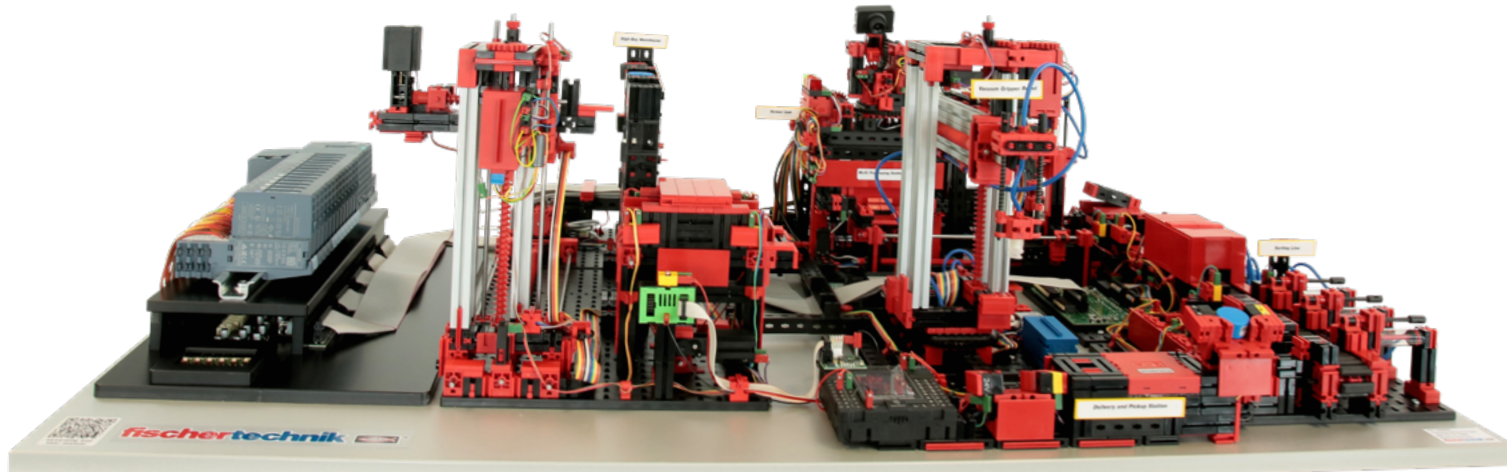
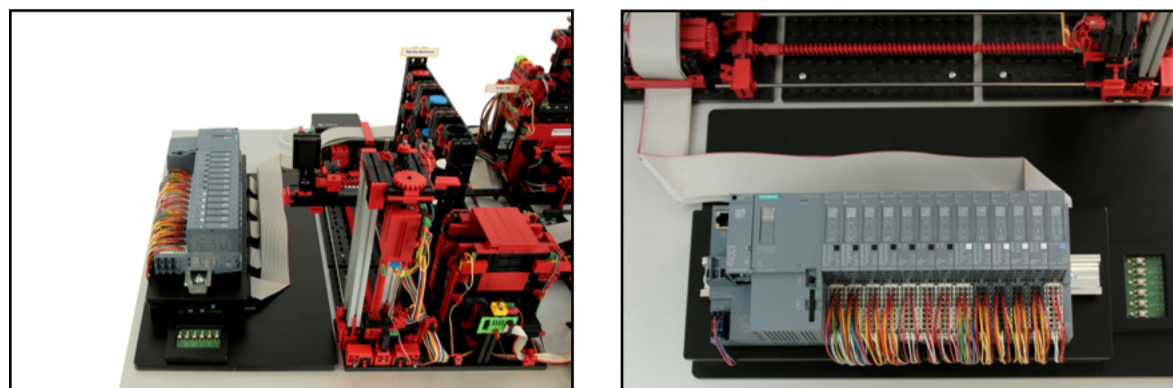


FISCHERTECHNIK TRAINING FACTORY INDUSTRY 4.0 24V WITH PLC S7-1500



CONTROL AND SOFTWARE

Control:
The Fischertechnik Training Factory Industry 4.0 24V is controlled by a Siemens PLC S7-1500 and is already equipped with a basic program (Structured Text, SCL). Our 24V adapter boards with interface to the PLC are pre-assembled in the learning factory and are connected to the PLC via terminals or pin strips. A Fischertechnik TXT controller is also installed in the learning factory, which enables connection to the Fischertechnik Cloud enables. In addition, the Fischertechnik TXT controller communicates in MQTT with the IOT gateway (Raspberry Pi), which in turn translates in OPC-UA to the PLC. In this way, 9V-based components, such as the environmental sensor, the USB camera and the NFC reader, can be addressed via the MQTT interface and read out by the PLC. The IOT gateway also offers the option of its own cloud connection.



