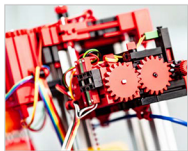


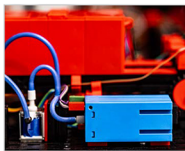
TRAINING FACTORY INDUSTRY 4.0



Encoder motor



Environmental sensor



Compressor



USB camera



FISCHERTECHNIK CLOUD, 2 DASHBOARDS RASPBERRY PI AND NODE-RED

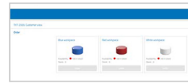
The WLAN router supplied and integrated into the Training Factory Industry 4.0 is used for connection to the fischertechnik cloud-based dashboard. Use of Chrome or Firefox web browsers is recommended. The cloud can be accessed once an initial connection is established with the end-user's smart phone, tablet, or other device (www.fischertechnik-cloud.com). The servers for the cloud are located in Germany, and adhere to very strict European requirements which apply to the storage of data. Personal data is stored in an account with password access protection, using the industry-standard protocol for authorization, "OAuth2". All data sent to the cloud is encrypted with certificates (https standard).

2 dashboards:
The fischertechnik dashboard in the cloud can be called and operated via mobile devices such as tablet and smartphone as well as on laptop and PC. Additionally, a local dashboard, created with Node-RED, is on the Raspberry Pi (IoT gateway) implemented, and custom dashboards can also be created via Node-RED. The dashboards included in Training Factory Industry 4.0 enable the display of platforms from three different perspectives:

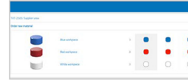
- Customer view
- Supplier view
- Production view

The **customer view** shows a webshop interface with a shopping cart, where you can order a workpiece and follow the current status of the order in the shopping cart. This history is displayed on the interface for the customer, so that he is informed about the status of his order. In the **supplier view**, the process for ordering raw materials is displayed and visualized. In the **production view**, the factory status, the production process, the inventory, the NFC/RFID reader and the sensor values can be queried. In addition, the camera that monitors the production line can also be controlled here. All these functions are controlled within one window and are switched over via the menu.

The **individual manufacturing steps** are visually simplified using connected nodes and represented in the **Production process view**. The currently active node (= production module) lights up green or red when the respective process step is being processed live or there is an error and is waiting to be corrected. The inventory production view visualises the current inventory of workpieces including minimum and maximum stock. A reorder point procedure is stored. This production view is used exclusively for visualisation. The production view of the **NFC/RFID reader** displays the workpiece data and can be used to read or delete workpieces manually. The raw data of the NFC tags can be read using a standard NFC app from mobile devices with NFC readers. Each workpiece has its own unique ID and displays the following data: Status, colour and timestamp from delivery to dispatch. The camera is also controlled via the production view and the read values of the **environment sensor** can also be viewed here.



