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Quotation/Proforma Invoice

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Worldskills 2024

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17.03.2023

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Festo Didactic – Technical Education Solutions

Festo Didactic is the world-leading provider of equipment and solutions for industrial education. We design and implement learning centers and laboratories, educational equipment and programs that train people to perform in highly dynamic and complex industrial environments. Our goal is to maximize learning success in educational institutions and industrial companies around the globe.

Festo Didactic educational solutions directly evolve from technologies and innovations in automation and engineering. They place students in real-life situations and enable them to gain practical experience with high-tech industrial components and current systems. The product design focuses on excellence in usability and practice orientation: All functional components stand out from their complex industrial surroundings. They are easy to use and easy to remember. Their specific functions, positions and connections within the learning system intuitively show how technologies really work.

All learning environments, such as learning factories, laboratory equipment and e-learning products, are offered in conjunction with technical, organizational and people-oriented training programs – in 40 languages worldwide – and are associated with services like planning and operating complex learning centers, and with consultancy services for industrial companies.

www.festo-didactic.com

Description CP Lab

CP Lab – Industry 4.0 right from the start

CP Lab – The compact Industry 4.0 learning system

The Cyber-Physical Lab is the professional and compact industry 4.0 learning system from Festo Didactic. It contains the relevant technologies and components to provide comprehensive industry 4.0 knowledge.

The modular and flexible design allows working in different learning scenarios: from the individual pallet transfer system with integrated control to the networked production facility with cloud services.

CP Lab – A versatile system

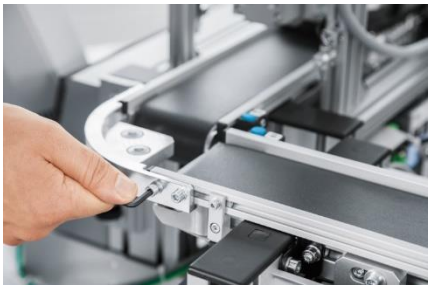
The modularity of the factory layout is one of the most important features of Industry 4.0. The CP Lab modules can be combined and expanded in a variety of ways.

In sequence

By simple combinations of the individual modules, different system configurations can be realised.

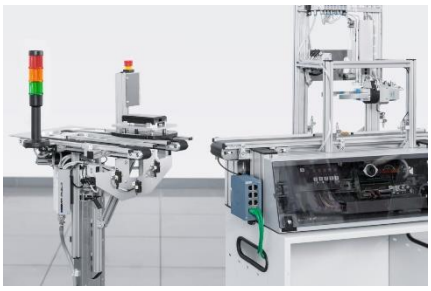
In circulation system

The individual modules can be easily combined "over corner". This means that complete circulation systems can already be implemented with four, six, eight or ten modules.



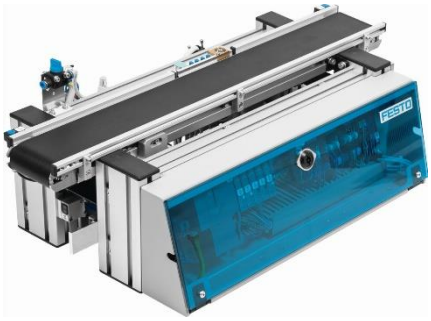
In combination with mobile robot

The CP Bridge (Branch) is used, as a supplementary module for CP Lab transfer system, to transport workpiece carriers to the next working position. The CP Bridge is the main interface which enables the handover of workpieces from CP Lab to the mobile robot system Robotino® and to CP Factory modules.



The system at a glance

Main components:

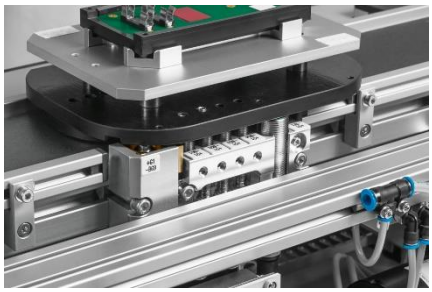


- Integrated control
- Mono-belt transfer system
- Pallet stopper
- 3/2-way valve
- Inductive sensors
- Capacitive sensors at the beginning and end of the conveyor
- RFID-read/write sensor
- Identification system, binary
- DC or AC motor
- Motor controller, bidirectional with 2 speed levels

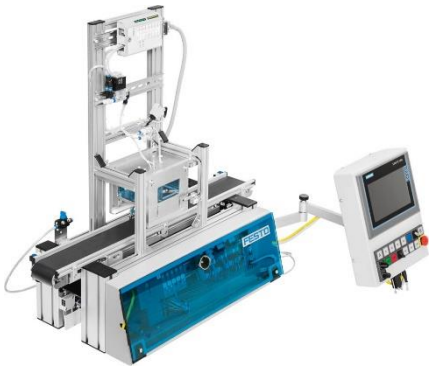
- Incremental encoder
- IO-Link Master
- IO-Link Device
- Analogue I/O via IO-Link
- Control panel

RFID process control

In CP Lab the workpiece takes over the process control. Every carrier is equipped with a RFID-tag on which workpiece parameters are stored.



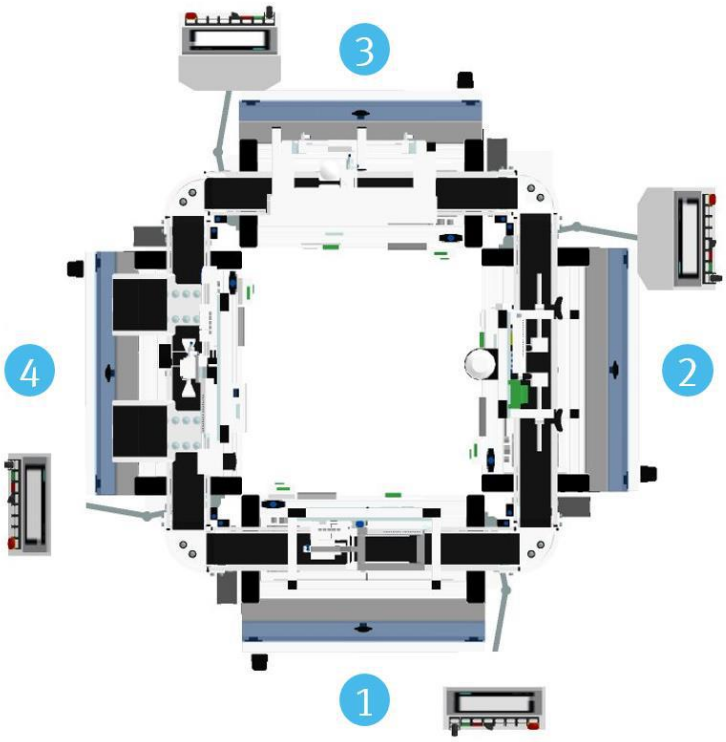
Following application modules are available:



