fischertechnik

Education Continuum
Hands-on learning solutions from preschool to higher education

2023/2024

CONTENT

PRIMARY SCHOOL

SECONDARY SCHOOL

Icons

⚙⁺	Listed components included	📦	Number of parts
🖥	Additional lesson and professional development support	✕	Number of experiments
⚙	Ideal accessories	🏗	Number of models

„At fischertechnik education, we aim to assist in preparing our society for the future. Our learning solutions are designed to aid teachers and students in acquiring critical future skills, including various STEM concepts, social and emotional skills, to help them navigate in a rapidly changing world driven by technological advancements. We believe that hands-on, experiential learning is very powerful and yields excellent learning outcomes. Our pedagogical approach emphasizes holistic learning that combines rational thinking and emotional engagement - from hands to heart to mind. fi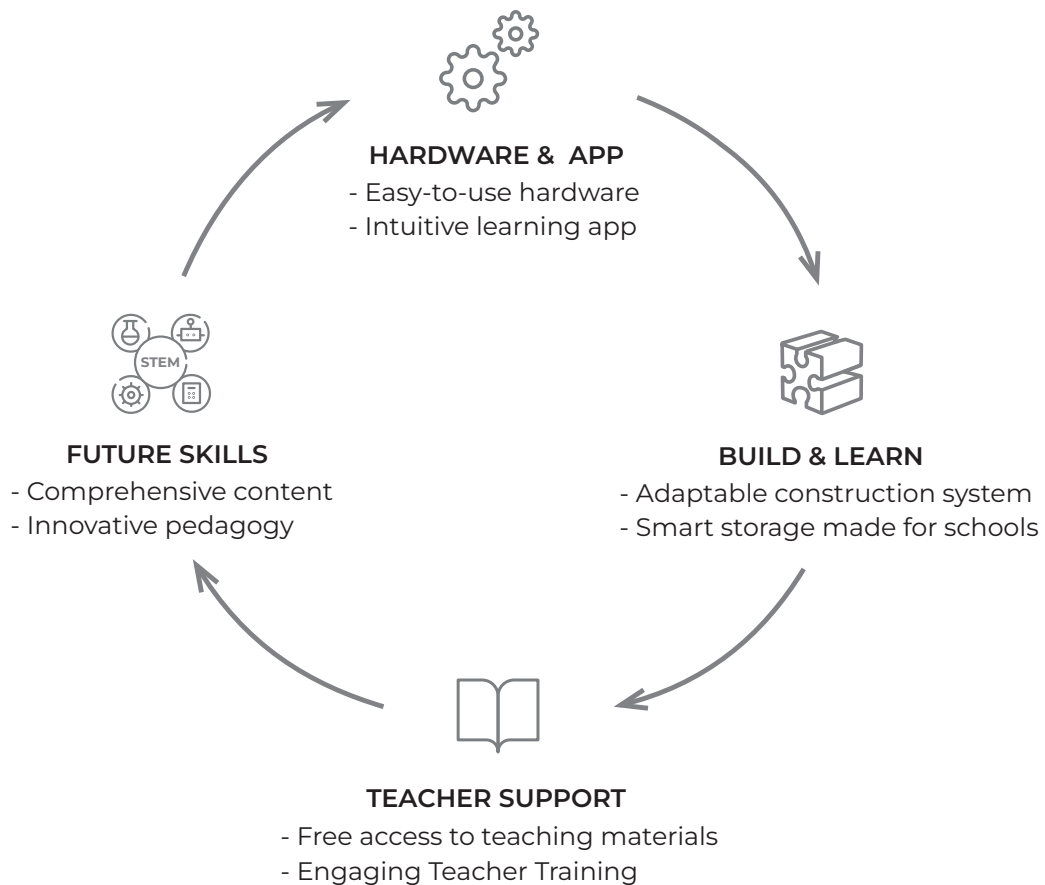schertechnik's educational programs cover STEM-related topics and tasks that are relevant to learners' daily lives and prioritize student agency. In teams, students experiment, learn, and reflect together while actively driving their joyful learning process."

Thomas Bußhart
General Manager fischertechnik

EXPLORE
fischertechnik

HARDWARE & APP
- Easy-to-use hardware
- Intuitive learning app

BUILD & LEARN
- Adaptable construction system
- Smart storage made for schools

TEACHER SUPPORT
- Free access to teaching materials
- Engaging Teacher Training

FUTURE SKILLS
- Comprehensive content
- Innovative pedagogy

The power of hands-on STEM learning

Holistic learning with your hands, heart and mind

All fischertechnik education solutions are based on the educational approach of hands-on, self-regulated learning that emphasizes active engagement and the practical application of knowledge.

Scientific research shows that exploring STEM concepts by actively driving the learning process can lead to very good learning outcomes, if students are able to:

- Learn holistically with hands, heart, mind and all senses
- Relate the task to their everyday life to see the real-world relevance
- Actively engage and drive the learning process
- Collaborate, work in a team and jointly share responsibility for the learning outcome
- Create tangible and meaningful results
- Reflect on the learning process
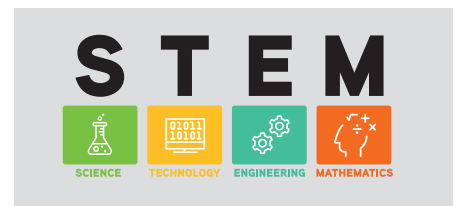
The fischertechnik building block

STABILITY
The pin and groove joint creates a strong connection between the building blocks.
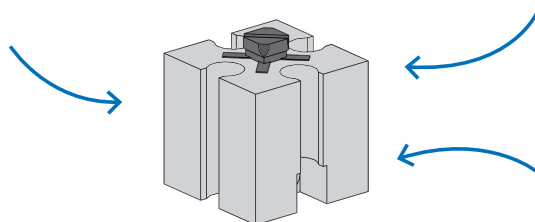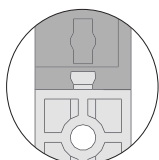
VERSATILITY
Allows the construction of additional building blocks on all six sides.

CREATIVITY
There are endless creative opportunities for your creations.

TEACHER SUPPORT

fischertechnik education learning solutions contain extensive teaching materials. These were developed together with pedagogical colleges, teachers and educators and are ideally suited to the needs of the classroom.

Introduction to the topic

fischertechnik education covers a variety of STEM topics. Each educational kit addresses one technical topic. The topic introduction provides content such as definition, history, basic knowledge and much more, which can be optimally used for lesson preparation and easily integrated into the lesson.

Curriculum alignment, learning objectives & time required

The teaching material includes an overview of the learning objectives, and the time required for the tasks and the respective curriculum references e.g. for the individual federal states in Germany. This allows each product to be perfectly scheduled into the lesson through individual assignment.
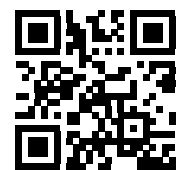
Tasks and solutions for use in the classroom

A wide variety of tasks are included to match the topics relevant to the curriculum. Within the tasks, various experiments are proposed. The tasks are divided into a construction task, thematic task and experimentation task. In this way, you progress from building, to learning technical content, to practical application of the knowledge gained.
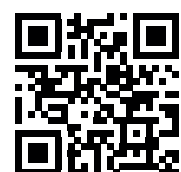
*Example based on the topic "STEM Coding Pro"

PRIMARY SCHOOL

The class sets are optimized for regular lessons at the primary level, designed for group work with two or more students and each dealing with a specific, technical topic. A class set, consisting of 2 blue BOX 1000, contains 16 identical individual sets, so that, for example, 15 students (or groups) and one teacher can be equipped with one set. Each individual set is stored in a clearly arranged tray with a printed sorting insert for uncomplicated back-sorting. These trays can be taken to individual work stations by the students to promote a smooth teaching process. Accompanied by teaching materials which include lesson plans and task sheets with educational plan references, the class sets are ideal for teaching technical content at the primary level.