Customer view



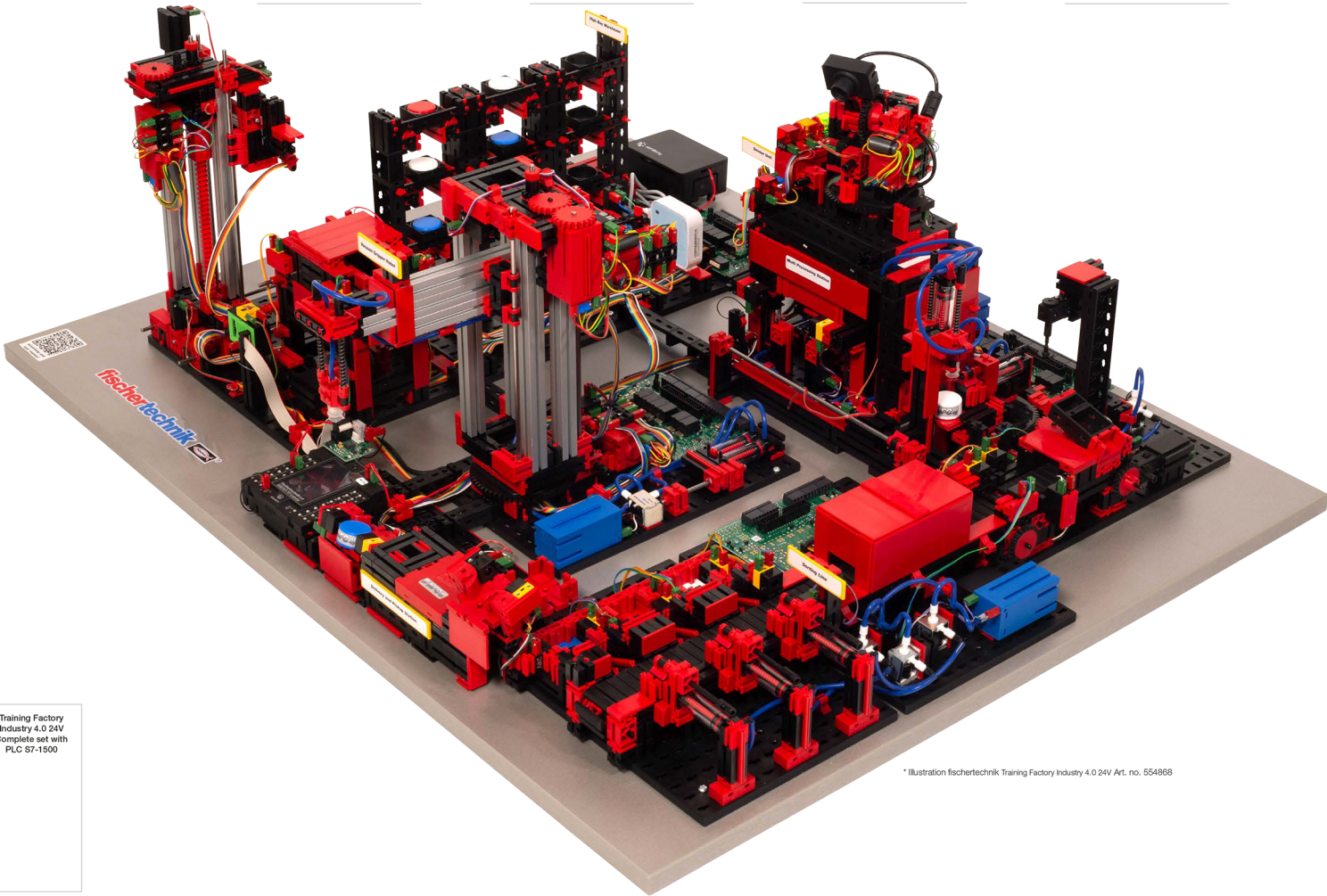
Supplier view



Production view



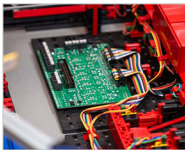
Environmental sensor data



* Illustration fischertechnik Training Factory Industry 4.0 24V Art. no. 554868



WiFi router



Boards of the latest generation



Raspberry Pi (IoT Gateway)



NFC Chip & NFC/RFID Reader

STORAGE AND TRANSPORT CASE

A customised case for safe storage and transport of fischertechnik factory models, which is precisely matched to their dimensions. This makes it ideal for users, who regularly take the factory models with them at trade fairs, want to show them to their customers and colleagues for demonstrations on the site or are looking for protection to cover and store these models. The practical transport option works in the following manner: The factory model is placed once in the lower part of the case (height: 30 mm). Only the upper hood (height: 340 mm) is removed or put on. The factory model itself then no longer needs to be moved and is also fully functional in the lower part.

Material:
Aluminium case-maker profile with plastic plates and steel ball corners as well as 4 steel tilt handles and angle protection corners. The upper part (case hood) is partially lined with soft foam blocks in different heights and has 3 internal zipper pockets for stowing cables and accessories. The lower part is lined with hard foam.



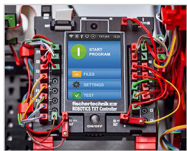
CONTROL AND SOFTWARE

9V version controller:

The Training Factory Industry 4.0 is controlled by six 9V-based fischertechnik TXT Controller. These are linked together and communicate via MQTT. Performance data for the TXT controllers is available at www.fischertechnik.de.

Software: C/C++ API programming interface

The software application is written in C/C++ and is loaded on the controller in the ready-to-start status. The C/C++ library and the API are published on GitHub: <https://github.com/fischertechnik>. This library can be used to write customised C/C++ programs for the Training Factory Industry 4.0.