- Magazine
- Turning
- Camera inspection
- Tunnel oven
- Drilling
- Press
- Measure analogue
- Workpiece output
- Labelling
- Pick-by-Light
- Dosing

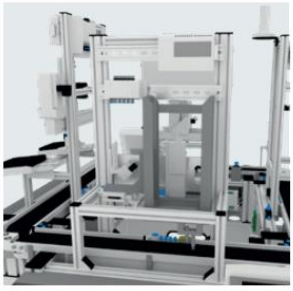
Further application modules on request.

Layout & Process

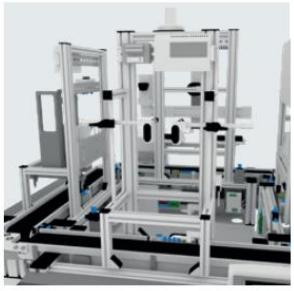


1) Process start: Outsourcing the front cover from the magazine
2) At the measuring station, two laser distance sensors are mounted above the workpiece on an adjustable measuring stand and can be partially directed to 2 measuring points.
3) With the iDrilling module, 2 pairs of holes (simulated) can be inserted into a workpiece.
4) End of the process: The output module is equipped with a biaxial handling system and is used to eject the workpieces on two roller conveyors

Layout & Applications

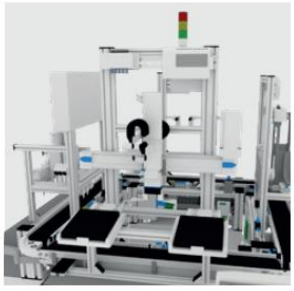


Magazine application module
– RFID
– Process start



Analog measuring application module
– QS
– SPC
– Analytics

Drilling application module
– CPS
– Production parameters
– Variants



Output application module
– Parameter processing
– Flexible handling
– Logistics
– Process end

Position	Quantity	Description

CP Lab Pallet Transfer System stations

Pos. 1 | 4,00

CP LAB CONVEYOR DC-1512SP

D12501

Picture similar

Function

The conveyor is the main component of the CP Lab and is used to transport workpiece carriers to the next working position. The identification of workpieces is done via capacitive sensors at the beginning and at the end of the conveyor. Every carrier is equipped with a RFID-tag on which workpiece parameters are stored. A RFID read- and write-system exchanges data with the workpiece that communicates through an IO-link-interface with the main Controller. The CP Lab Conveyor is equipped with a PLC and all necessary interfaces in order to be complemented by an application module and to communicate with the MES.

Highlights:

- A compact Industry 4.0 Learning System – The CP Lab Conveyor is "ready for Industry 4.0" because of its clearly defined mechanical and electrical interfaces as well as the use of open standards.
- A modular and flexible layout – The modular and flexible design makes working in various learning scenarios possible: from a single transfer system with an integrated controller up to a cross-linked production system with cloud services.
- Modern industry supervision – The embedded modular controller S7 1512SP makes the system a self-intelligent industry 4.0 component.
- The learning content is part of the application module – The application modules are mounted on the conveyor and are controlled via I/O, Profinet, TCP/IP, OPC UA or Plug & Produce - depending on the type of the module.

Learning content for project work:

- Installation and structure of manufacturing plants
- Capture of information using intelligent sensors
- PLC programming
- Control via embedded controllers*
- Communication based on open standards
- Industrial communication and IT-security*
- Fieldbus technology
- Identification systems
- Plug & Produce: Quick modification*
- Cyber-physical systems*
- Production management with MES*: Creation, management, controlling and visualization of customer orders

Position	Quantity	Description
		• Use of the cloud technology* (* These topics require additional products) Main components: • Mono-belt transfer system length 700 mm, width 80 mm • Pallet stopper with sensors and valve • Pallet identification BCD with 4 inductive sensors • Pallet identification RFID on I/O-Link • Capacitive sensor at the beginning and the end of the conveyor • PLC Siemens S7-1500 CPU 1512SP • 16 inputs/16 outputs digital 24 V • Siemens I/O-Link Master • Festo I/O-Link Device 8 inputs/8 outputs digital, 4 inputs/2 outputs analogue • Incremental position measuring via optical sensor • Conveyor drive 24 VDC • DC motor controller bi-directional and creep speed • I/O interface for application module Syslink 8 inputs/8 outputs • Interface for control panel with 4 inputs/4 outputs and Emergency Stop Note: The optional touch panel and the application modules are not included in this item.

Position	Quantity	Description
Pos. 2	4,00	

CP Lab Touch panel Siemens TP700 Comfort with HMI case

D12605

Picture similar

Description

The CP Lab Touch Panel TP700 Comfort is used for operator control and monitoring. Thus, the control panel includes in addition to the classical actuators and lamps also a Siemens Touch Panel TP700 Comfort with high-end functionality. The touch panel is complete integrated, wired and tested.

The Human Machine Interface (HMI) consists of a case and a console with classical buttons and lamps. It is plugged to the CP Lab Conveyor by means of I/O cable and is used as control panel for signal entry and monitoring unit. The HMI case is mounted on the profile frame of the conveyor. In the basic configuration, the HMI case is equipped with 4 electrical actuators and 4 light indicators. If required, the HMI case can be equipped with additional 8 electrical actuators/indicators and up to 8 potential-free switching contacts for safety circuits.