(+) eLearning   You Tube

Class Set Statics

How can a house survive a storm unscathed and why don't cranes fall over? The designers of tomorrow are exploring these questions and many others like these. They are exploring the stability and strength of technical structures and discovering the relationships between loadbearing capacity and connecting elements. Eight exciting models, in combination with the didactic material that comes with them, teach the subject of statics using bridges, cranes and truss constructions.

KEY AREAS

- Stability and strength in engineering structures
- Functional characteristics of structures
- Compressive and tensile forces
- System of triangular bracing

Incl. static components: Angle girders & struts

Additional lesson and professional development support & class model „Bridge"

3200

24

8

Item No.	564059
EAN	4048962458466
Dim. (mm)	405x280x400
Weight (g)	7660

Class Set Simple Maschines

We encounter simple machines everywhere in our everyday lives. They help us to do work using as little effort as possible. The crowning glory of this construction kit is the relay machine that passes a ball back and forth. This is something the whole class can get involved in and combine the principles of what they have learned across the different modules with the fun of building and playing.

Incl. gear wheels and cable winch

Additional lesson and professional development support & class model „ball forwarding machine" (built from all 16 sets)

2320

61

10

Item No.	564061
EAN	4048962458480
Dim. (mm)	405x280x400
Weight (g)	8140

Class Set Optics

Explore optical phenomena and experiment with light in class! Explore penumbra and umbra, discover many exciting things with a magnifying glass or determine the time with a sundial. These and many other exciting topics can be taught playfully in the classroom using the Class Set Optics. In addition to the models, which can be built quickly and are therefore easy to teach, the kit offers exciting experiments.
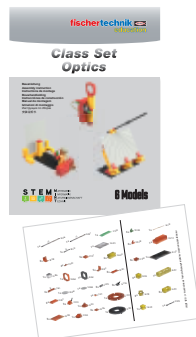
Incl. lens f=25mm, lens f=80mm, mirror, 2x LED & holder for 9V battery (battery not included)

Additional lesson and professional development support

1264

6

6

Item No.	559892
EAN	4048962424737
Dim. (mm)	390x270x200
Weight (g)	7700

Class Set Solar Energy

Renewable energies are becoming increasingly important. Our Class Set Solar Energy is the perfect introduction to the topic of solar energy for young students. With three quickly assembled models, the basics of solar energy can be taught in class using ten ready-made tasks, including solutions, with lots of fun and exciting insights.
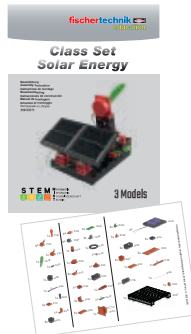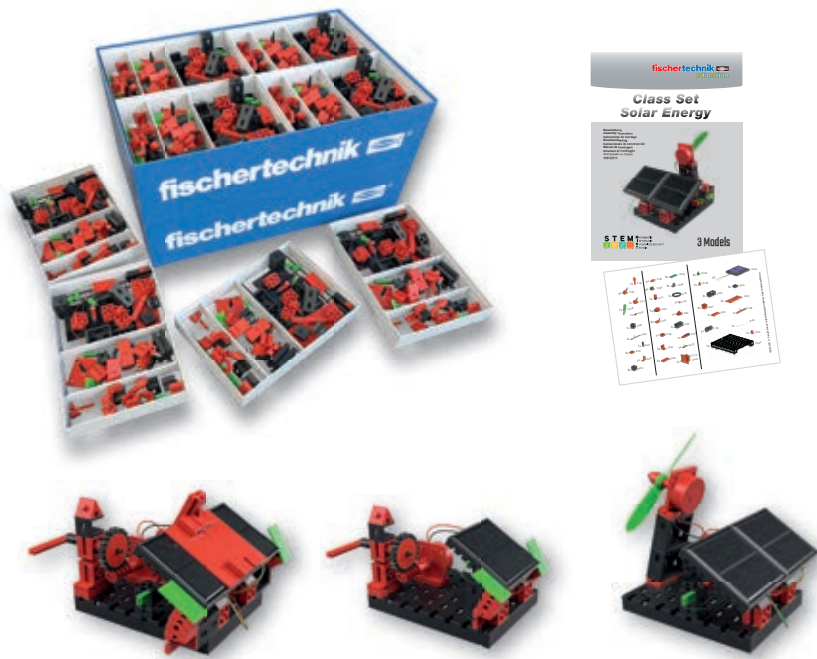
Incl. 2x solar module 1V, solar motor & push button

Additional lesson and professional development support

1184

10

3

Item No.	559894
EAN	4048962424751
Dim. (mm)	390x270x200
Weight (g)	7600

Class Set Electrical Control

How does the light in the stairwell come on? Why does it go on at the bottom and off at the top? These and many other questions about electrical circuits are taught in an engaging and kid-friendly way using our Class Set Electrical Control with different models and experiments. The models can be easily built in class and directly integrated with the ready-made tasks and solutions.
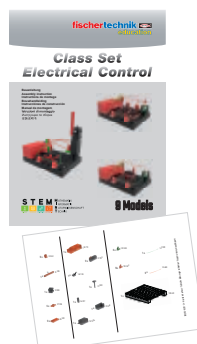
Incl. 2x push button, LED, motor, holder for 9V battery (battery not included)

Additional lesson and professional development support

544

25

9

Item No.	559893
EAN	4048962424744
Dim. (mm)	390x270x200
Weight (g)	6600

Class Set Gears

How does a bevel gear, a belt gear or a rack and pinion gear work? What happens when the transmission ratio changes? Young researchers can investigate these and many other questions using various models and experiments. The models can be set up quickly and easily in the classroom and can be used optimally with the help of the ready-made tasks and solutions.

Incl. gears, bevel gears, rack, belt, chain, axles, building blocks & base plate 120x60 mm

STEM Gear Tech

Additional lesson and professional development support

1600

12

15

Item No.	559887
EAN	4048962424683
Dim. (mm)	390x270x200
Weight (g)	7100

Class Set Basics

NEW

With this creative box especially for primary schools, students learn how to turn their imagination into creative models. Through the building ideas included, children quickly and easily construct their first playful models and explore them in role-play with the included figure.

Additional lesson and professional development support

1440

Item No.	571104
EAN	4048962510461
Dim. (mm)	390x270x200
Weight (g)	7314

Robotics First Coding

Writing your own program, and thus bringing a robot to life, is incredibly exciting and thrilling! It is impossible to imagine today's world without this technology. To introduce even the youngest students to this exciting and important topic, our fischertechnik First Coding is the ideal choice. This introduction to computer science and robotics succeeds through the use of ready-made components, along with a whole lot of ands-on fun. The two motors and sensors are integrated in a ready-to-use block. That means: switch on, connect to the mobile device via Bluetooth and get started! The three models can not only be controlled via smartphone and tablet, but it is also child's play to create your own program with the First Coding app. The comprehensive teaching material, including three experiments with solutions, provides the perfect basis for teaching.