PLC S7-1500

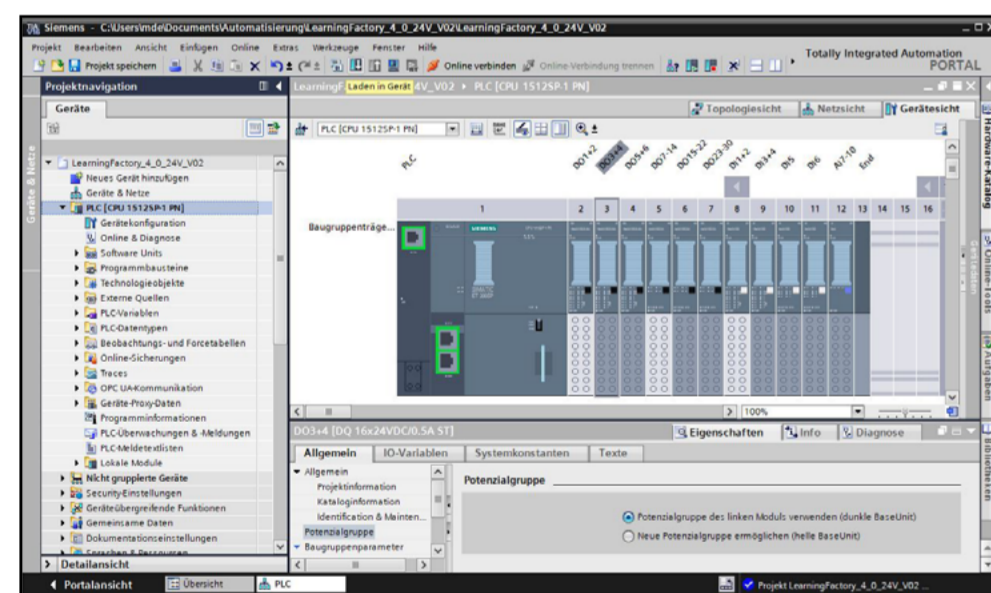
Assemblies for the trainer package configuration with Siemens S7-1500:

These modules are required if the PLC program (structured text, ST/SCL), which is included free of charge is to be used to control the Fischertechnik learning factory 4.0, 24V without adaptations. The program itself is published at www.github.com/fischertechnik/plc_training_factory_24v. It can also be used with other brands and/or assemblies, but must then be adapted individually.

Art. No.	Description	Qty
6ES7512-1SK00-4AB2	Trainer Package ET 200SP Distributed Controller	1
SIMATIC ET 200SP, Digital Output Module, DO 16x 24V DC0,5A Standard, Source Output (PNP, P-switching) Packaging unit: 1 piece, suitable for BU type A0, color code CC00, substitute value output, module diagnostics for: short circuit to L+ and M, wire break, supply voltage	2	
6ES7132-6BH01-0BA0	SIMATIC ET 200SP, BaseUnit BU15-P16+A0+2D, BU type A0, push-in terminals, without AUX terminals, new load group, WHH: 15x 117mm	5
6ES7193-6BP00-0DA0	SIMATIC ET 200SP, digital output module, DO 4x 24VDC/2A High Speed, packaging quantity: 1 piece suitable for BU type A0, color code CC00, 3 alternative operating modes: DC, oversampling, PWM module diagnostics	3
6ES7132-6BD20-0DA0	SIMATIC ET 200SP, digital input module, DI 16x 24V DC standard, input type 3 (IEC 61131), sink input (PNP, P-reading), packaging unit: 1 piece, suitable for BU type A0, color code CC00, input delay 0.05...20ms, module diagnostics for: wire break, supply voltage	1
6ES7131-6BH01-0BA0	SIMATIC ET 200SP, base unit BU15-P16+A0+2B, BU type A0, push-in terminals, without AUX terminals, bridged to the left WHH: 15x 117mm	4
6ES7193-6BP00-0BA0	SIMATIC ET 200SP, analog input module, AI 2x1 Standard Packing unit: 1 piece, suitable for BU type A0, A1, color code CC00, module diagnostics, 16 bit	1
6ES7134-6FB00-0BA1	SIMATIC ET 200SP, digital input module, DI 8x 24VDC High Speed, packaging quantity: 1 piece, three alternative operation modes: DI, oversampling, 4counter, suitable for BU type A0, color code CC01	2
6ES7131-6BF00-0DA0		

