and many more.

### Training Stand VW Sensors/Actuators

| Article | Order-No. |
|---|---|
| Training Stand VW Sensors/Actuators | 81979 |
| Training Stand VW Sensors/Actuators with Parking Aid (Park Distance Control) | 93025 |

**More information at: christiani-international.com/81979**

### Tip: We offer selected measuring tools for your training workshops!

#### 2-channel Handheld Oscilloscope Multimeter

**More information at: christiani-international.com/58556**

#### Ross-Tech® HEX-V2®

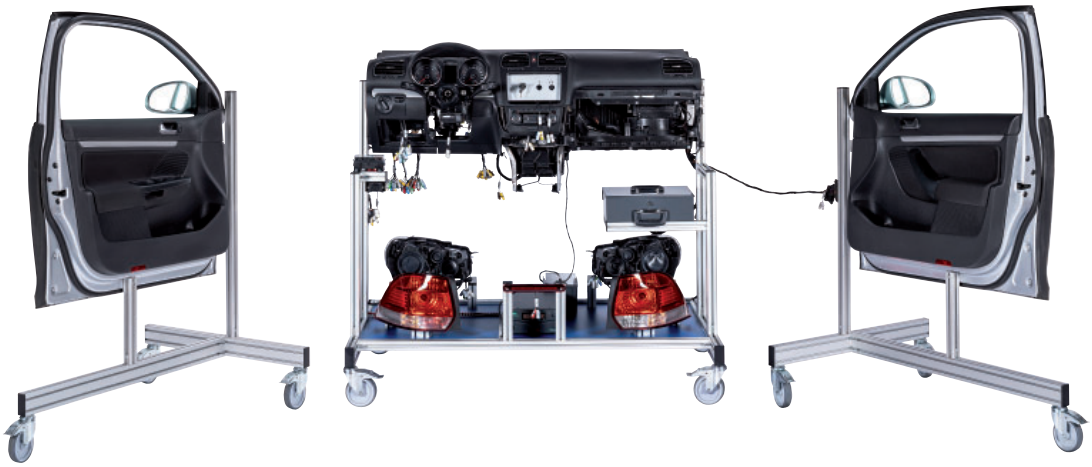
**More information at: christiani-international.com/14289**

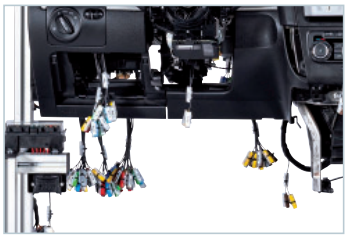
# Vehicle electrics and networked systems

## From the basics to advanced topics

**Electrical vehicle systems are amongst the most complex automotive technology to be found in vehicles. The use of measuring and test equipment as well as sophisticated diagnostics devices requires specific expertise in vehicle electrics and in the complete data communication system structure. Increasing numbers of vehicles additionally have high-voltage systems in their drive and comfort systems. As a result, work on electric vehicle systems must be carried out taking into account the necessary safety measures.**

The training stand is perfect for practical use in the areas of CAN-LIN bus, central electrics, air conditioning control, airbar and comfort system. The integrated fault circuit with 20 faults enables troubleshooting in electrical connectors and practice-oriented work with measuring devices and diagnostics systems usually used in workshops. Eight additional faults can also be switched in the CAN data bus in order to facilitate troubleshooting in data communication between the various control devices.





**Learning objectives:**

- Naming of electrical and electronic components, assemblies and systems
- Testing and repair of electrical and electronic circuits
- Selecting and using electrical measuring and testing equipment
- Measurement and evaluation of electrical quantities and signals
- and many more.

### Training Stand Central Electrics

| Article | Order-No. |
|---|---|
| CAN-LIN-Bus | 82616 |
| Additional equipment bi-xenon bending light | 34401 |
| Additional equipment break-out box for driver doors | 34402 |