Item No.	560843
EAN	4048962429992
Dim. (mm)	320x80x230
Weight (g)	760

* works with First Coding App (required)

STEM Coding Pro

NEW

How do traffic lights work? How can I learn to program a simple drawing robot? On the basis of models taken from everyday life and tasks that build on each other, children learn key digital skills step by step. With the aid of an user-friendly controller, practical sensors and actuators, an intuitive Scratch app, models that are quick to set up and the colourful fischertechnik building blocks, primary school children solve tasks they are familiar with from their living environment. Thanks to the playful hands-on approach to learning, children also develop important social and emotional skills.

Item No.	569025
EAN	4048962492811
Dim. (mm)	440x315x80
Weight (g)	1780

* works with Coding Pro App (required)

Starter Sets

Programming in primary school

The fischertechnik starter sets for micro:bit or Calliope teach the principles of programming in an easy-to-understand way to students from the third grade upwards. Both sets include a fischertechnik parts assortment for building three stationary models. This allows simple, understandable demonstration models (pedestrian traffic lights, hand dryers or barriers) to be equipped with actuators and sensors and controlled via the micro:bit board or the Calliope board.

- Step by step instructions for getting started
- Various tasks and their solutions

Additional lesson and professional development support
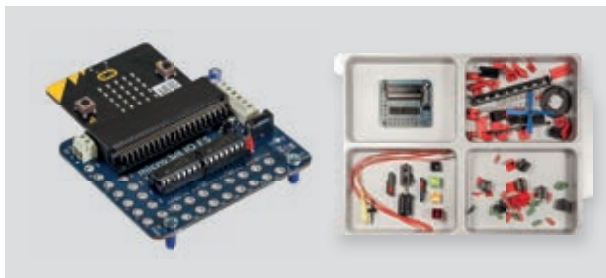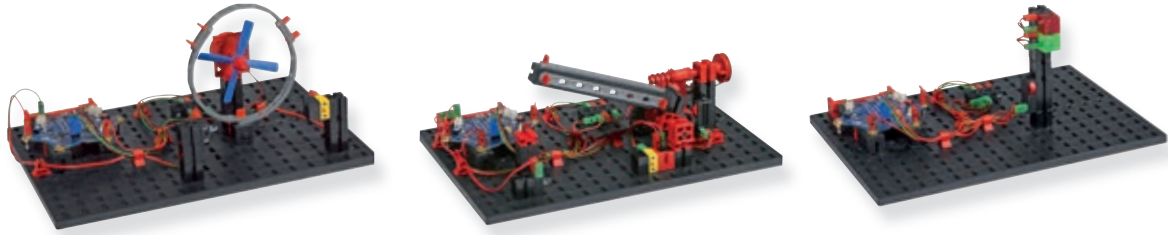
for micro:bit

Fig.: iO F5 adapter with micro:bit
(8 outputs and 6 inputs;
micro:bit not included)

* Required: micro:bit, software „Make Code",
 Power supply

Incl. micro:bit iO F5 adapter, XS motor, 2x light barrier LED, phototransistor, 2x push button & printed construction manual

90

3

Item No.	548884
EAN	4048962350944
Dim. (mm)	440x315x80
Weight (g)	1450
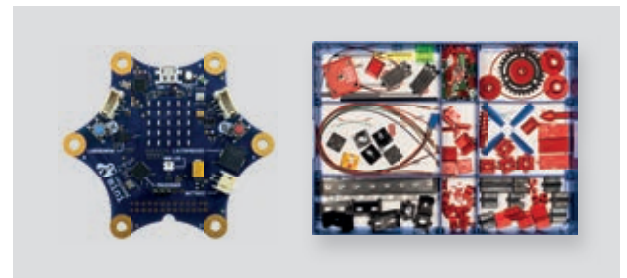
for Calliope

Fig.: Calliope Board
(not included)

* Required: Calliope Board and software
 „Open Roberta", Power supply: Via USB

Incl. solar motor, 2x light barriers LED, phototransistor, 2x push buttons, printed construction manual & special mounts for the Calliope board

125

6

Item No.	544626
EAN	4048962316322
Dim. (mm)	270x195x40
Weight (g)	650

SECONDARY SCHOOL

fischertechnik STEM kits are optimized for practice-oriented work from the middle and high school level upwards. Each set is designed to address a specific, technical topic from the STEM field. Each kit contains a set of parts with which various models can be built and experiments conducted. The models are optimized for functionality and thus avoid long construction times. Ideally, two to four students can work with a kit at the same time. Accompanied by the didactic concept including lesson plans and task sheets with curriculum reference, the STEM kits are ideal for teaching.

⊕ eLearning   ▶ YouTube

STEM Optics

Basic principles of optics

Developed especially to do justice to the demanding requirements of regular lessons, this set offers a comprehensive collection of 18 models, which help students to explore the basic principles of optics in a playful and interactive way. Starting with basic concepts such as the magnifying glass and the paths beams take through different lenses, the set leads learners to more complex subjects, such as telescopes, spectrums, microscopes or projectors. Each model has been designed with great care and can be set up quickly thanks to the unchanging lens holder in connection with the optical bench, guaranteeing a smooth workflow in hands-on lessons. This gives learners the opportunity to actively experiment, observe and explore. The didactic accompanying material supports the students' journey of discovery and provides detailed instructions, explanations and tasks, which turn learning into an integrated experience.

NEW

KEY AREAS
- Explain optical principles
- Learn technical terms and articulate relationships between concepts
- Estimate, measure and compare
- Improve logical and strategic thinking
- Practice project and group work

Incl. 2 x lens f40, 1 x lens f103 & 1 x lens f-35

Additional lesson and professional development support

182

49

18

Item No.	569023
EAN	4048962492798
Dim. (mm)	440x315x80
Weight (g)	1784

STEM Smart Physics

Construction and data analysis combined

The world of construction and data analysis combined guarantees a practical and interactive learning experience in regular lessons. STEM Smart Physics contains ten exciting models, which make numerous physics experiments possible. From accelerated bodies through harmonic oscillations to the spreading and spectrums of sound – exciting tasks are waiting for learners, enabling them to test hypotheses and investigate physical laws in a practical way. The Phyphox app reads out the data collected in the smartphones that are integrated in the models and makes an immediate and detailed analysis of the measuring results possible. Thanks to the combination of theory and practice, learners gain a deep understanding of physical principles and develop their problem-solving expertise and analytical skills at the same time. The didactic accompanying material – especially developed for regular lessons – rounds the concept off and makes direct classroom use possible.

NEW

KEY AREAS

- Experiment with physical phenomena
- Apply physical principles
- Understand and articulate relationships between concepts
- Evaluate and analyse measurements
- Practice project and group work

Inkl. U-beam for fast and robust setups

Additional lesson and professional development support

107   18   10

Item No.	569024
EAN	4048962492804
Dim. (mm)	440x315x80
Weight (g)	1613

* works with Phyphox App (required)

STEM Statics

Basics of statics

Why is a triangle so important to the world of statics? Where do we encounter this everywhere in everyday life? These and other statics principles will be explored in a simple and clear way using fischertechnik's STEM Statics Advanced and practical model examples. We will explore topics such as compressive and tensile forces, and statics and forces in the equilibrium. We will be able to measure and check the results of the practical experiments with the help of the spring balance included in the kit. Students will have fun and discover the spirit of discovery as they internalise physical ways of thinking and working, and consolidate what they have learned in the long term.