Features:

- Widescreen-Display with 16 Mio. colours and LED backlighting
- High-end functionality: Archiving, VB-script and various viewers for showing plant documentation (i.e. as PDF) or as web-browser
- Data backup
- Different interfaces for process communication
- Integrated PROFINET-Switch
- Programming from WinCC Comfort V11 (TIA Portal)

Technical data:

- 7,0” Widescreen TFT-Display
- Resolution: 800 Pixel x 480 Pixel
- Number of colours: 16 Mio.
- Touch screen
- 2 Ethernet interfaces
- 1 Profibus interface
- 2 USB interfaces with integrated switch
- Dimensions (B x H x T): 214 x 158 x 70 mm
- Supply voltage: 24 V DC
- Current consumption: 0,5 A

Process coupling:

- S7-1200, S7-1500
- S7-200, S7-300/400

Position	Quantity	Description
		• LOGO! • WinAC • Allen Bradley (EtherNet/IP) • Allen Bradley (DF1) • Mitsubishi (MC TCP/IP) • Mitsubishi (FX) • OMRON (Host Link) • Modicon (Modbus TCP/IP) • Modicon (Modbus RTU) • OPC UA Client Main components of the HMI case • Metal case • Circuit board • Electrical actuators • Light indicators • Emergency stop • VESA mounting plate • Carrying arm • Connector for Profinet • Connector for safety circuits • Connector for control panel (basic configuration) • Connector for control panel (extended configuration) • Cable set System requirements: • 64 Bit: Windows 7 Professional, Enterprise, Ultimate SP1, Windows 8.1 Professional, Enterprise • 32 Bit: Windows 7 Professional, Enterprise, Ultimate SP1 Scope of delivery: • Siemens Touch Panel TP700 Comfort • Ethernet cable (CAT 6, crossover, 6 m) • Engineering-, Options- and Runtime software and license WinCC Advanced (TIA-Portal) Note: This product requires a license for the end user to be used exclusively for educational purposes. Festo provides the declaration text on a form. If Festo does not provide this declaration or does not deliver it on time, Festo is not obliged to deliver this product.

Position	Quantity	Description
Pos. 3	4,00	**Switch XB008** D12725 SCALANCE XB008 unmanaged Industrial Ethernet Switch for 10/100 Mbit / s; LED diagnostics, IP20, DC 24V power supply, with 8x 10/100 Mbit / s twisted pair ports with RJ45 sockets; Note: this unmanaged switch is not for advanced network scenarios such as ring high availability, VLAN operation, and others. suitable. We are happy to advise you on further variants for the implementation of these topics. Picture similar
Pos. 4	4,00	**Edutrainer** 159396 **Power supply unit for mounting frame** • Input voltage: 85 – 265 V AC (47 – 63 Hz) • Output voltage: 24 V DC, short-circuit-proof • Output current: max. 4 A • Dimensions: 170 x 240 x 92 mm Type: Connector as per CEE 7/VII for DE, FR, NO, SE, FI, PT, ES, AT, NL, BE, GR, TR, IT, DK, IR, ID Picture similar

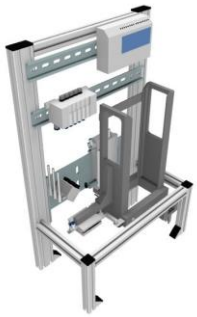
Position	Quantity	Description

CP Application modules

Pos. 5 | 1,00

APPLICATION MODULE MAGAZINE

D13007



Picture similar

Function

The application module Magazine can be mounted on CP Factory basic modules as well as on CP Lab conveyors. It is designed for magazining and distributing of cubic workpieces. The workpieces are stored in a magazine shaft and can be distributed individually depending on the order information. All sensors and actuators are connected to an I/O terminal, which can optionally be exchanged by fieldbus nodes (Profinet I/O). The application module is completely assembled and tested.

Learning content:

- Mechanical and electrical design of the module
- Electro pneumatic circuits
- Pneumatic drive technology
- Fieldbus technology
- Sensor technology
- PLC programming
- Magazining and distributing of parts
- Variable manufacturing
- Communication with superior control and MES

Consisting of:

- 1x Module frame made from aluminium profiles
- 1x Stacking magazine
- 1x Pneumatic feed separator
- 1x Valve block
- 1x Signal interface

Technical data

Interface	SysLink IEEE488, 24 pin
Number of I/O	8 DI/8 DO
Voltage	24 VDC
Pressure	6 bar
Dimensions (H x W x D)	525 mm x 340 mm x 185 mm
Size of workpiece (L x W)	115 mm x 80 mm
Magazine	Stacking magazine Capacity: 10 pieces
Sensors	End position detection

Position	Quantity	Description
Pos. 6	1,00	

APPLICATION MODULE MEASURING

D13019

Picture similar

Function

The application module measuring can be mounted on CP Factory basic modules as well as on CP Lab conveyors. Two laser distance sensors are mounted on adjustable stands and are used for analogue differential measurement of workpieces at 2 different measuring points. The sensors are connected to an I/O terminal, which can optionally be exchanged by fieldbus nodes (Profinet I/O). The application module is completely assembled and tested.

Learning content:

- Mechanical and electrical design of the module
- Analog measurement technology: Differential measurement/absolute and relative measurement
- Fieldbus technology
- Sensor technology
- PLC programming
- Communication with superior control and MES

Consisting of:

- 1x Module frame made from aluminium profiles
- 2x Laser distance sensor
- 2x Measurement stand
- 1x Signal tower, 3 colours
- 1x Signal interface

Technical Data

Interface analogue	Analogue terminal 2 Inputs
Voltage	24 VDC
Dimensions (H x W x D)	775 mm x 240 mm x 255 mm
Size of workpiece (L x W)	115 mm x 80 mm
Measuring range	10 - 80 mm
Measuring accuracy	Max. 0,2 mm
Measuring signal	0 - 10 V

Position	Quantity	Description
Pos. 7	1,00	

APPLICATION MODULE iDRILLING

D13013

Picture similar

Function

The application module iDrilling can be mounted on CP Factory basic modules as well as on CP Lab conveyors. It is designed for handling of cubic workpieces. Two drilling spindles, moving in Z-direction as well as in X-direction, simulate the drilling process of two pairs of drilling holes in the workpiece. All sensors and actuators are connected to an integrated PLC with web-interface. This makes the module an intelligent module with CPS functionality. The application module is completely assembled and tested.