**More information at: christiani-international.com/82616**

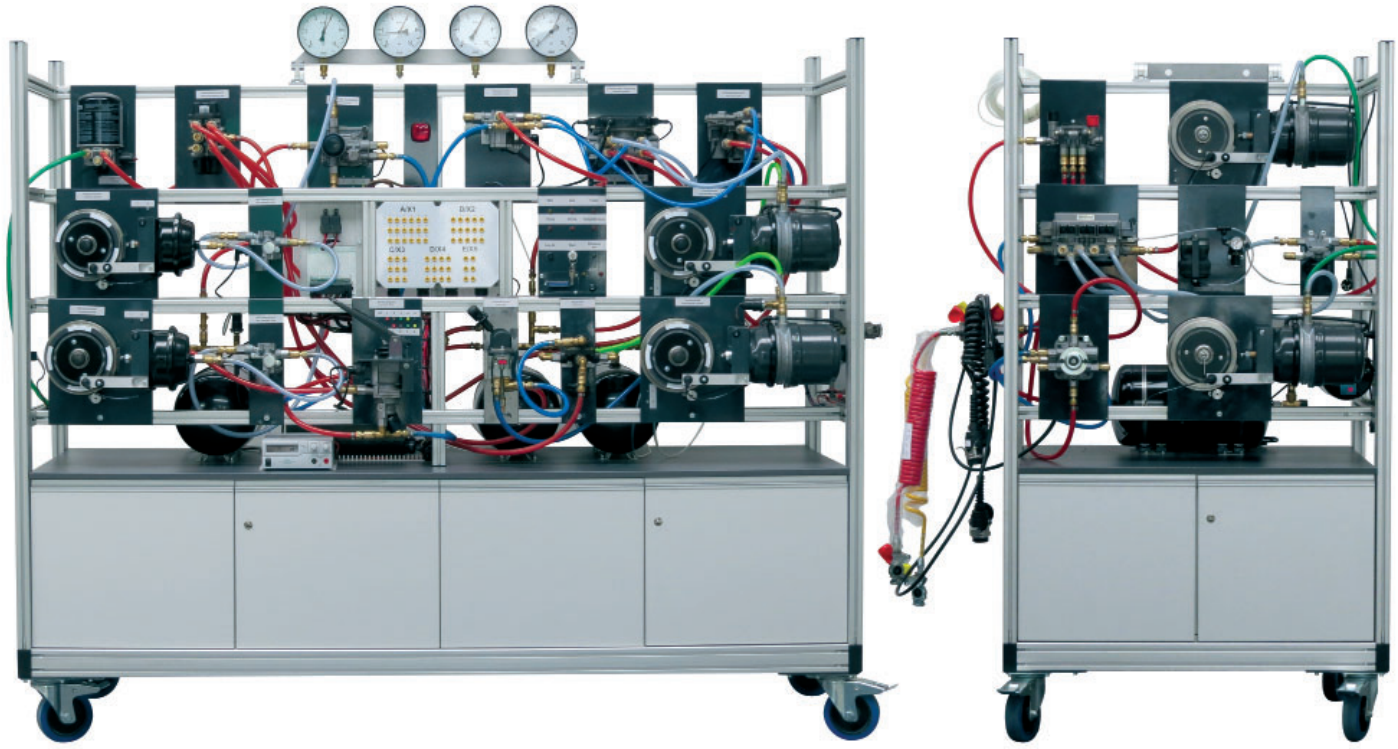
**You can find other training stands and corresponding accessories at:**
**christiani-international.com/vehicle-electrics**

# With compressed-air braking systems for increased safety

## Training stand compressed-air braking system EBS 1C

**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 trouble-shooting. 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.



**Learning objectives:**

- Performing maintenance, diagnostic and repair work on braking systems and networked systems
- Identification of braking systems, analysis of functions and interaction with other systems
- Evaluation of self-diagnosis of electronic brake energy control systems and networked systems
- Coding of control units, adaptation of software versions and testing of data communication lines
- and many more.

### Training Stand Compressed-Air Braking System

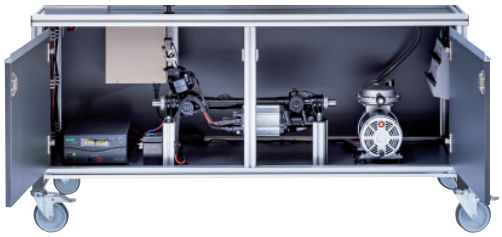
| Article | Order-No. |
|---|---|
| WABCO EBS 1C Motor Vehicle | 80870 |
| WABCO EBS 1C Trailer | 80871 |
| WABCO EBS 1C Motor Vehicle and Trailer | 77192 |
| WABCO TEBS-E Trailer | 32850 |
| WABCO EBS 1C / TEBS-E Motor Vehicle and Trailer | 32855 |