KEY AREAS

- Implementation of static principles
- Determining tensile and compressive forces in two dimensions
- Forces in equilibrium of stationary bodies

Incl. structural components: angle girders and struts, spring balance, rope and rope winch as well as rope hooks

Additional lesson and professional development suppor

315   21   10

Item No.	564060
EAN	4048962458473
Dim. (mm)	440x315x80
Weight (g)	2022

STEM Simple Machines

Understanding simple machines

There is a whole range of physical laws inside this construction kit. STEM Simple Machines covers the topics on which the various tools and machines are based (rope and bar, lever, pulley, and inclined plane). But we don't just get to explore complex mechanical functions like those of a differential gear – we also examine exciting models from our students' everyday lives in great detail and give them those eureka moments! The mechanics of a screw clamp and a pulley is just one example of the mechanical functions that we explore. We will be able to measureand check the results of the practical experiments with the help of the spring balance included in the kit.

Incl. rope, rope pulleys, gears, wheels, axles & threads

Additional lesson and professional development support

347

70

14

Item No.	564062
EAN	4048962458497
Dim. (mm)	440x315x80
Weight (g)	1800

STEM Renewable Energies

Basics of renewable energies

How can you generate electricity in an environmentally friendly way? How does a fuel cell work and how can it be used to generate hydrogen? Renewable energies are the most important energy sources of the future. The generation, storage and use of electricity from the natural energy sources of water, wind and sun are clearly explained using different models. The powerful solar modules with their many attachment options open up flexible use in the models. The gold cap included serves as an energy storage device and can release the energy fed into the grid. The fuel cell illustrates how water is split into hydrogen and oxygen. In this way, the principle of future forms of energy is learned and important skills are trained.

Incl. solar motor (2VDC), 2x solar module (1VDC, 400 mA), gold cap energy storage, LED, fuel cell, voltage converter & multimeter

Additional lesson and professional development support

270

28

9

Item No.	559881
EAN	4048962424621
Dim. (mm)	440x315x150
Weight (g)	2700

STEM Pneumatics

Basics of pneumatics

Pneumatics experimentation began as early as the third century BC, when the enormously versatile usability of compressed air was first discovered. STEM Pneumatics teaches the basics of pneumatics and demonstrates, for example, how a compressor, pneumatic valves and cylinders, and an exhaust air throttle valve work. The concept is rounded off by the extensive lesson plans for teachers.
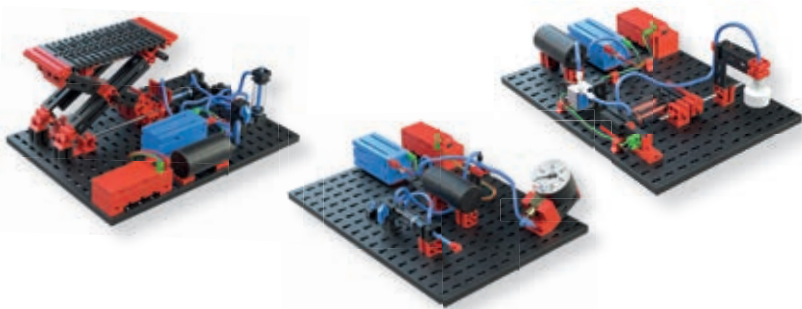
Incl. compressor, pressure gauge, 2x double-acting cylinders, 2x single-acting cylinders, compressed air accumulator, 2x manual valve, solenoid valve, push button, change-over check valve, vacuum cup, 2x exhaust air throttle & battery holder for 9V battery (battery not included)

Accu Set & Power Set

Additional lesson and professional development support

273   29   8

Item No.	559878
EAN	4048962424591
Dim. (mm)	440x315x80
Weight (g)	1800

STEM Electronics

Basics of electronics

Discover the exciting world of electronics with STEM Electronics! Through different models this construction kit teaches the basics and offers a variety of different electronics topics. From simple to complex models, such as an alternating flasher, many exciting functional models can be constructed with this construction kit. Teachers can find information material on the topic as well as ready-made tasks and solutions in the fischertechnik e-Learning Portal.
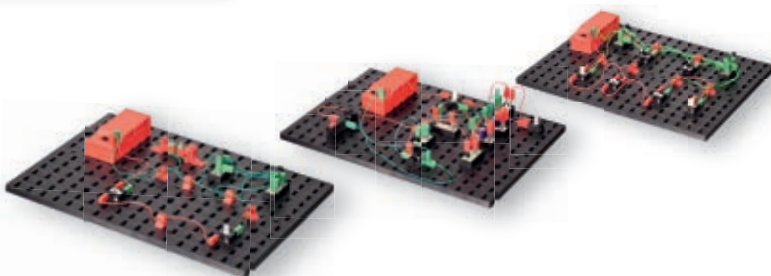
Incl. XS motor, 2x push button, 2x diode, 2x transistor, 3x resistor, 2x capacitor & holder for 9V battery (battery not included)

Accu Set & Power Set

Additional lesson and professional development support

180   60   23

Item No.	559884
EAN	4048962424652
Dim. (mm)	440x315x80
Weight (g)	1600

STEM Gear Tech

Basics of gear technology

The engaging experiments can be conducted, using different models such as a beam balance, a scissor lift or a windshield wiper, and the exciting technology behind them can be conveyed. Of course, the various types of gears, such as a clock gear, planetary gear or differential gear, are also included. The concept is rounded off by the accompanying educational material available online.

KEY AREAS

- Lever laws
- Gear ratios
- Four-bar linkages
- Pulley block
- Differential gears
- Planetary gears

Incl. gears, bevel gears, internal gear, worm, various axles, rope with winch and pulleys, chain, building blocks & base plate 258x186mm

Additional lesson and professional development support

320

26

17

Item No.	559886
EAN	4048962424676
Dim. (mm)	440x315x80
Weight (g)	1800

STEM Mechanics 2.0

Basics of mechanics and statics

This learning kit is ideal for future mechanical engineers, technicians or engineers: How does a cardan drive or a manual transmission work? What is a planetary gear? How do you construct a stable bridge? This learning kit answers these and other elementary questions from the subject areas of mechanics and statics using different models.

KEY AREAS

- Mechanics
- Statics
- Dynamics
- Effect of forces on bodies and objects

Incl. XS motor & battery holde

Accu Set

Additional lesson and professional development support

500

30

Item No.	538423
EAN	4048962263350
Dim. (mm)	440x315x150
Weight (g)	3150

TXT 4.0 Controller

The TXT 4.0 Controlller offers plenty of new features with its 512 MB RAM and 4 GB eMMC memory, the three servo outputs and a capacitive touch display that supports swipe gestures. The improved WLAN and Bluetooth module offers the right wireless interface for numerous applications. Another interface is the USB host port, to which, for example, the fischertechnik USB camera or USB sticks can be connected. Up to 8 additional controllers can be connected to one controller as extensions. The flat housing allows the controller to be perfectly integrated into the models. To always be up to date, firmware updates are automatically downloaded via the cloud, preserving custom programs. With the software Robo Pro Coding can be programmed both graphically and with Python. Robo Pro Coding is operating system independent and can also be used with mobile devices (Android / iOS). With an additional app (Android / iOS). With an additional app (Android / iOS), the TXT 4.0 Controlller can also be controlled via voice recognition.
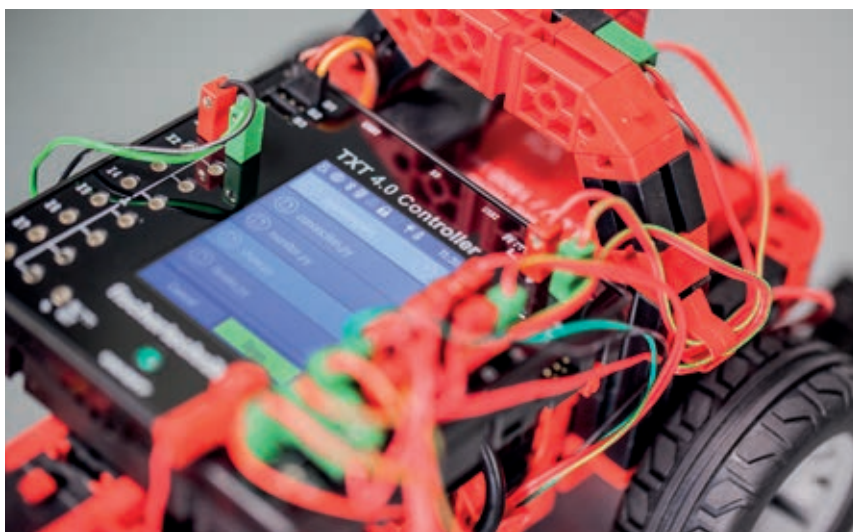
FEATURES