TXT Controller



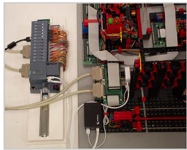
C/C++

24V version controller:

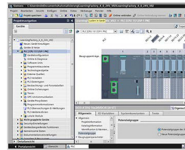
The Training Factory Industry 4.0 24V is controlled by a PLC (not brand-specific, not included in the scope of delivery) and has a completed example program (as structured text, STL already included in the scope of delivery). The newly developed 24V adapter boards as an interface to the PLC are pre-installed in the training factory and connected to the PLC via terminals. The Training Factory Industry 4.0 24V also has an installed fischertechnik TXT Controller. This provides the connection to the fischertechnik Cloud. In addition, the TXT Controller communicates in MQTT with the IOT-Gateway (Raspberry Pi), which in turn translates in OPC-UA to the PLC controller. This allows 9V-based components such as the environmental sensor, USB camera, or reader to activate via the MQTT interface and read out information from the PLC. The IOT Gateway offers an optional connection to a separate cloud.

Software:

The PLC basic program was created based on a Siemens S7-1500, and can be viewed, used free of charge and downloaded on GitHub: <https://github.com/fischertechnik>. The training factory can also be controlled with other models and brands of PLC, and users can also program their own individual solutions. Minor adjustments to the example program may be necessary (to be completed by the user).



PLC Control system



SCL Program

OVERVIEW OF ALL 24V VARIANTS

Training Factory Industry 4.0 24V	Training Factory Industry 4.0 24V	Training Factory Industry 4.0 24V with PLC connection board	Training Factory Industry 4.0 24V with PLC S7-1500
Model side wiring			
PLC side wiring			
Siemens S7-1500			

TECHNICAL DOCUMENTATION

The layout plan for the PLC controller and the model, and requirements for the PLC controller, as well as PLC assembly recommendations from fischertechnik are available for download free of charge from the product page (www.fischertechnik.de/training-factory-industry24v/).



ACCOMPANYING BOOKLET

In addition to all technical documents available at www.fischertechnik.de, the fischertechnik eLearning portal also contains a didactic accompanying booklet with detailed operating instructions as well as vital and helpful training and teaching content specially developed for the Training Factory Industry 4.0. The technical specifications and explanations for the individual modules of the training factory are also listed. The accompanying booklet can be viewed at www.fischertechnik-elearning.com.



TRAINING FACTORY INDUSTRY 4.0 - AVAILABLE IN 4 VERSIONS:

The digitally driven change in industrial production requires stronger networking and integration on all production levels, and more accurate information. With fischertechnik Training Factory Industry 4.0, these digitalization activities can be simulated, learned, and applied before they are implemented on a large scale. A highly flexible, modular, cost-effective, and robust training and simulation model, which can be extremely useful for teaching and demonstrations purposes.

The fischertechnik learning environment is used for learning and understanding industry 4.0 applications in vocational schools and industrial training, as well as for use in research, teaching and development at universities, in companies, and in IT departments. These models are used to simulate the ordering process, the production process and the delivery process in digitalized and networked process steps.

The following topics can be addressed with fischertechnik Training Factory Industry 4.0:

- Training and simulation on a realistic production image
- Deepening learning through haptic comprehension
- Optical and sensory applications
- Digital traceability with NFC/RFID
- Customer-specific 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 disposition data
- Connection of upstream/downstream logistics processes
- High-bay warehouse operates according to FIFO industry standard
- For 24V: Basic program as structured text (STL) for Siemens PLC S7-1500 already included, custom program creation by end-user is also possible
- For 9V: Basic program in C/C++ already included, custom program creation by end-user is also possible

Factory environment:

This consists of the factory modules like storage and retrieval stations, Vacuum Gripper robot, High-Bay Warehouse, Multi Processing Station With Furnace, a Sorting Line With Color Detection, an environmental sensor and a pivoting camera. After the order has been placed in the dashboard, the workpieces pass through the respective factory modules and the current status is immediately visible on the dashboard. The integrated environmental sensor reports values for temperature, humidity, air pressure and air quality. The camera sees the entire system through the vertical and horizontal pan range and can thus be used for web-based remote monitoring. Individual workpieces are tracked using NFC (Near Field Communication): A unique identification number (ID) is assigned to each workpiece. This enables traceability and visibility of the current status of the workpieces in the machining process.

	24V Training Factory Industry 4.0 24V with PLC connection board	9V Training Factory Industry 4.0 9V
Item No.	554868	551584
EAN	4048962395945	4048962354188
Dimension (mm)	972 x 772 x 402	972 x 772 x 402
+ additional outer box	475 x 330 x 257	-
Weight (kg)	24	24
Control	PLC (not included)	6x fischertechnik TXT Controller
Software	Basic programs as structured text (STL) for Siemens S7-1500	Basic programs C/C++
Power Supply	(not included)	3x power supply required 505297 (for 230V) 122992 (for 120V)
Cabling	Completed by customer	Completely cabled