Highlights:

- Controller with web interface for Cyber-Physical-System (CPS) – The integrated intelligent controller supervises the operating status of single actuators and is able to automatically generate order proposals, e. g. for spare materials, via web interface.
- Compact and powerful Festo controller – With its industrial design, Festo CECC-S offers 12 digital inputs, 8 digital outputs and 2 high-speed digital inputs. Furthermore, a wide range of interfaces are available: 4x IO Link Master; 1x IO Link Device; 1x Ethernet; 1x USB; 1x CANopen.
- Autonomous system – A comprehensive CoDeSys function library enables the autonomous control (stand-alone) and economical automation of the system.
- Hybrid control – Direct control of electric and pneumatic drives using CANopen and IO Link Master.
- Various communication: ProfiNet; Ethernet IP; Modbus TCP.

Learning content:

- Mechanical and electrical design of the module
- Electro pneumatic circuits
- Pneumatic drive technology
- Electrical drive technology
- Fieldbus technology
- Sensor technology
- PLC programming
- Handling technology
- Cyber-Physical-System (CPS): local intelligence and self-diagnostics
- Variable manufacturing
- Communication with superior control and MES

Consisting of:

Position	Quantity	Description

- 1x Module frame made from aluminium profiles
- 1x Pneumatically operated linear Z-axis
- 1x Pneumatically operated linear X-axis
- 1x Valve block
- 2x Drilling spindle
- 1x Integrated web controller

Technical data

Interface	Web-interface CANopen Ethernet/OPC UA USB/IO-Link
Controller	Festo CECC, integrated
Number of I/O	14 DI/8 DO
Voltage	24 VDC
Pressure	6 bar
Dimensions (H x W x D)	525 mm x 375 mm x 215 mm
Size of workpiece (L x W)	115 mm x 80 mm
X-Axis	Linear, pneumatic Stroke: 120 mm Position detection: 2 End position sensors
Z-Axis	Linear, pneumatic Stroke: 40 mm Position detection: 2 End position sensors
Drilling unit	Twin drill head Drive: 24 V Max. drilling diameter: 2 mm Current limiter: 3 A Drilling distance: 40 mm

Position	Quantity	Description
Pos. 8	1,00	

APPLICATION MODULE WORKPIECE OUTPUT

D13018

Picture similar

Function

The application module workpiece output can be mounted on CP Factory basic modules as well as on CP Lab conveyors. It is equipped with a two-axis handling system and is used to output cubic workpieces on two roller slides. All sensors and actuators are connected to an I/O terminal, which can optionally be exchanged by fieldbus nodes (Profinet I/O). The application module workpiece output can be used as a manual workplace for picking workpieces. The application module is completely assembled and tested.

Learning content:

- Mechanical and electrical design of the module
- Handling technology
- Electrical drives: stepper motor
- Fieldbus technology
- Sensor technology
- PLC programming
- Communication with superior control and MES

Consisting of:

- 1x Module frame made from aluminium profiles
- 1x Handling module
- 1x Parallel gripper, pneumatic
- 2x Roller slide
- 1x Valve block
- 1x Signal interface

Technical data

Interface digital	Syslink IEEE 488, 24 pin
Number of I/O	8 DI/8 DO
Voltage	24 VDC
Pressure	6 bar
X-axis	Stepper motor
Z-axis	Pneumatic
Gripper	Pneumatic
Dimensions (H x W x D)	600 mm x 460 mm x 300 mm
Size of workpiece (L x W)	115 mm x 80 mm

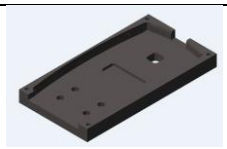
Position	Quantity	Description
Pos. 6	1,00	**CAMERA SYSTEM** 8158958 Machine Learning in Image Processing The MPS IoT Kit Machine Learning deals with machine learning based on neural networks ("deep learning"), one of the most prominent sub-disciplines of artificial intelligence. The hardware includes a single-board computer equipped with an HD camera to capture images that are then analysed by a neural network. A variety of Python programmes are available as software. The front ends of almost all tools are web-based, so that access via mobile devices such as smartphones, tablets, laptops, etc. is possible. Thanks to the Wi-Fi hotspot, the MPS IoT Kit Machine Learning offers wireless remote access. The system is delivered ready to use so that learners can start their first experiments immediately. The aim of the MPS IoT Kit Machine Learning is for learners to learn the basic topics in machine vision with machine learning in a simple way. Not only are the two learning methods supervised and unsupervised machine learning discussed, but also the main applications in machine vision - i.e. image classification, object localisation and multiple object recognition - are presented and discussed through a series of hands-on experiments. Learners will be able to distinguish apples from lemons or tools from shoes, etc. A possible task for integration into a learning factory is to check the filling level of chutes with workpieces by applying machine learning techniques. Otherwise, all kinds of objects can be recognised and localised. In addition, powerful neural network architectures such as so-called convolutional neural networks are used. All software is well documented and enables learners to conduct their own machine vision experiments outside the learning factory. Prior programming knowledge is not required. The learning materials encourage learners to transfer their knowledge to new applications. Learning content • Artificial intelligence/machine learning in image processing • Practical application of convolutional neural networks/deep learning • Supervised and unsupervised machine learning • Computer vision (image classification, object localisation, multi-object detection) • IoT retrofitting of legacy systems Benefits Picture similar

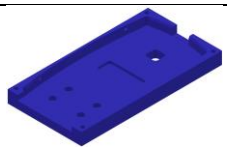
Position	Quantity	Description
		• The MPS IoT Kit Machine Learning can either be used stand-alone or integrated into existing learning factories • Learners have the opportunity to apply the algorithms to new objects and images • Focus on practical application of artificial intelligence/machine learning to solve real-world challenges Key components • Single board computer with HD camera • Ethernet cable • HDMI cable • Power connector Technical data • Power supply: 110/230 V AC/1 A • Dimensions (W x H x D): approx. 200 x 200 x 600 mm