- Touch display
- USB host
- Card slot
- Speaker
- App
- WIFI
- Bluetooth
- Voice recognition

Item No.	560166
EAN	4048962426724

Built on Blockly   python

FURTHER FEATURES

- Processor: Arm® dual Cortex®-A7 650 MHz + Cortex®-M4
- Memory capacity: 512 MB DDR3 RAM, 4 GB eMMC
- Memory expansion: Micro SD card slot
- Color touch display: 2.4", 320x240 pixels, capacitive, allows swipe gestures
- Flat design - dimensions: 90x90x17,5mm
- 8 universal inputs: digital/analog 0-9VDC, analog 0-5 kΩ
- 4 fast counting inputs: digital, frequency up to 1kHz
- 3 servo outputs 5V (max. 2A), short-circuit proof
- 4 motor outputs 9V/250mA (max. 1 A): Speed infinitely variable, short-circuit proof, alternatively 8 single outputs e.g. for LEDs
- Combined Bluetooth / WLAN radio module: Bluetooth 5.0 (BR, LE & EDR), WLAN dual band 2.4 GHz and 5 GHz 802.11 a/b/g/n / USB 2.0 client: Mini USB socket for connection to PC
- USB host interface: USB-A socket e.g. for fischertechnik USB camera or USB sticks

- Camera interface: via USB host, Linux camera driver integrated in operating system
- Integrated loudspeaker for playing sounds
- 2x pin header 6-pin: For extension of inputs and outputs as well as I²C interface
- Linux based open source operating system, firmware update via cloud, USB stick, micro SD card
- Programming with Robo Pro Coding (Blockly and Python), C/C++ compiler (not included) - further programming possibilities via REST interface
- Control also possible via voice recognition app (Android / iOS)
- Available output voltages: 9V, 5V and 3.3V
- Power supply: 9VDC socket 3.45 mm or fischertechnik sockets 2.5 mm

* Required accessory: Accu Set or Power Set

LET'S GET STARTED!
www.fischertechnik.de/schools

Robo Pro Coding App

The app Robo Pro Coding offers in its multilingual environment, text-based programming via Python, in addition to the possibility of graphical programming (block based with Blockly). Users can choose from beginner, advanced and expert learning levels to work at the appropriate level of difficulty. Program examples are available. Self-created programs can be stored locally on the device and online in the cloud. This allows versioning and sharing of created programs in the cloud between users. Actuators and sensors can be tested quickly via the interface test.

COMPATIBLE WITH

- Windows
- Linux
- macOS
- Mobile devices (Android / iOS)

Modular Concept

The fischertechnik STEM Robotics concept for middle and high schools is modular: **ONE** basic for regular classes and **SIX** high-tech extensions for use in advanced classes and international robotics competitions.

## Robotics TXT 4.0 Base Set and Add On Expansion Sets

This robotics basic construction kit provides the base for use in coding lessons: Controller, software, power supply, actuators and sensors and many basic building blocks are included. The six separately available add on sets expand the TXT 4.0 Base Set by their respective focus and can be clearly integrated in the tray provided for this purpose.

Robotics TXT 4.0 Base Set

Measurement, control, regulation and programming from secondary level onwards

The fischertechnik Robotics TXT 4.0 Base Set is the perfect start to programming like the pros! In addition to the camera with image processing, the extensive construction kit contains an ultrasonic sensor, two encoder motors, a track sensor, a phototransistor as well as two push buttons and two LEDs. The models can be pro- grammed and controlled with the Robo Pro Coding programming software and the Robotics TXT 4.0 Controlller. Beginners can access ready-made sample programs,while advanced and professionals can get started directly in a Blockly programming environment or in Python. With an additional app (Android/ iOS), the TXT 4.0 Con- trolller can also be controlled via voice recognition. Included are 12 exciting models ranging from pedestrian traffic lights, a barrier, a barcode scanner to mobile driving robots with encoder motors, camera, lane and distance sensor.
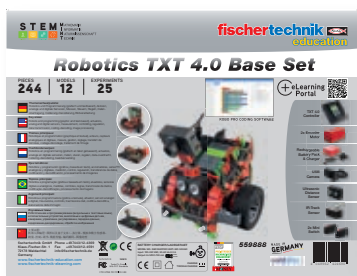
KEY AREAS

- Robotics and programming (graphical and text-based)
- Actuators
- Analog and digital sensors
- Measurement
- Control
- Data transmission
- Coding-decoding
- Image processing

Incl. Robotics TXT 4.0 Controller, Robo Pro Coding Software, Accu Set, 2x Encoder Motor, USB Camera, Ultrasonic Sensor, Track Sensor, 2x Push Buttons, 2x LED & phototransistor

Additional lesson and professional development support

244   25   12

Item No.	559888
EAN	4048962424690
Dim. (mm)	440x315x150
Weight (g)	2850

Built on Blockly   python

Add On Expansion Sets

Building on this, the various add on expansion sets with specific high-tech themes such as autonomous driving, omniwheels and IoT (Internet of Things), the ideal expansion set for robotics competitions, artificial intelligence or industrial robots. Thus a painting robot becomes an autonomous car, or a soccer robot. Or a train barrier becomes a sensor station for measuring temperature, humidity, air pressure, air quality and brightness.

Autonomous Driving

Competition

Artifical Intelligence

Omniwheels

IoT

Industrial Robots

ADD ONS FOR ROBOTICS TXT 4.0 BASE SET

Take your building and coding experience to the next level

Autonomous Driving

Build and program your own "car of the future" to amaze and delight the classroom! The Robotics Add On: Autonomous Driving together with the Robotics TXT 4.0 Base Set offers the opportunity to explore and understand some of the exciting technological breakthroughs that are quickly becoming a part of our everyday lives. From automatic lights to a lane departure warning system, cruise control to automatic parking- this model guarantees enthusiastic eyes in the classroom. In addition to a differential, the construction kit contains more wheels, LEDs and a servo motor for steering. Add On: Autonomous Driving is rounded off by the teaching material, which contains 7 experiments with associated solutions.

* Required: Robotics TXT 4.0 Base Set

KEY AREAS

- Autonomous driving
- Control technology
- Analog sensor technology
- Speed measurement
- Distance calculation
- Distance measurement

Incl. chassis (differential, wheels), servo, LED & steering

Add On:
Omniwheels & Competition

Additional lesson and professional development support

115   7   1

Item No.	559896
EAN	4048962424775
Dim. (mm)	280x180x65
Weight (g)	530

Built on Blockly   python

Build, code, compete and win

Get creative, design your own autonomously driving robot vehicle and win the competition. There are several global and local robot competitions worldwide that you can join individually or as a team. Big competition formats are organized by e.g. World Robot Olympiad, Robo Cup, World Skills, but there also a lot of local initiatives you can join. Look for your nearest competition organizer and event and start building!