**More information at: christiani-international.com/77192**

# Safety and driving dynamics on the road

## Training stand driving dynamics control

**Demonstrate and test functions and processes, faults and measured values just like on the original braking system. With the fully functioning ABS/ESP braking system, various operating and control states can be demonstrated. The required components are arranged in the IPO principle (input – processing – output) and colour-coded.**



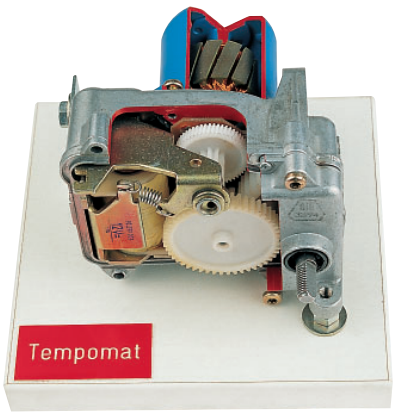
### Training Stand Driving Dynamics Control

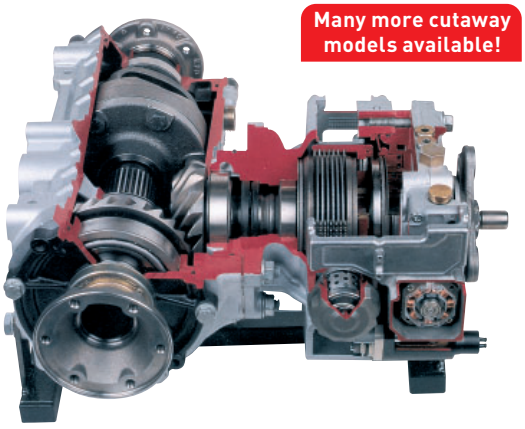
| Order-No. |
| --- |
| 33430 |

More information at: christiani-international.com/33430

# Learning on cutaway models

**Christiani's cutaway models allow you to provide excellent demonstrations of the inner workings of components and engine parts that are not usually visible. The cut edges are highlighted in colour to aid visibility. The moving parts, such as pistons, shafts or valves, are also functional on the cutaway model.**




### Cutaway Model Actuator for Cruise Control

| Order-No. |
| --- |
| 73325 |

More information at: christiani-international.com/73325

### Cutaway Model Haldex Clutch

| Order-No. |
| --- |
| 73490 |

More information at: christiani-international.com/73490

# STEM Education / Physics

## Teaching materials and experimental equipment

**It is our mission to inspire young people with a thirst for knowledge in science and technology. Encourage your students' engagement and interest with practical and demonstrable approaches, which ensure successful learning in physics classes!**

**Your students at secondary level can carry out numerous basic experiments in physics thanks to our robust and high-quality cases. The device sets required for the experiments are neatly organised and securely stored in plastic cases with device-shaped foam inserts. The cases are space-saving as regards storage and it is easy to see at a glance whether the set is complete. The corresponding student workbooks provide you with support for preparing classes, as well as supporting your classes when performing experiments.**

**We are your contact partner for STEM lessons!**

**Here is a overview of the most important teaching media and products, covering the most important topics for practical physics lessons.**

- Cases
- Device Sets
- Experiment Instructions

**Our experiment devices are perfect for conveying the following topics:**

- Mechanics
- Optics
- Magnetism
- Electrostatics
- Electrics / Electronics
- Electromagnetism

**STEM Education / Physics**

- Mechanics
- Optics
- Magnetostatics
- Radioactivity

### Tip: Practise CAD and CAM skills

**FiloCUT 3 enamel cutter**

The FiloCUT system is a very easy-to-use CNC fusion cutting system for polystyrene foam. The machine will help and motivate students to acquire future-oriented skills.