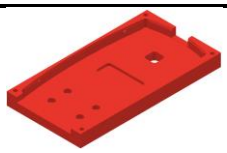
Accessories

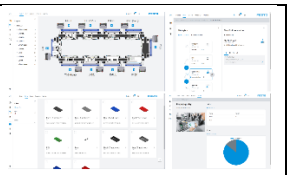
Pos. 10	1,00	**PASSIVE DEFLECTION** D12702 Description The passive deflection makes it possible to connect two CP Lab pallet transfer systems at a 90 degree angle. Thus, individual modules can be easily combined with each other as "corner solution". A complete circulating system (e.g. with 4, 6, 8 or 10 CP Lab pallet transfer systems) can be realised. The passive deflections are connected to the conveyor profiles by means of T-Nuts. The workpiece carriers are "passively" transferred from a pallet transfer system to the following pallet transfer system, there is no electrical connection required. Scope of delivery: • 4x Passive deflection Note: The passive deflection is required for circulation system with carriage (D12720). Picture similar

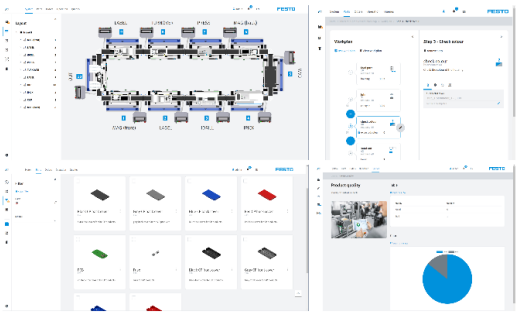
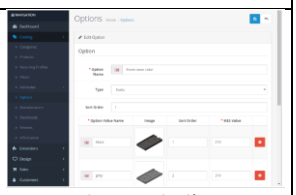
Position	Quantity	Description
Pos. 11	4,00	**CARRIAGE** D12720 Picture similar Description The carriage makes the CP Lab system into a compact and mobile unit. The CP Lab conveyor can be easily mounted on the carriage. The carriage is designed for the use of CP Lab conveyor and is suitable for the combination with CP Factory. The carriage will be delivered including rollers and adjustable feet. Technical data: • Dimensions (H x W x D): 800 mm x 540 mm x 350 mm • Frame: A4 in undercarriage
Pos. 12	4,00	**Door for carriage D12720** D12724 Transparent doors for CP Lab carriage D12720.
Pos. 13	4,00	**WORKPIECE CARRIER** D12703 Picture similar Description The workpiece carrier is used to transport workpieces or pallets with workpieces on CP Lab or CP Factory pallet transfer systems. For identification, the workpiece carrier is equipped with a RFID-tag and 4 bit code. Technical data: • Design: Glass fiber reinforced plastic (GRP) • Dimensions: 100 mm x 160 mm x 15 mm • BCD Code: codeable, 4 screws • Track width: 80 mm • Transport weight: max. 3 kg

Position	Quantity	Description
Pos. 14	4,00	**PALLET** D12704 Picture similar Description The pallet is used to transport workpieces on CP Lab or CP Factory pallet transfer systems. The pallet, on which the workpiece is transported is placed on the workpiece carrier (D12703). Technical data: • Design: Aluminium • Dimensions: 100 mm x 160 mm x 5 mm • Workpiece holder: changeable, screwed
Pos. 15	12,00	**WORKPIECE FRONT COVER BLACK** D12705  Picture similar Description The workpiece set, consisting of a back cover, printed circuit board, electronic component and front cover, is used for the representation of many relevant process steps such as milling, drilling, marking, tempering, testing, turning, assembling, loading, pressing and more. The front cover is part of the workpiece set. Technical data: • Material: Plastic, black • Dimensions: 110 mm x 60 mm x 10 mm

Position	Quantity	Description
Pos. 16	4,00	**WORKPIECE FRONT COVER GREY** D12709 Picture similar Description The workpiece set, consisting of a back cover, printed circuit board, electronic component and front cover, is used for the representation of many relevant process steps such as milling, drilling, marking, tempering, testing, turning, assembling, loading, pressing and more. The front cover is part of the workpiece set. Technical data: • Material: Plastic, grey • Dimensions: 110 mm x 60 mm x 10 mm
Pos. 17	4,00	**WORKPIECE FRONT COVER BLUE** D12711  Picture similar Description The workpiece set, consisting of a back cover, printed circuit board, electronic component and front cover, is used for the representation of many relevant process steps such as milling, drilling, marking, tempering, testing, turning, assembling, loading, pressing and more. The front cover is part of the workpiece set. Technical data: • Material: Plastic, blue • Dimensions: 110 mm x 60 mm x 10 mm

Position	Quantity	Description
Pos. 18	4,00	**WORKPIECE FRONT COVER RED** D12713  Picture similar Description The workpiece set, consisting of a back cover, printed circuit board, electronic component and front cover, is used for the representation of many relevant process steps such as milling, drilling, marking, tempering, testing, turning, assembling, loading, pressing and more. The front cover is part of the workpiece set. Technical data: • Material: Plastic, red • Dimensions: 110 mm x 60 mm x 10 mm

Position	Quantity	Description
Pos. 15	1,00	**FactoryViews MES4 V3 for CP Lab** D15005 -S- **Description:** The MES4 V3 controls production orders in real time, just like in a real factory, and takes on a central software function in manufacturing. The MES4 V3 combines classic MES functionalities with the new opportunities offered by the growing interconnected networks in the Industrial Internet of Things. MES4 V3 is specifically focused on educational suitability and is therefore perfect for use in training and teaching courses in industrial automation. All relevant functions can be accessed quickly and intuitively via the browser-based user interface. FactoryViews MES4 V3 supports CP Lab and MPS 400 systems. The function range includes: • Graphical system configurator with station library • Graphical workplan editor, including processing time and energy consumption • Production control via service-oriented architecture (SOA) • Communication with resources via TCP/IP or OPC UA • Order management • Graphical live tracking of workplan steps • Operator view with status indicator per resource • Reporting of S7 PLC warnings and errors • Editor for database analyses, e.g. OEE or quality, with live diagrams • Import and export functions for layouts, work schedules, orders and evaluations in standard formats such as CSV and JSON • Layout export to CIROS • Software languages: DE, EN, FR, PT, HU, ZH • Interfaces: TCP/IP, REST, SQL Thanks to its integration with FactoryViews, MES4 V3 also benefits from a seamless interaction with other apps such as our educational webshop, platform-independent operation, and the snapshot function, which allows work statuses to be backed up and restored to a file with just one click.  Picture similar