Omniwheels

Build and program even more intriguing robots with the Add On: Omniwheels. Together with the Robotics TXT 4.0 Base Set, four exciting Omniwheels models can be constructed: Driving robots with different tasks, such as soccer robots, ball-throwing robots that recognize and knock down targets, and painting robot with pen that can be lowered and raised. The highlight of the kit are the Omniwheels, which are driven by four encoder motors (two of are included in the TXT 4.0 Base Set) and thus enable movement in any direction! The camera included in the TXT 4.0 Base Set enables image processing through which, for example, the soccer robot can recognize, follow and shoot a ball!

* Required: Robotics TXT 4.0 Base Set

KEY AREAS
- Omniwheels vehicle control
- Object recognition
- Image processing
- Soccer robotics

Incl. 4x Mecanum Omniwheels, servo & 2x gear motor

Add On: Autonomous Driving

Additional lesson and professional development support

331   7   4

Item No.	559898
EAN	4048962424799
Dim. (mm)	320x230x80
Weight (g)	820

Built on Blockly   python

IoT (Internet of Things)

Professional entry into data acquisition with the Robotics Add On: IoT! Together with the Robotics TXT 4.0 Base Set, the sensor station enables the measurement of temperature, humidity, air pressure, air quality and brightness. The sensor station can be programmed and controlled with the Robo Pro Coding programming software and the Robotics TXT 4.0 Controlller, and is ideal for teaching topics such as data acquisition and transmission as well as control and regulation of actuators and sensors. The data acquisition is carried out via the connection of the TXT 4.0 Controlller with the fischertechnik cloud, in which the sensor data is stored, collected and graphically displayed. Via the user interface, the so-called dashboard, the various sensor data are permanently recorded (in realtime) and the camera, which can be swiveled in two axes, is remotely controlled. The teaching material of the Add On: IoT contains 6 experiments and associated solutions.

* Required: Robotics TXT 4.0 Base Set

KEY AREAS
- Robot competitions
- Project work
- Workshops in robotics

Incl. environmental sensor & brightness sensor

Power Set

Additional lesson and professional development support

72   6   1

Item No.	559897
EAN	4048962424782
Dim. (mm)	280x180x65
Weight (g)	450

Built on Blockly   python

Competition

The Robotics Add On: Competition is designed for schools, universities and other educational institutions that want to develop or improve their models for robotics competitions for their students. With this set, models can be enhanced and new features can be added, making this kit the perfect addition for competitions around the world. The set includes the new RGB gesture sensor, a combo sensor (gyroscope, acceleration and compass), an ultrasonic sensor, two more powerful motors, and track links and caterpillar pads for the undercarriage of a tracked robot - ideal for building competitive driving robots.

* Required: Robotics TXT 4.0 Base Set

KEY AREAS

- Robot competitions
- Project work
- Workshops in robotics

Incl. RGB gesture sensor in 6 directions, color detection, ambient brightness, proximity detection up to 15cm, ultrasonic sensor, combi sensor (gyroscope, acceleration and compass), more powerful motors & snap-on track pads

Additional lesson and professional development support

240

Item No.	560842
EAN	4048962429985
Dim. (mm)	320x230x80
Weight (g)	600

Built on Blockly   python

Artificial Intelligence

NEW

Artificial Intelligence is a key future technology. Our construction set promotes an early interest in this technology and prepares students for possible future vocational fields. They can immerse themselves in a playful way in the basic principles of AI and are given an insight into how AI technologies work. The set contains three models with different levels of difficulty. They illustrate the diversity of AI applications and offer a perfect introduction to this forward-looking technology. The scope of delivery includes instructional accompanying materials especially for use in the classroom, which deepen the understanding of Artificial Intelligence.

* Required:
Robotics TXT 4.0 Base Set

KEY AREAS

- Understand fundamentals of working with AI and machine learning
- Perform basic object detection
- Learn how to measure and evaluate model and classifier accuracy
- Experience the importance of high-quality training data for machine learning
- Discover how AI is used in real-life contexts

Incl. conveyor belt, work pieces, LED's & stickers

Additional lesson and professional development support

314   6   3

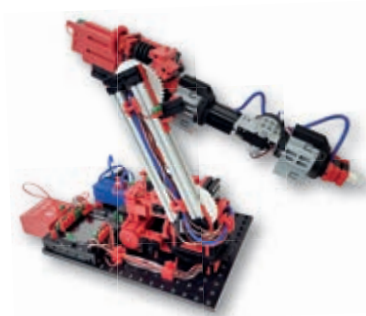| Item No.	569022
EAN	4048962492781
Dim. (mm)	320x230x80
Weight (g)	1613

Built on Blockly   python

Industrial Robots

This set allows learners to take an intensive look at the subject of industrial robots and to prepare themselves in a practical way to deal with the challenges of the modern world of work. Students assemble two realistic six-axle robot models and learn how to program these. This hands-on experience enables them not only to gain theoretical knowledge but to develop practical skills as well. Thanks to the included didactic material and interaction with our models, learners develop analytical skills, problem-solving expertise and practical teamwork in addition to gaining technical know-how.

NEW

(Packaging not final)

* Required: Robotics TXT 4.0 Base Set

Incl. 3x servo joints with digital servos & work pieces

Additional lesson and professional development support

371   6   2

Item No.	564064
EAN	4048962458510
Dim. (mm)	320x230x80
Weight (g)	1516

Built on Blockly   python

COMPLETE SET FOR COMPETITIONS
Build the future already now

STEM Coding Competition

The new fischertechnik STEM Coding Competition comes with everything you need to build and program an autonomously driving robot car and to master an obstacle course successfully. The construction set for a customised chassis contains the powerful TXT 4.0 Controlller, three ultrasonic sensors, a powerful encoder motor, a camera, a differential gear, double-pivot steering including servo motor and a rechargeable battery and power adapter. The set is suitable for taking part in robotic competitions such as the Future Engineers category in the World Robot Olympiad.
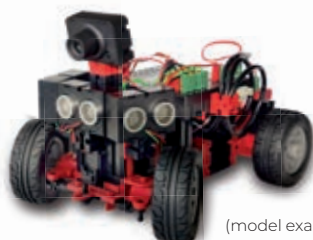
Incl. TXT 4.0 Controlller, 3 x ultrasonic sensor, powerful encoder motor, servo motor, Ackerman steering, differential gear, accu + charger, camera, kit for individual chassis

Additional lesson and professional development support

258

Item No.	571099
EAN	4048962510447
Dim. (mm)	465x80x320

Built on Blockly   python

(Packaging not final)

(model example)

ACCESSOIRES

Box 1000

Ideal storage system for fischertechnik parts: Practical storage box with 8 sorting trays and 32 sorting bars. The lid is also the large building plate 390x270 mm.

Item No.	30383
EAN	4006209303832
Dim. (mm)	390x270x100
Weight (g)	1889

Accu Set

Microcontroller controlled charger that reliably protects against overcharging. Very short charging time, max. 2 h. Powerful NiMH Accu Pack with short circuit protection, 8.4V/1800 mAh.

Type	Item No.	EAN
220V	34969	4006209349694
120V	57487	4006209574874
240V UK	79833	4006209798331
220V AUS	52091	4006209520918

Dim. (mm)	225x150x65
Weight (g)	490

Power Set

Power supply unit and stepless power controller: The power supply from the socket for all fischertechnik models.