**More information on page 29.**

# Case Set Mechanics (Mechanics 1 – 3)

**For mechanics experiments for students, we offer cases designed for basic mechanics, simple machines and linear movement. These enable students to learn about the nature of solid and liquid materials, as well as investigate Newton's laws. All devices are neatly organised in plastic cases with device-shaped foam inserts. The student workbooks for mechanics make it easier to prepare for and perform the experiments.**



Set includes workbook for Mechanics and Linear movement

## Case Set Mechanics 1 – 3

**Spanish also available!**

| Article | Order-No. |
|---|---|
| with Timer Set, incl. Experiment Instructions, English | 44582 |
| without Timer Set, incl. Experiment Instructions, English | 44580 |

**More information at: christiani-international.com/44582**

# Case Set Optics (Optics 1 – 3)

**For student experiments involving optics, we offer three cases designed for geometric optics, lens equation and wave optics. All devices are neatly organised in plastic cases with device-shaped foam inserts. The components in the cases can be advantageously combined to enable a wide range of different experiments. The high-quality foam inserts also protect fragile components and enables clear organisation.**

### Experiments with the case Optics 1:

- Light propagation: Shadow
- Mirror
- Refraction
- Lenses
- Eye
- Mixture of colour

### Experiments with the case Optics 2:

- Light propagation
- Mirror
- Lenses
- Optical instruments
- Eye
- Colour dispersion

### Experiments with the case Optics 3:

- Spherical lens error
- Chromatic aberration
- Diffraction at the grid
- Wavelength determination
- Polarisation with filters
- Rotation of the polarisation plane by the placement of solids
- Saccharimeter – Model
- Photoelastic object





Spanish also available!

Set includes workbook for Optics 1 and Optics 2+3

## Case Set Optics 1 – 3

Spanish also available!

| Article | Order-No. |
|---|---|
| incl. Experiment Instructions, English | 44578 |
| Experiment Instructions Optics 1<br>Documents for the Students, English | 96577 |
| Experiment Instructions Optics 2 & 3<br>Documents for the Students, English | 96578 |
| Experiment Instructions Optics 1 (6 Pieces)<br>Documents for the Students, English | 97931 |
| Experiment Instructions Optics 2 & 3 (6 Pieces)<br>Documents for the Students, English | 97932 |

**More information at: christiani-international.com/44578**

# Case Magnetostatics

**The magnetostatics device set offers the possibility of investigating the various forces of magnetic systems through a range of impressive experiments. The well-organised storage for individual parts makes it easier to set up experiments and allows students to research individual aspects of magnetism in a focused manner.**

### Experiments with case Magnetostatics:

- The magnet as a compass
- Magnetic and non-magnetic materials
- Magnetic force
- Interaction between magnet and iron
- The floating paperclip
- Magnetic influence
- Rejection by influence
- Elementary magnets
- Magnetic field between two magnets
- The magnetic field
- Field lines of a horseshoe magnet
- Magnetic field of earth

### Case Magnetostatics

Spanish also available!

| Article | Order-No. |
|---|---|
| incl. Magnetic Needle Model and Magnetic Bearing Plate | 98441 |
| Documents for the Teacher, English | 95857 |
| Documents for the Students, English | 96357 |
| Documents for the Students (6 Pieces), English | 97929 |

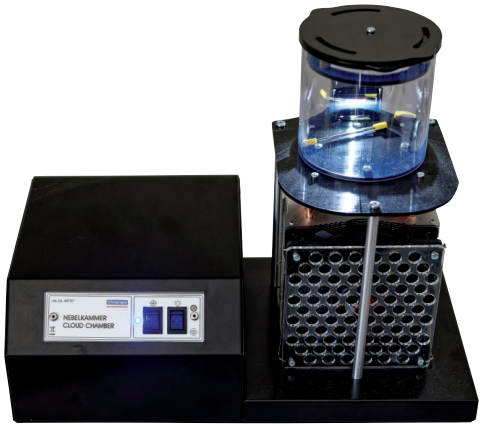
**More information at: christiani-international.com/98441**


# Cloud Chamber with Peltier Cooling and LED Lighting

**You can easily convey an understanding of radioactivity to your students with our compact cloud chamber.**

### Learning objectives:

- Demonstration of radioactivity
- Identification and description of different particle tracks
- Explanation of the origin of particle tracks
- Understanding of the effect of particle radiation on materials




Spanish also available!

| Article | Order-No. |
|---|---|
| Continuous Cloud Chamber with Peltier Cooling and Bright LED Illumination | 100786 |

**More information at: christiani-international.com/100786**

# Christiani Academy

## Advanced Training for Technical and Specialist Trainers

**The Christiani Academy is a modern training centre for targeted qualification of technical and specialist trainers. As Germany's oldest distance learning institute, Christiani has a long history of advanced training.**

### The Christiani Academy's range of advanced training focuses on topics in three areas:

1. Trainer qualification
2. Technical qualification
3. AR/VR virtual learning

### Advanced training at locations world wide

Our range facilitates advanced training at a variety of locations across the world:

- Courses with supervision (blended learning) – worldwide
- Seminars and workshops – at our customers' company site or in our Competence Centres in Germany (Rheine in Westphalia and Landsberg am Lech near Munich, as well as our company site in Berlin)
- Webinars and online courses – from anywhere in the world
- Specialist literature

### Customised solutions

We develop customised solutions for advanced training for staff in companies, educational institutions and other institutions.