Position	Quantity	Description
		Scope of delivery: • MES4 V3 software for CP Lab, single license The software can be accessed from multiple web browsers within the local network. • PC with TFT-monitor 
Pos. 16	1,00	**Web shop for MES4** D17012  Picture similar Modern web shop for ordering configurable product variants. The product properties selected by the online ordering party are transferred from the Web shop to the Manufacturing Execution System MES4, which then ensures and monitors the production in the plant. Course contents: Industry 4.0 ERP functions examples Configuration of a webshop MES connection The customer can place orders via the webshop running on the server. Only a browser is necessary to access the webshop from PCs or mobile devices, such as tablets, smartphones or laptops. The customer sees in the compilation of his order directly the total cost of the cart. The prices for the individual parts of the products in the different variants are managed. For sales orders, delivery notes and invoices can be printed out. An automated production process with too low stock is also possible. Each newly defined product can be configured for the webshop and is then available online in the shop as a selection. properties

Position	Quantity	Description
		Freely configurable Network communication Parallel commissioning of several plants Server with database set up on PC to be ordered separately (for example MES PC) Communication between web shop and MES Inventory management system Individual pricing of the products Print preview of delivery notes and invoices Large statistics area about orders, sales, customers, country overview Order via the local network, also possible over the internet with Cloudpaket Personalized order Different prices for different variants Indication about availability MES + MES mobile Live view of the order list E-mail dispatch for order tracking The data of the system is stored in a MySQL database, which can be easily accessed via a preinstalled user interface. All data can be exported in different formats (e.g., CSV).
Pos. 17	1,00	**Equipment Set TP1312 Smart Sensors** 8116358 Picture similar **Equipment Set TP1312 Smart Sensors** The Equipment Set TP 1312 Smart Sensors includes a basic selection of smart sensors with IO-Link® communication: diffuse photoelectric sensor, inductive proximity sensor and ultrasonic sensor. Along with the sensors, the training package includes an IO-Link® master with 4 sensors communication ports and 3 different Ethernet protocols (PROFINET®, EtherNet/IP™ or Modbus® TCP) to communicate with programmable logic controllers and other factory automation devices along with all the necessary cables. All components of TP 1312 are mounted on our Quick-Fix® mounting system and are compatible with the Sensor Workstation (8110729) or one of our profile plates. Features Uses the most important smart sensors in Industry 4.0 with a comprehensive learning path • Uses the most important smart sensors in Industry 4.0 with a comprehensive learning path • Industrial IO-Link® communication master module with 3 different Ethernet protocols • Enables building IO-Link® communication setups just like in the industry with sensors, IO-Link® master and PLC with possibility to add smart interface also in the learning experience

Position	Quantity	Description
		• Easy to integrate the specific smart sensors you need with the right curriculum • Develops new skills for the newest smart sensor technology • Prepares students for further learning in factory automation Learning goals Students will follow the scope of the training curriculum from an initial understanding of Industry 4.0 concepts and sensors fundamental principles. Then, through a comprehensive learning path, students will develop the most important competencies regarding smart sensors and their benefits in industry. Competencies to be developed include: • Understanding the benefits of smart sensors in the context of Industry 4.0 • Selecting sensors for the right applications • Setting up IO-Link® communication and parameterize smart sensors in the field • Monitoring and analyzing data to perform predictive maintenance and replace defective sensors quickly • Integrating smart sensors to programmable logic controllers and the different manufacturing communication layers • Troubleshooting sensors Technical Data: • Scope of delivery: - One (1) diffuse photoelectric sensor with IO-Link® (8110725) - One (1) inductive proximity sensor with IO-Link® (8110726) - One (1) ultrasonic sensor with IO-Link® (8110727) - One (1) IO-Link® master module with 4 ports (8110729) - One (1) accessories kit for Equipment Set TP1312 Smart Sensors (8112723) • Also requires the following accessories (not included): Sensor Workstation (8110723) or a profile plate for Quick-Fix® mounting system combined with 24 V dc power supply

Position	Quantity	Description
Pos. 18	1,00	**Accessories for Smart Sensors** Accessories for TP 1312 consisting of • Slide unit 572740 • Set of test objects 549830 • RFID sensor with IO-Link® 8110728

Position	Quantity	Description
		• Flow sensor with IO-Link® 8115026 • Systainer® with T-LOC system 8022297 • Systainer/container insert B 687461 • Handles for Systainer 683012

Position	Quantity	Description
Pos. 19	1,00	**CIROS 7** 8140772 Picture similar **CIROS 7** CIROS is an industrially tested, extremely powerful platform for creating and using 3D simulation models for automation technology. It combines the following functions into a single common interface: • Discrete time 3D simulations with modelling mechanisms • CAD import filter for STEP, IGES, STL, VRML and COLLADA • CAD export filter for conventional formats • Layout of systems and production lines based on model libraries and application modules • Access to more than 1100 robot models • Robot programming in the following programming languages, among others: – Industrial Robot Language (IRL) – Mitsubishi MELFA BASIC V – Kuka Robot Language (KRL) – ABB Rapid • Connection to the Manufacturing Execution System MES4 for operating training factories as a didactic digital twin • Virtual human with 30 independent degrees of freedom • The extensive model library contains – Beginner models for an introduction to basic topics – Further course documents in Festo LX (free registration required) – Virtual illustrations from the Festo Didactic learning systems such as MPS and Robotino for transferring learning performance between simulated and physical devices – Prepared examples on industrial interfaces such as PLCSIM Advanced • The model is either controlled via the integrated STEP7 PLC control, through the use of other interpreters such as IRL or via external interfaces to PLCSIM and PLCSIM Advanced • Additional connections to other OPC-based interfaces such as CODESYS are established using OPC UA or EzOPC • EasyPort is used for coupling up to four external hardware PLCs for simulation control (hardware in the loop) • Matlab, Python or EtherCat is used to connect external simulation controllers and to model the system behavior • Expandable behaviors for detecting and correcting faults can be logged in the fault simulation mode. Evaluation of the outcomes enables effective training for systematic commissioning and repairs in the event of malfunctions to be organized in the simulation environment. • In order to process the outcomes of exercises and projects as effectively as possible, extensive camera paths and modes are provided. For device-independent display, it is possible to export as a video or HTML5 container. System requirements