- Power supply unit performance data: Voltage 9VDC 2.5A
- Performance data Power Controller: adjustable output 1A max., additional output with 9VDC, 1A max. (not adjustable), both outputs short-circuit proof with overload protection

Type	Item No.	EAN
220V	505283	4048962069440
120V	91087	4006209910870

Dim. (mm)	225x150x65
Weight (g)	431

Motor Set XS

Thanks to the compact dimensions, this motor can be installed almost anywhere. In addition to building blocks, gear parts, and gears, the set also includes a safety battery holder with integrated pole-changing switch for 9V battery (battery not included).

- Performance data: Voltage 9VDC, max. power 1.0W at 6000rpm

45

Item No.	505281
EAN	4048962069426
Dim. (mm)	225x150x65
Weight (g)	201

Motor Set XM

Powerful gear motor in compact plastic housing with numerous attachment options. With many gears, axles and gear parts.

- Performance data:
  Voltage 9VDC, max. power 3.0W, approx. 340rpm

* Required: Accu Set or Power Set

40

Item No.	505282
EAN	4048962069433
Dim. (mm)	225x150x65
Weight (g)	278

Control Set

The Control Set lets fischertechnik models be controlled remotely via the Bluetooth Control App, using a smartphone or tablet. The Bluetooth Low Energy technology offers a long range of up to 10 meters. The receiver has three motor outputs and a servo output, which enables smooth steering and continuous speed regulation. The set comes with one servo. The app can be used to operate up to two receivers, which allows for a large number of use cases.

Item No.	563931
EAN	4048962457438
Dim. (mm)	225x65x150
Weight (g)	273

Creative Box Basic

With the Creative Box Basic, students can let their creativity run wild! Equipped with many basic building blocks, angle beams and other „basics", this set is perfect for creating great things: It can be used to build freely, to reconstruct an existing theme, or to further expand an existing project. The simple and flexible functionality of the building blocks is explained in a quick reference guide. The large fischertechnik base plate is used as the basis for the models, which also functions as the closing lid of the sorting box. Comes packed in the sturdy BOX 1000 with 8 sorting trays and flexible sorting bars.

630

Item No.	554195
EAN	4048962390490
Dim. (mm)	390x270x100
Weight (g)	2800

Creative Box Mechanics

Whether it's a worm gear, a chain drive, a cable winch, or many other mechanical devices, this box provides the tools to create it! The model can then be used to recognize and understand how it works, while the construction strengthens constructive thinking. The function and interaction of the included fischertechnik building blocks is explained in short form. The sorting boxes are closed by the fischertechnik base plate 500, which is ideally suited as a basis for creative building. Supplied in two sturdy BOXes 500.

290

| Item No.	554196
EAN	4048962390506
Dim. (mm)	270x195x80
Weight (g)	1050

Arduino® & Raspberry Pi®

These fischertechnik adapters bridge the gap between the popular Arduino® UNO, Arduino® MEGA and Raspberry Pi® controllers and the versatile fischertechnik modular system Advanced users use the fischertechnik system to build complex mechanical models.
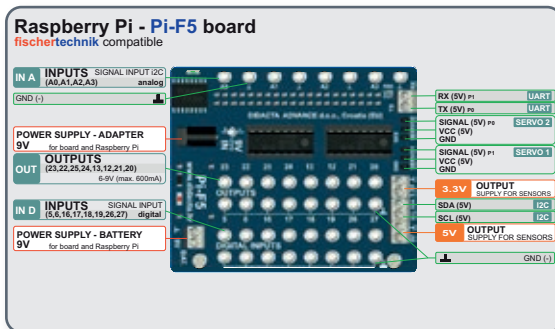
Type	Item No.
Arduino® UNO	179450
Arduino® MEGA	179449
Raspberry Pi®	179448
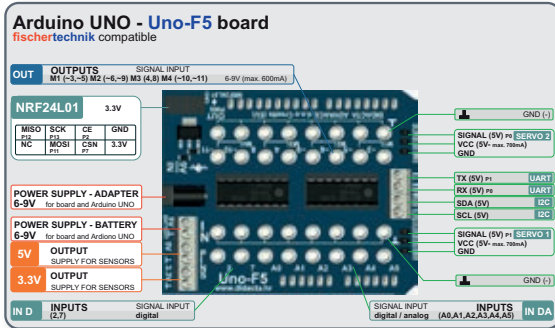
Arduino® UNO
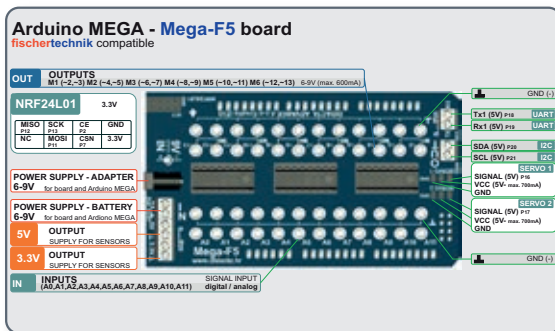
Arduino® MEGA

Raspberry Pi®

IMPORTANT COMPONENTS
Technical details

„GREEN" COMPONENTS

- Gold Cap (3.0V / 10F) - electrolytic capacitor for electrical energy storage
- Solar module ❶ (1V / 400mA) - generation of electric current from solar energy
- Reversible fuel cell with integrated hydrogen storage ❷
  Operation as electrolyzer (2-3V / 8ml/min / 400-1500mA)
 Operation as fuel cell (0.5-0.9V / 300mW / 600mA)

ACTUATORS

- Motors – generation of motion and propulsion of fischertechnik models:
  XS motor ❶ (9VDC / 5995rpm / 1.52mNm / 265mA)
  S motor (9VDC / 9500 rpm / 4.8mNm / 650mA)
  S motor (24VDC / 10700rpm / 5mNm / 300mA)
  XM motor (9VDC / 338rpm / 84.15mNm / 950mA)
  Encoder motor 9V ❷ (9VDC / 105rpm / 90mNm / 510mA)
  Encoder motor 24V (24VDC / 100rpm / 90 mNm / 190mA)
  Solar motor ❸ (2VDC)
- Compressor ❹ : Compressed air generation
  9V (9VDC / 0,7bar / 2l/min / 200mA)
  24V (24VDC / 0,7bar / 2l/min / 40mA)
- 3/2-way solenoid valve - control of pneumatic cylinders:
  12V (12VDC / 0.133A) / 24V (24VDC / 70mA)
- LED white (9VDC / 10mA) and Rainbow LED (9VDC / 10mA)
- Light barrier LED 9V (9VDC / 20mA)
- Light barrier LED 24V (24VDC / 16mA)

✓ ARDUINO® ✓ BBC MICRO: BIT ✓ RASPBERRY PI®
www.fischertechnik.de/third-party-compatibility