- We train technical specialists and trainers.
- We support trainers in their work with targeted qualification measures.
- We enable companies and educational institutions across the world to work according to the German model of dual education, combining theory and practice.
- We can create customised advanced training programmes from existing workshop modules to train multiple participants, or we can develop learning content according to our customers' requirements.

**Christiani Academy**

- Technical Training
- Vocational Pedagogical Training
- Virtual and Augmented Reality Training

# Technical Training

**From basic knowledge through to proficient expertise, we train technical staff in metal technology, automation technology and electrical engineering. We will also be happy to develop tailor-made education concepts for your employees.**

## PLC Technology

With the "PLC Technology" training course, the participant learns the basics of PLC technology and programming with the SIMATIC STEP 7 programming language in a practical manner in six instructional letters. As part of the course PLC programs for various automation tasks are created and tested with a professional simulation program.

**Learning content:**

- Basic structure and functions of modern automation systems
- Installation steps for configuration and parameterization of software and hardware
- Well-founded insight into the process-oriented working method and operation of a SIMATIC S7-300
- Creation of PLC projects and the systematic design of program sequences and program documentation
- Important programming commands in different programming languages (AWL/KOP/FUP)
- Program structure with functions, data and function blocks
- Standard functions, standard function blocks and individual registers in SIMATIC STEP 7 projects
- Practical exercises on the simulation models are used for commissioning and testing
- Systematic troubleshooting and error correction

## Electrician Basics

This module is designed for employees (participants) from the areas of engineering, construction, commissioning and service & maintenance of electrical systems and equipment with electrical engineering training. Electrical specialists are qualified to carry out, supervise and be responsible for electrotechnical work on equipment, electrical systems and in electrical operating facilities. The module also covers laws, standards and guidelines, electrical components and hazards in electrical engineering.

## Electrician

### (with switching qualification for switching authorization)

The basis of this course is the module "Electrician Basics". On top of this module the following additional contents will be covered. Electricians are trained to carry out switching work in the medium-voltage grid up to 52 kV. They are authorised to connect and disconnect electrical operating sites to the distribution network. Electrical installers are responsible for the management of electrical installations and operating sites as plant and/or work supervisors.

**More information at:**
**christiani-international.com/academy**

# Drive Technology

Starting from some general basics, the most important types of drives are introduced one after another in the "Drive Technology" course. Every electric drive is characterised by its electric motor. The considerations of the drives will therefore always begin with functional descriptions of the type of motor used and will then be extended to the actuators and methods for controlling and regulating the drive.

**Learning content:**

- Basic structure of modern electric drives
- The structure and main components of DC drives
- The structure and operation of an asynchronous motor, a frequency converter and a speed-controlled asynchronous motor
- The differences between V/f control and vector control
- The application areas and special features of servo drives
- The control and optimization of servo drives
- The application areas and special features of stepper drives
- The classification of electric drive systems in automation solutions
- Designing solutions for motion control applications
- Electromagnetic compatibility
- Practical work with virtual test benches