Position	Quantity	Description
		• Intel Core i5 (7th generation) or equivalent • 8 GB RAM, at least 200 GB HDD/SSD • Windows 10 1709 64-bit or later • Simple models: Intel HD 530 or better • Complex models or for displaying large models in virtual reality: NVIDIA GeForce GTX 1070 or better • CIROS supports OpenVR. A free Steam account is required in order to use the virtual reality feature The purchase of a license provides the rights to continuously operate the version including two subsequent years of updates. Type: CIROS 7: **CIROS configuraton: CIR-DIG-STU-CPL** **1x Ciros Studio** **1x Ciros CP System model library**

Position	Quantity	Description
Pos. 20	1,00	

Energy measurement box

8129208

Picture similar

The single-phase energy measurement box expands training factories by measuring the consumption of electrical energy and compressed air as well as other variables such as currents, voltages, active and reactive power, processing the data and communicating via the network. In addition to the possibility for energetic analyses and optimizations, this provides a data source for a continuous stream of live data from the production plant. Up to three stations with single-phase electrical consumption as well as compressed air consumption can be evaluated in parallel per energy measurement box, e.g. three CP Lab belts each with 24 V power pack.

The energy measurement box can be placed both on the table and in a laboratory trolley, or hung in an A4 holder by removing the feet. Power is supplied via an IEC C14 male connector. This means that the energy measurement box can be operated flexibly both at various training factory modules as well as at laboratory workstations or other consumption points simply by reconnecting.

The single-phase energy measurement box includes the following components:
Power measurement:

- Siemens SENTRON PAC3220 power analyzer for 3 measuring channels
- 3x current transformer 35:1
- 3x IEC 60320-1 C13 socket, max. 10 A total

Compressed air measurement:

- 3x Festo SFAH IO-Link flow sensor
- 3x Festo SPAU IO-Link pressure sensor
- 3x In and 3x Out push-in connectors for 6 mm tubing

Control and communication:

- Festo CPX-E PLC with IO-Link master, web server, OPC UA server
- RJ45 LAN connection

All constituents are state-of-the-art industrial components. Communication to the sensors is implemented via Modbus TCP and IO-Link, communication to the energy data management is provided via a documented OPC UA interface.

Scope of delivery:

- Single-phase energy measurement box
- 3x IEC connecting cable
- Network cable
- Connections, pneumatic
- Operating instructions with connection examples

Position	Quantity	Description
		Suitable for: Energy monitoring package for CP systems, including PC and software D35002, IOT Gateway Type: Single-phase energy measurement box
Pos. 21	1,00	**FactoryViews Energy App** Picture similar Energy monitoring is the basis for understanding, controlling and optimizing energy flows within a factory. The energy monitoring package includes all necessary software tools for communication, visualization and analysis. An OPC UA client periodically retrieves energy data from the controller of the energy measuring box and stores them in an open MariaDB database. The energy data can be visualized, evaluated and exported as CSV data via various dashboards and it is possible to actively intervene in production. The Monitoring dashboard offers a graphical visualization of all signals, both as a real-time diagram and historical values. Limit values can be defined for each signal, and a notification is triggered if the limits are exceeded or undercut. If the Smart-Maintenance Option is available, a maintenance order can be created automatically. The Analysis dashboard allows the graphical analysis of the power and air consumption of process steps, for example to quantify energy efficiency measures. The footprint dashboard visualizes the current consumption with costs and environmental effects. Parameters such as electricity price and specific emissions can be configured. The Factory dashboard allows to start and stop the CP Systems learning factory, to monitor the total consumption, to reduce peak loads and to parameterize energy-efficient operation. In simulation mode, recorded data or random values can be streamed instead of real measurements. **Learning contents:** • Industrial energy monitoring with OPC UA • Power and compressed air consumption • Energy efficiency measures • Costs and carbon emissions • Dashboard creation **Scope of delivery:** • Energy App software, single license The dashboards can be accessed from multiple web browsers within the local network. • Connectivity to all signals of one Energy Measurement Box (model 8129208 or 8130678) • Workbook

Position	Quantity	Description
Pos. 22	1,00	**Wireless Access Point for CP System** D14203 TP-Link Archer C7 AC1750 Dual Band Gigabit WiFi Router (1300Mbps (5GHz) + 450Mbps (2.4GHz), 4 Gigabit LAN Ports, 1 USB 2.0, Print / Media / FTP Server, APP Control) Black Accespoint is needed for CP System.
Pos. 23	1,00	**IOT GATEWAY** 8172682 The IoT Gateway connects production level devices to the Industrial Internet of Things (IIoT). It has a network connection for the device side, one for the cloud side and a hardware switch to control read and write authorization. The gateway offers a web interface with configuration options, including • Network configuration including DHCP client • NTP client for time synchronization • Device management • MQTT broker settings The gateway is able automatically to find known device types such as the Festo Didactic energy measurement box in the network. The information for pairing the devices is stored in a signature file. After the devices have been paired, referred to as onboarding, the data is automatically retrieved cyclically and forwarded to an MQTT broker. Your own signature files can be created and imported, meaning that your own device types can be found, coupled and read out via OPC UA. The graphical development environment installed on the gateway, Node-RED, enables edge computing functionalities, i.e. data processing at the boundary between the local network and the cloud. A wide range of signal sources can be integrated using library elements, e.g. via the protocols OPC UA, Modbus TCP or REST API, signals can be pre-processed using function blocks or JavaScript code, dashboards can be set up for visualization and signals can be output to server services such as MQTT, MySQL or cloud services such as Siemens MindSphere or Microsoft Azure. The gateway can be installed with the supplied accessories e.g. in CP Lab carriage or on the NetLab EduTrainer and connected. **Scope of delivery:** • IoT Gateway • Connection cable 24 VDC to 4 mm safety plug • 2 x network cable & Mounting accessories • Training documents with example scenario

Picture similar

Position	Quantity	Description
Pos. 24	1,00	

TP 1333: networks and IT Security

Picture similar

8127829

Equipment set TP 1333: networks and IT Security

Equipment set TP 1333 contains components for the setup of example networks that serve to communicate all important fundamentals of IT security:

- 2x EduTrainers with integrated electricity supply and one each of S615 router and XC208 switch
- 1x Ethernet cable set
- 1x Festo NetLab Toolkit configuration software
- 1x configuration files for the exercises with S615 router and XC208 switch
- 1x workbook, in printed form and on a USB data carrier

The equipment is configured for two workstations. The individual modules can be adapted to the spatial situation in the classroom or laboratory. The modules can be positioned flexibly to solve the exercises: on worktables or in an A4 mounting frame. The two EduTrainers with Siemens router and switch form the core of equipment set TP 1333.