Software:

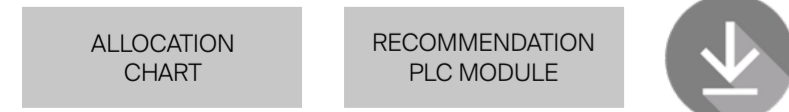
The basic program written and provided for the PLC was created to match the Siemens PLC S7-1500 and can be downloaded and used free of charge at www.github.com/fischertechnik and can be used free of charge. However, the Learning Factory 4.0 24V can also be controlled with other PLC models from other manufacturers and programmed by the user using individual solutions. In these cases, the user may have to make adjustments to the basic program.



SCL PROGRAM

TECHNICAL DOCUMENTATION

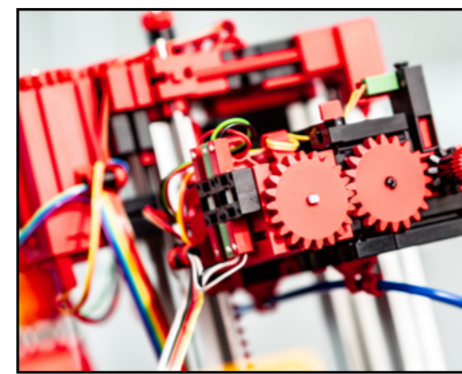
The PLC assignment plan, the requirements for the PLC control and the recommendation for the PLC-modules from Fischertechnik are available for download free of charge on the product page.



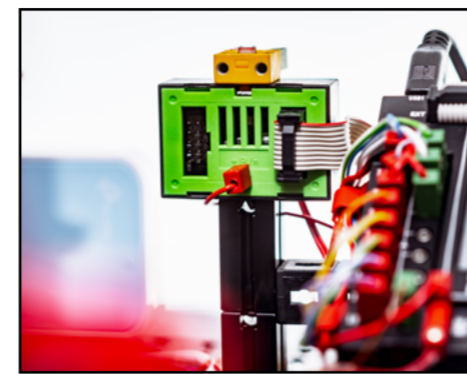
ACCOMPANYING BOOKLET



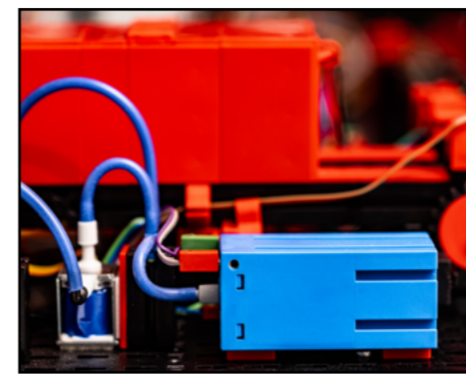
In addition to all technical documents at www.fischertechnik.de/en/simulating, the Fischertechnik eLearning portal contains an accompanying didactic booklet with detailed operating instructions as well as important and useful training and teaching content, especially developed for the Learning Factory 4.0 24V. It also contains the technical specifications and explanations for the individual modules of the learning factory.