# Hydraulics

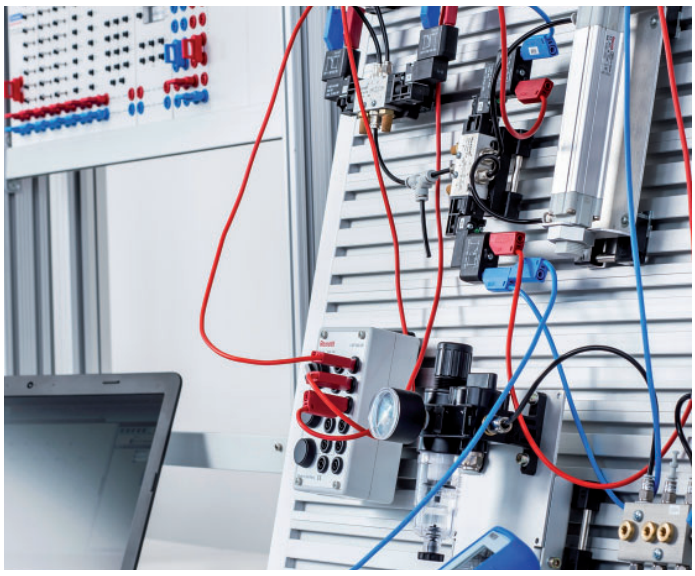
This course is suitable for anyone who is encountering the subject of "Hydraulics" for the first time. The focus is on safety, basic physics and the structure of a simple hydraulic system. Furthermore, the function and schematic structure of various components are covered extensively in the course to help participants get started with hydraulics. With the help of various measuring methods, the special features and effects of area ratios are demonstrated in practice, among other things.

# Pneumatics / Electropneumatics

The course "Pneumatics / Electropneumatics" developed in cooperation with the company SMC, the world's leading expert for pneumatic solutions. Using practical examples, the course imparts comprehensive knowledge about pneumatic components and systems. Step by step, under professional supervision, you will acquire basic physical knowledge, learn to create and simulate pneumatic plans and gain an insight into electropneumatics.

**Learning content:**

- Possible applications and operating conditions of pneumatics
- Structure of pneumatic systems
- Physical basics
- Properties of the transmission medium compressed air
- Pneumatic drive elements (cylinders, grippers and pneumatic motors)
- Cylinder designs and mounting options
- Functionality and types of directional control valves
- Possible applications of shut-off and flow control valves
- Circuit diagram creation and extensions
- Representation with control tasks
- Function and fields of application of proportional technology
- Basics of vacuum technology
- GRAFCET plan representations
- Basics of electrical engineering and electropneumatics
- Introduction – electrical control of valves
- Basic circuits in electrical control systems
- Sensors in pneumatic systems



**More information at:**
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# Automation Technology / Industry 4.0

The course "Automation Technology / Industry 4.0" deals in detail with the modular Mechatronics System Sorting System 4.0 (mMS SSC 4.0). With the mechatronic system, learning contents of automation technology and mechatronics can be taught from the basics to complex applications of Industry 4.0 in a small space. The following content will be taught in this training course:

- Fundamentals of mechatronics
- Basics of industrial system and processes
- Sensor and actuator technology
- IO-Link technology
- PLC and HMI programming in TIA portal
- Pneumatics and electropneumatics
- Plant, machinery and operator safety
- Network technology - wired and wireless
- IIoT tools like OPC UA, MySQL and MQTT
- Dashboard designing using Node-RED
- Data acquisition, data storage and data analysis

This training course is well suited for plant mechanics, mechatronics technicians, automation technology technicians, technicians for industrial engineering, technicians for industrial mechanics etc.

## Course structure:

### Day 1

- Introduction to SSC 4.0 and various IoT tools used in SSC 4.0
- Commissioning check of SSC 4.0 Understanding how to make the system ready for operation
- Manual IO Check. Understanding various sensors and actuators installed in SSC 4.0
- Automatic operation – How to issue a command from HMI, dashboard or smart devices

### Day 2

- Understanding PLC and HMI programming structure
- Introduction to IO-Link technology and various IO-Link devices used in SSC 4.0
- Introduction to OPC UA and learning how to use OPC UA to get the data from the PLC to the visual dashboard
- Introduction to MQTT and MySQL. How these tools are used in SSC 4.0 for data exchange and logging

### Day 3

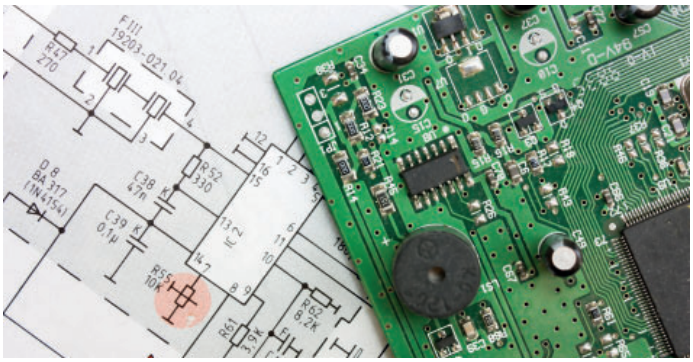
- Introduction to Node-RED (graphical development tool) and learning how Node-RED brings all IIoT tools together to display information on a visual dashboard
- How SSC 4.0 can send data to the cloud. LIVE demonstration of cloud connections