The enclosed Festo NetLab Toolkit (NLTK) configuration software enables the configuration of network and safety functions. Examples of such functions include setting an IP address, clearing the ARP address memory, and importing and deleting NetLab hierarchy certificates. The NLTK requires one-off admin rights when launched, and makes the necessary functions available to the students. During the teaching unit, there is no further need to enter the administrator password.

The enclosed workbook contains detailed practical exercises on applications that are becoming increasingly important in the industry. Theoretical foundations supplement the exercises perfectly. Pre-configured software setups and sample solutions optimize laboratory-based learning. Exercises 1 to 4 can be carried out separately at one workstation. Exercises 5 and 6 are carried out jointly at neighboring workstations. The workbook covers the following key cyber security topics in everyday industrial situations:

- switching and monitoring
- address allocation in production networks
- routing and firewall functions
- VLAN-separated manufacturing networks
- Network Address Translation (NAT)
- Virtual Private Networks (VPN)

For schools and training institutions in the commercial sector.

The end customer must confirm a license statement that the product will only be used for educational purposes. Festo provides the text on a form. If the end customer does not submit this statement, or fails to do so within a reasonable time, Festo is not obligated to deliver these goods.

Type: en

Position	Quantity	Description
Pos. 25	1,00	**Festo LX** 8133287 Picture similar **Digital Learning Portal Festo LX – Voucher for 5 users for 1 year** Festo LX Basic Subscription Festo LX is our Digital Learning Portal for individual Learning Experiences. Our cloud-based learning portal offers didactically prepared learning content for many technical areas. Festo LX is based on multimedia Learning Nuggets that can be combined to form individual Courses and Learning Paths. Courses can thus be adapted very easily and perfectly tailored to the individual needs of teachers and learners. Festo LX offers a mix of stand-alone courses and learning equipment-based courses to facilitate the hands-on experiments in technical fields. Festo LX has a mapping of the courses with the hardware equipment so you can easily see the courses related to an equipment or the equipment required in a course. **Overview of content on Festo LX** On Festo LX, you will find a variety of learning content for many areas of technical education and professional qualification. From factory automation and fluid power to IIoT and Industry 4.0, electrical engineering, process automation, renewable energies and STEM. Your license gives you access to more than: • 250 eLab courses - digital, interactive courses to use in combination with our Festo Didactic learning systems • 70 eLearning courses to acquire theoretical knowledge without the need for any hardware • 120 Evaluations for knowledge checks before or after a class • 80 courses and simulations for Connected Learning with our product lines FACET and Tec2Screen • 70 Short videos and user manuals • 300 eBooks, which are PDF versions of workbooks for your learning systems **Functional scope** With your Festo LX Basic subscription you will have access to a variety of Festo LX Contents and the following features: • Course library to browse and filter all available courses from Festo • Easy creation and editing of individual courses with the LX Creator • User Management: organize individual learners and groups, manage user permissions, assign specific contents

Position	Quantity	Description
		• Tracking of learner's progress and success as well as export of learning results • Management and inventory of learning equipment • Availability of learning portal interface as well as contents in various languages • Mobile learning from various devices possible **Individualization of content** With the help of the LX Creator which is included in your license, it is possible to customize Festo Didactic courses according to your needs. You can create custom content from scratch or integrate existing material into Festo LX. You can reuse content from Festo in your own courses to build your personal and individual learning contents. **Content on Festo LX** Our Festo LX Basic Package supports, amongst others, the following topics: Fluid Power: Various courses for the field of pneumatics, electropneumatics, hydraulics, electrohydraulics and mobile hydraulics Electrical Engineering and Electric Power Technology: Various courses for the field of electrical engineering/electronics, electric power circuits, digital electronics, electric drive technology, motor controls and e-mobility Factory and Process Automation: Various courses for the field of mechatronics, sensors and smart sensors, industrial control technology, micro controllers, PLC and fieldbus technology, robotics, process instrumentation and control, and water management IIot and Industry 4.0: Various courses for the field of digitalization and networking, data security, MES and production planning, energy management and monitoring, Artificial Intelligence, NX/MCD Sustainability: Various courses for the field of energy efficiency, renewable energies, power generation, biologization Metal Working and Mechanics:

Position	Quantity	Description
		Various courses for the field of turning, milling, drilling, CNC machining, CAD, dimensional metrology. mechanical drives, piping, wiring Organization and People: Various courses for the field of lean management, production processes and optimization as well as project management **Licensing and subscription duration** Your license allows you to add an unlimited number of learners to your organization. Content is accessible to the number of learners specified in the license. A license can be withdrawn from one user and assigned to another (transferable license based on course assignments). The number of users and subscription duration of this license is specified below. Once you activate your license in Festo LX, the subscription duration will start. Licenses will not renew automatically. **Access for 5 users for one year.**

Remarks:

- Delivery according to availability
- Commissioning at site is not included. This could be ordered with 8155812.
- Technical training is not included. This could be ordered with 8155812.
- CIROS training is not included. We would recommend two days remotely. PN is 8155820.
- This offer is valid until June 2024.
- Warranty is 24 months as of day of acceptance/delivery.
- The conditions for offer, delivery, payment and software utilization printed in our current catalogue are valid. In case you do not have these, they can be obtained from your contact person. http://www.festo-didactic.com/int-en/agb