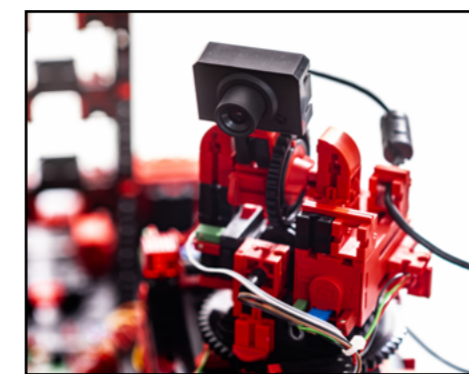
ENCODER MOTOR



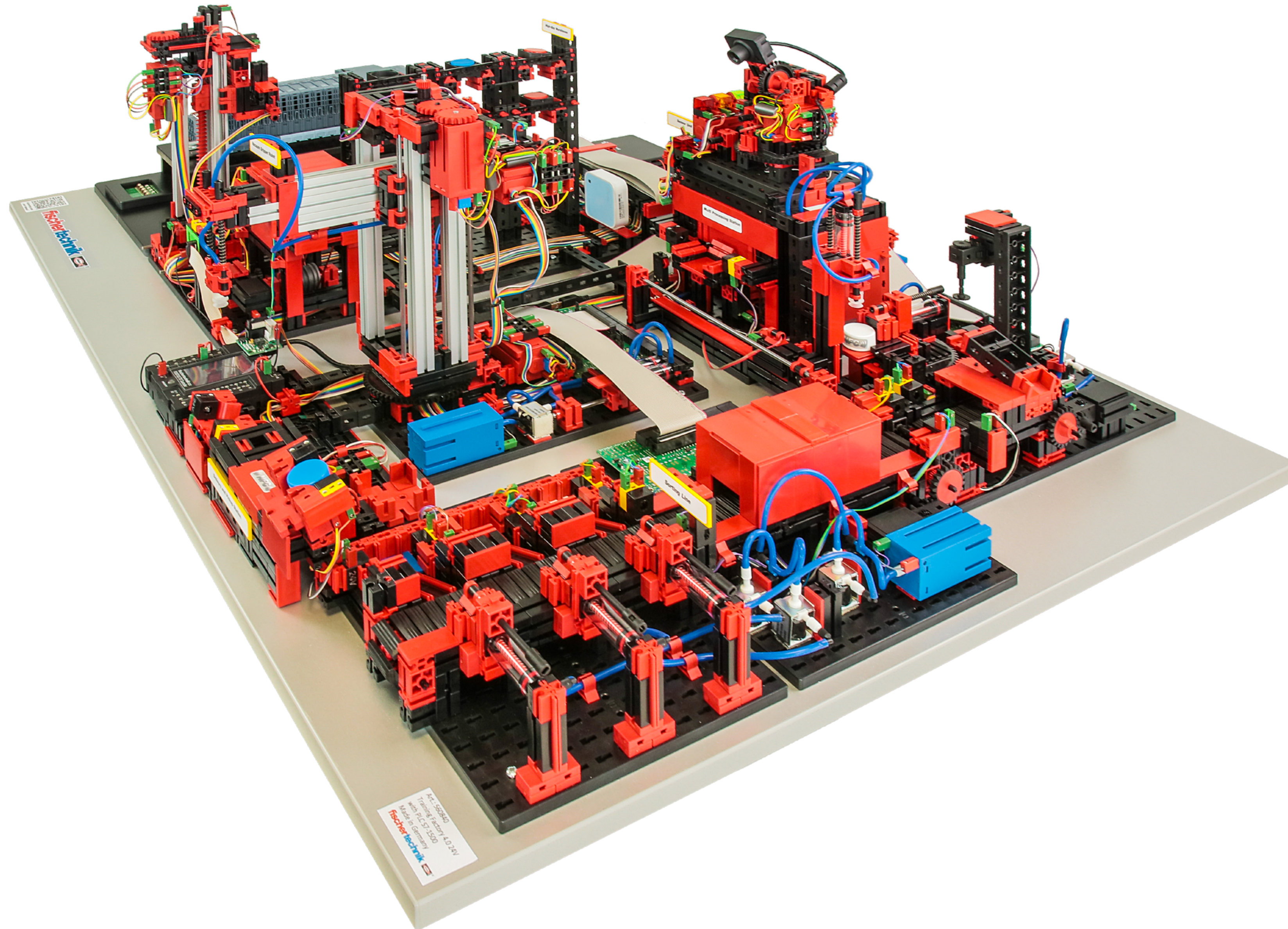
ENVIRONMENT SENSOR



COMPRESSOR



USB CAMERA



FISCHERTECHNIK CLOUD, 2 DASHBOARDS RASPBERRY PI AND NODE-RED

The connection to the Fischertechnik Cloud is established via the WLAN router supplied and integrated in the Learning Factory. The cloud can be used via a personal access that is only created once (www.fischertechnik-cloud.com). The cloud servers are located in Germany and ensure that the strict European requirements for data storage apply. Personal data is protected in an account with password access, the very secure "OAuth2" industry standard is used. All data sent to the cloud is encrypted with certificates (https standard).