# Electronics

The Electronics Compact course provides basic knowledge of electronics and electrical engineering. Illustrations, circuit diagrams and experiment instructions clearly explain the electrotechnical processes. The balanced relationship between theory and practice gives you the necessary confidence in learning the electronic and electrotechnical basics. Numerous exercises serve to consolidate and check what you have learned.

**Learning content:**

- General principles of electrical engineering and electronics
- The most important terms and units
- Electronic components in different circuits
- Structure and function of measuring instruments
- Meaning and properties of electric and magnetic fields
- Structure and function of semiconductor components
- Components of power electronics
- Amplifier types and their properties
- Exercises and solutions
- Professional electronics experiments



# 3D Construction

The "3D Construction" course teaches the diverse possibilities of object-oriented design with the CAD program SolidWorks®. Participants learn to create 3D models with the CAD software SolidWorksDIN, to design their own shapes as well as to design components and assemblies.

**Learning content:**

- Basics of 3D modeling with CAD
- Designing and constructing 3D objects on the computer
- Basics of assembly design
- Creating sectional and detailed views
- Collision check in the assembly
- Motion simulation on the model
- Project management
- 2D drawing derivation

# Industrial Foreman Metal

Technological change in industry is leading to new structures, courses of action and demands in companies. As a result, there is a growing need for middle managers in industry. This is where the metal industry foreman comes in. Industrial foremen in the metal sector are coordinators, consultants and managers in their companies. As an intermediary between skilled workers and company management, you assume responsibility for production and employees.

**Learning content:**

- Acting in a legally conscious manner
- Business management
- Application of methods of information, communication and planning
- Cooperation within the company
- Cost accounting
- Consideration of scientific and technical laws
- Operating technology
- Production engineering
- Assembly technology
- Operational costing
- Planning, control and communication systems
- Occupational, environmental and health protection
- Personnel management
- Personnel development
- Quality management

# Vocational Pedagogical Training

**By supporting junior staff, trainers play a crucial role in ensuring a company's success. The tasks are diverse in nature: Alongside technical expertise, trainers also work as coaches or moderators, taking on pedagogical tasks. The variety of roles, requirements and tasks for training staff require comprehensive knowledge, as well as skills in planning, methodology and pedagogy.**

## Instructor Qualification – Training

In addition to technical expertise, training young people is a task that also requires personal and pedagogical qualities. In this course, trainers gain the skills to carry out training professionally, methodically and practically, covering the training plan, learning content to be taught through to schedules for trainees.

The course is particularly effective due to its mix of methods. It conveys the learning content in a short time and in an easily understandable way. The contents are structured according to the four fields of activity.

**Learning content:**

- Checking training requirements
- Prepare training
- Conduct training
- Completing training

## Learning Process Facilitator

The training course for certified learning process facilitators is suitable for anyone who wants to deepen and expand the basic knowledge. It is aimed at vocational trainers who want to reflect on their own pedagogical actions and place their training activities on a solid pedagogical and professional basis.

In addition to the specialist knowledge on the design of learning processes, you will also acquire a great deal of methodological competence in this course, for example on learning offline and online.

**Learning content:**

- Organization and planning of vocational training processes
- Accompanying learners and their learning processes

**More information at:**
**christiani-international.com/academy**

## Certified Training and Further Education Pedagogue

The advanced training to become a certified training and further education pedagogue is suitable for all those who deal with the topic of training on a full-time basis. In addition, the advanced training is the first choice for those who want to perform examination or management tasks in education and training.
According to the DRQ (German Qualification Framework), the Certified Training and Further Education Educator course is at level 6. Our advanced training conveys the elementary tools for professional vocational training - from planning and implementing educational processes to advising, accompanying and supporting learners to quality assurance. This is the ideal further training for full-time trainers in companies and educational institutions.