SENSORS

- Gesture sensor (RGB) in 6 directions: Color detection, ambient brightness, proximity detection up to 15cm (3.3VDC / I2C interface)
- USB color camera ❶ (1MP): Color, motion, track and ball detection
- NTC resistor (1.5kΩ / 450mW): Temperature measurement
- IR lane sensor (2 outputs digital 9V): Lane detection
- Color sensor (signal: analog 0-9VDC): Color detection
- Ultrasonic distance sensor ❷ (9VDC / distance 3cm-3m): Distance measurement
- Photoconductive cell (RSW551): Measuring brightness
- Push button (can be used as normally closed and normally open contact): Touch sensor
- Phototransistor for light barrier (up to 35V)
- Reed contact: Magnetic sensor
- Potentiometer (0-4,7kΩ): Rotary resistor
- Combi sensor ❸ 3 sensors in one component:
  Triaxial 16bit gyroscope, triaxial 12bit accelerometer, compass sensor, with I2C connector (9VDC)
- Environmental sensor ❹ (9VDC / 0,12A max. / I2C interface): Measurement of temperature, air pressure, humidity, air quality
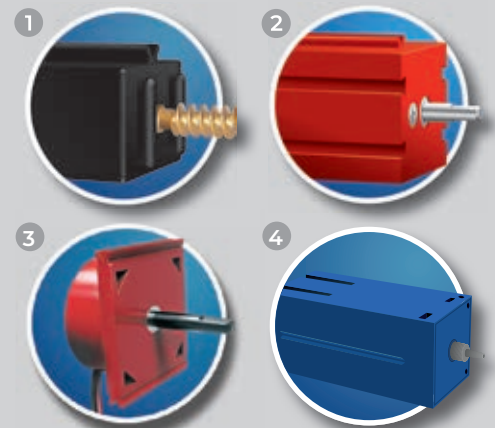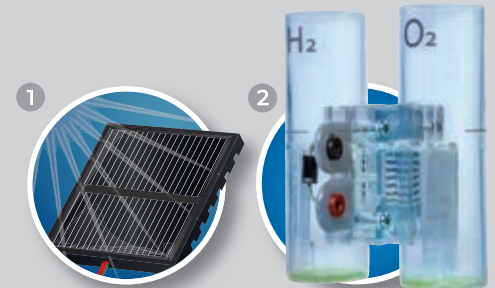
CONTROLLER & SOFTWARE

PRESCHOOL / PRIMARY

Robot chassis
- Completely assembled with integrated control unit, 2 motors, track sensor, 2 push buttons, battery compartment
- Bluetooth 5.2 interface
- Attachment option for wheels & fischertechnik building blocks

Graphical programming app
- Child-friendly, easy programming of the models via tablet / smartphone with the First Coding App
- Available for iOS and Android

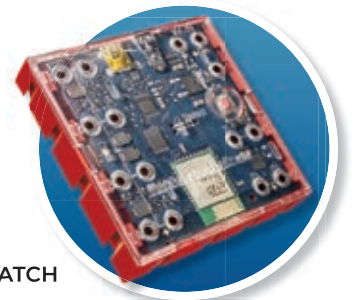## PRIMARY SCHOOL

BT Smart Controller
- Processor - 32-bit Cortex M0
- Control unit that connects PC/ tablet and model
- 2 outputs for actuators
- 4 inputs for sensors
- USB and Bluetooth 4.0 interface

Robo Pro Coding App
- Multilingual programming environment
- Graphical programming (block-based with Blockly)
- Selection of different learning levels possible (beginner, avanced, expert)
- Save created programs locally or in fischertechnik cloud storage
- Program examples included

Coding Pro App
- includes teaching material , digital building instructions and SCRATCH
- for iOS, macOS, Windows and Android

✓ SCRATCH

SECONDARY SCHOOL

TXT 4.0 Controller
- Processor: Arm® dual Cortex®-A7 650 MHz + Cortex®-M4
- Memory capacity: 512 MB DDR3 RAM, 4 GB eMMC
- Memory expansion: Micro SD card slot
- Color touch display: 2.4", 320x240 pixels, capacitive, allows swipe gestures
- Flat design - dimensions: 90x90x17,5mm
- 8 universal inputs: Digital/Analog 0-9VDC, Analog 0-5 kΩ
- 4 fast counting inputs: Digital, frequency up to 1kHz
- 4 motor outputs 9V/250mA (max. 1 A): Speed infinitely variable
- 3 Servo outputs 5V (max. 2A), short-circuit proof
- Control also possible via voice recognition app (Android / iOS)

Robo Pro Coding App
- Multilingual programming environment
- Graphical programming (block-based with Blockly) or text-based programming with Python
- Selection of different learning levels possible (beginner, avanced, expert)
- Save created programs locally or in fischertechnik cloud storage
- Program examples included

SIMULATION

Discover innovative training and simulation models to explore automation, artificial intelligence, industry 4.0 and agile production simulation with fischertechnik

Training, Simulation & Demonstration

fischertechnik is used in industry for vocational training and for the realistic representation and simulation of complex systems. The functional models from fischertechnik are a proven and costeffective means of planning and developing industrial applications and testing processes. They are used worldwide in training, development and presentation. The combination of the flexible and modular fischertechnik system with industry-standard sensors and actuators as well as the controllers of leading manufacturers open up almost unlimited possibilities for hardware simulation. Complicated technical systems are presented realistically and simulated so perfectly that they are comprehensible to everyone. This facilitates investment decisions and avoids costs for correcting possible planning errors.

Industry 4.0 – Internet of things

Even today, fischertechnik simulation models are Industry 4.0 ready. Enriched by sensors and combined with a cloud, the core topics of digitally networked production can be physically visualized, and tangibly demonstrated: Predictive maintenance, production quality prediction, human & machine interaction, remote control, data exchange via dashboards. The SAP UCC has developed a teaching scenario with case studies and exercises that helps teachers and learners alike to grasp the opportunities presented by Industry 4.0.

The following page shows an excerpt from the range of simulation models.

Training Factory Industry 4.0 9V V.2

The factory consists of the modules storage and retrieval station, vacuum suction gripper, high-bay warehouse, multi-machining station with kiln, a sorting line with colour recognition, an environmental sensor and a swivelling camera. After an order has been placed in the dashboard, the workpieces pass through the respective factory modules and the current status is immediately visible in the dashboard. The integrated environmental sensor reports values for temperature, humidity, air pressure and air quality. The camera's vertical and horizontal swivel range allows it to see the entire plant, making it suitable for web-based remote monitoring. The individual workpieces are immediately visible in the dashboard. The individual workpieces are tracked by NFC (Near Field Communication): each workpiece receives a unique identification number (ID). This enables the current status of the workpieces in the machining process to be traced and visible. The workpieces are tracked by NFC (Near Field Communication).

KEY AREAS

- Training and simulation on a realistic production image, in-depth learning through haptic grasping
- Optical and sensory applications, digital traceability with NFC/RFID
- Integrated cloud connection, control via smart devices, as well as use and operation of dashboards
- Remote monitoring via camera possible as well as linking of production and disposition data
- Connection of upstream/downstream logistics processes

Quality control with AI 9V

The use of artificial intelligence in quality control brings numerous advantages, which are already being used in the automotive industry for instance. Processes can be speeded up, fault rates and costs minimised and fault evaluation standardised. The fischertechnik sorting line is supplied with workpieces in three different colours. These workpieces are marked with three processing characteristics as well as different fault patterns. The workpieces are scanned by the camera and classified with the aid of the trained AI. Depending on colour, feature and fault pattern, the workpieces are then sorted by the artificial intelligence on the basis of their quality features. The AI used is realised with machine learning in Tensorflow, where an artificial neuronal network was trained with image data. The learned AI is executed on the fischertechnik TXT 4.0 Controlller. The model's sequence control is implemented in the Robo Pro Coding programming environment and in Python.

KEY AREAS

- Ideal training, simulation and demonstration model for education and research
- Visualization of AI systems, machine learning and neural networks
- Networking of theory and practice for a sustainable learning result
- Already built, stable training model. Mounted on stable wooden plate, packaging of the model in stable cardboard box

GET MORE INFORMATION!
www.fischertechnik.de/en/simulating and in the separate „Training Models" catalog.

Join us on

MADE IN
GERMANY