2 Dashboards:

The Fischertechnik dashboard in the cloud can be accessed and operated via mobile devices such as tablet and smartphone as well as on the laptop and PC. In addition, a local dashboard, created with Node-RED, is implemented on the Raspberry Pi (IOT gateway) and custom dashboards can also be created via Node RED. The dashboards included in the Training Factory Industry 4.0 allow platforms to be displayed from three different perspectives:

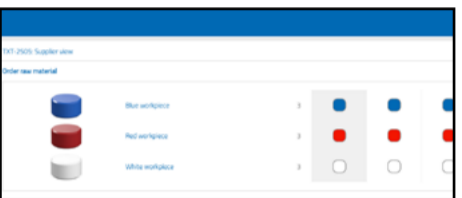
- Customer view
- Supplier view
- Production view

The customer view shows an interface of the online store with a shopping cart where you order a part and track the current status of the order in the cart. The history is displayed in the customer interface so that the customer is informed about the status. In the supplier view, the ordering process for the raw material is displayed and viewed. In the production view, the factory status, production process, inventory, NFC/RFID reader and sensor values are visualized. In addition, the camera for monitoring production is also controlled via the production view. All these functions can be arranged individually via the menu.

In the factory state, the status of each module is shown via a traffic light display. If a fault occurs in production, this is detected by a signal. After the cause has been eliminated, the error can be acknowledged and production can be continued. In the "Production process" view, the individual production steps are displayed visually in a simplified manner. The traffic light of the respective module lights up green or red when its process step is active or an error is pending for rectification. The "Stock" production view visualizes the current stock of parts, including minimum and maximum stock. A reorder point procedure can be defined. This production view is used exclusively for visualization. The NFC/RFID reader production view displays the part data and can be used to manually read or delete parts. The raw data of NFC labels can be read by mobile devices with an NFC reader with a standard NFC app. Each part has its own unique ID and maps the following data: Status, color and timestamp from delivery to shipment. The camera is also controlled via the production view and the readings from the environmental sensor are also viewed here.



CUSTOMER VIEW



SUPPLIER VIEW



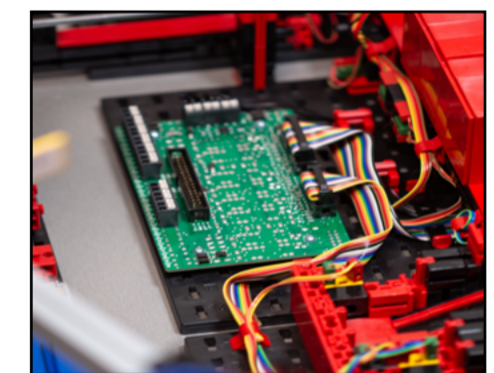
PRODUCTION VIEW



DATA ENVIRONMENTAL SENSOR



WLAN ROUTER



LATEST GENERATION BOARDS



RASPBERRY PI (IOT GATEWAY)