**Learning content:**

- Module 1: Accompanying learning processes
- Module 2: Organizing learning
- Module 3: Examining and evaluating
- Module 4: Accompanying professionals, ensuring quality

## Certified Training Vocational Educator

Vocational educators usually work as managers or specialists in training and further education as well as in personnel development. Further training to become a certified vocational educator is at the level of a master's degree (DRQ7). For those who aspire to leadership functions in vocational education and would also like to qualify for tasks in personnel development or strategic management, our advanced training as a certified vocational educator is the right career step.

**Learning content:**

- Module 1: Accompanying learning processes
- Module 2: Organizing learning
- Module 3: Examining and evaluating
- Module 4: Accompanying professionals, ensuring quality
- Module 5: Organization and management
- Module 6: Leadership and consulting

# Virtual and Augmented Reality Training

**Experience augmented reality (AR) and virtual reality (VR) for use in vocational and further training. What we offer for AR/VR and 360-degree applications is particularly suitable for trainers, but also for managers or HR managers/employees as well as trainers.**

## XR (AR/VR) Experience Day

In addition to getting to know the technologies and their advantages and disadvantages, the goal is to identify concrete application scenarios in your environment. In doing so, no main topic or application scenario is excluded or focused on. It is about the meaningful use in your business processes and the "release" of the various potential benefits for your organization.

## Immersive Learning Day

In this multi-part online workshop, you will experience the different XR technologies. You will recognize and understand fields of application in different educational and training areas and will be able to identify and derive first steps for your own AR/VR projects.
The innovative concept of the Online Immersive Learning Day makes it possible to experience a wide variety of examples live in the home office or at the workplace using a smartphone (AR, 360) and VR glasses (VR). This allows for an initial experience and opens up the idea generation and identification of fields of application in the training/learning environment in the respective company.

## Virtual Reality (VR) Collaboration Expert

Virtual meetings, workshops and trainings in an immersive virtual environment will be the future in modern learning and working environments. Numerous tools such as MS Teams, ZOOM, Vitero or EduDip are reaching their limits and new possibilities are opening up through the use of virtual multi-user environments in virtual reality (VR). The new solutions require an expansion of the competencies of trainers, coaches and facilitators.

## VR/AR Learning Architect/ Designer

Design and implement VR/AR Learning Experiences in your organization as a Learning Architect. We explain the context for producing immersive learning content and integrating it holistically into existing learning processes - with the goal of integrating VR/AR projects, learning scenarios and applications into the organization itself and implementing them in a scalable manner.

## Virtual Reality Trainer

The trainer of the future speaks VR. Become an enabler of positive learning experiences with virtual reality and professionalize your blended learning processes. The following topics will be addressed in particular:

- Role of trainers
- Integration in blended learning processes (incl. VR Collaboration)
- Design of the physical/virtual learning space (incl. VR Collaboration)

## AR/VR Workshop: Create your own 360-degree App in 360 Minutes

In our online workshop we show you the digital future - dive in and see for yourself. Let's talk together about the topic of 360° and about virtual worlds in the context of your organization. Invest 360 minutes of your time for this. Learn how 360° applications work, which hardware you need to create content, how to develop intelligent stories with 360°, how to design them interactively, how to enrich them with existing media/content and how to publish them on the same day for current mobile devices or VR glasses.

**More information at:**
**christiani-international.com/academy**

# Five excellent reasons to choose Christiani

Talk to one of our advisors! Contact your Area Sales Manager on page 1.

## International and future-oriented

We are a forward-looking company that operates on an international scale and is always at the cutting edge with our innovative products.

## The right choice for everyone

We offer a comprehensive range of teaching materials, teaching systems and learning concepts for technical training – all from a single source, perfectly coordinated and tailor-made to suit your needs.

## Your reliable partner for end-to-end training

We are your reliable partner for every stage of learning, for both learners and teachers, right from encouraging an interest in technology at school, to conveying the necessary technical knowledge in vocational training and at university, through to professional advanced training in technical areas with our Christiani Academy.

## Technical expertise, proudly Made in Germany

Companies, educational institutions and training centres across the world rely on our products, solutions and services. Christiani represents technical training modelled on the German educational system, combining theory and practice.

## Professional consulting and service quality

People are always at the heart of what we do. You can count on our reliable employees' specialist and technical expertise. We are happy to advise you by telephone and e-mail, and remain your reliable contact partner after purchase or conclusion of contract.

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