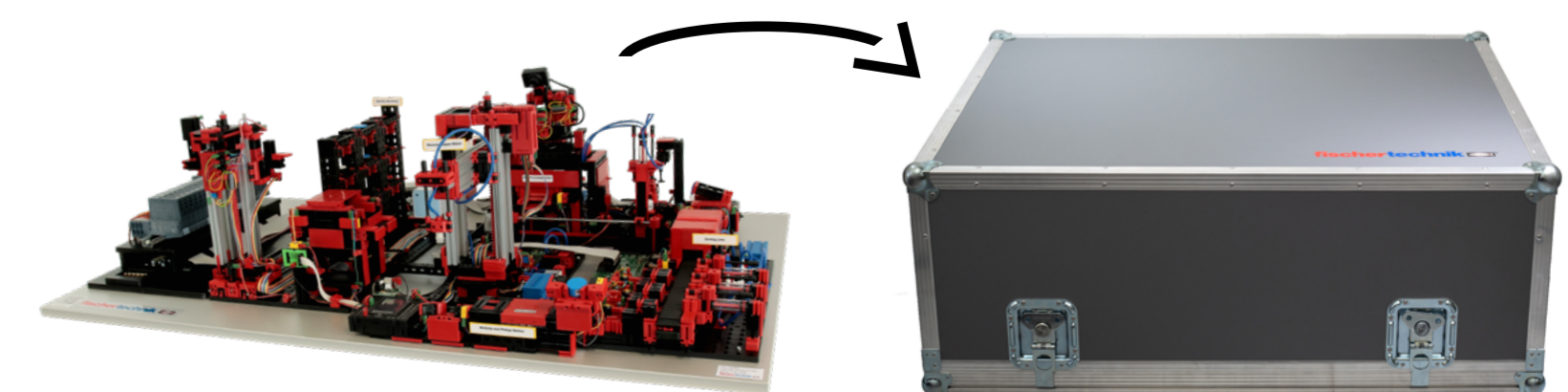
NFC CHIP & NFC/RFID READER

STORAGE AND TRANSPORT CASE

A custom case for safely storing and transporting the Fischertechnik factory variants, which is precisely matched to their dimensions. This makes it ideal for users who regularly transport the Training Factory to trade fairs, take it to customers' or colleagues' sites for training purposes, or use it to protect the learning factory. This is how the practical case works: The factory is placed once in the lower part of the case. Only the top cover is removed or put on. The factory itself then no longer needs to be moved and is fully functional even in the lower part.

Material:

Aluminum casemaker profile with plastic panels and steel ball corners as well as four steel tilt handles and angle protection corners. The upper part (case hood) is partially lined with soft foam blocks at various heights and has three interior zippered pockets for stowing cables and accessories. The bottom part is lined with hard foam.



TRAINING WITH THE FISCHERTECHNIK TRAINING FACTORY INDUSTRY 4.0 24V

The digitally driven transformation in industrial production calls for stronger networking and more intelligent information at all production levels. With the Fischertechnik Learning Factory 4.0, these digitalization activities can be simulated, learned and applied on a small scale before they are implemented on a large scale. A highly flexible, modular as well as cost-effective and robust training and simulation model that can be put to exceedingly good use. The Fischertechnik learning environment is used for learning and grasping Industry 4.0 applications in vocational schools and training as well as for use for research, teaching and development at universities, in companies and IT departments. The simulation depicts the ordering process, the production process and the delivery process in digitalized and networked process steps.

Topics that can be implemented with the Fischertechnik Training Factory Industry 4.0 24V:

- Training and simulation on a realistic production image
- In-depth learning through haptic grasping
- Optical and sensory applications
- Digital traceability with NFC/RFID
- Customized production in batch size 1
- Integrated cloud connection, control via smart devices
- Use and operation of dashboards
- Web-based remote monitoring
- Linking of production and scheduling data
- Connection of upstream/downstream logistics processes
- High-bay warehouse operates according to FIFO industry standard and dynamic warehousing
- Basic programs as structured text (SCL) for Siemens SPS S7-1500 already included, own program creation possible

Factory environment:

The Fischertechnik Training Factory Industry 4.0 24V consists of the following modules: Vacuum Gripper Robot, Automated High-Bay Warehouse With Stacker Crane, Multi Processing Station With Oven, Sorting Line With Color Detection, environmental sensor and rotating camera. After ordering goods on the dashboard, the workpieces pass through the appropriate modules in the factory. The current production status is immediately visible in real time on the dashboard. The integrated environmental sensor reports the values for temperature, humidity, air pressure and air quality. The vertical and horizontal panning range allows the camera to see the entire plant and can thus be used for web-based remote monitoring. Traceability of individual parts is provided via NFC (near field communication). Each part is assigned a unique identification number (ID). This enables traceability as well as visibility of the workpieces during the entire production process.

TECHNICAL DATA

Designation	Training Factory Industry 4.0 24V Complete Set with PLC S7-1500
Article No.	560840
EAN	4048962429961
Dimensions (mm)	972 x 772 x 402
Weight (kg)	51,5
Control	Siemens PLC S7-1500
Software	Basic programs as structured text (SCL) for Siemens S7-1500
Power supply	24V power supply included
Wiring	Completely wired

TECHNICAL DATA

Designation	Storage and transport case
Item no.	563147
EAN	4048962429961
Dimensions (mm)	1190 x 790 x 370
Weight (kg)	19kg