fischertechnik ®

education

MADE IN
GERMANY

STEM
S SCIENCE
T TECHNOLOGY
E ENGINEERING
M MATHEMATICS

M ATHEMATIK
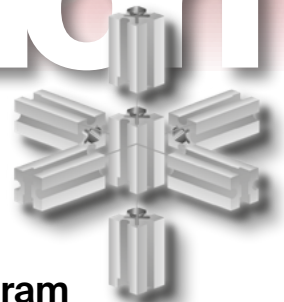**I** NFORMATIK
N ATURWISSENSCHAFT
T ECHNIK

2022

ENGLISH

education

What is fischertechnik?

fischertechnik is a flexible and innovative construction system, built around the unique fischertechnik core building block which allows for attachment on all six sides.

fischertechnik building blocks for an engaging STEM education program

fischertechnik is known around the world for producing high quality, STEM focused construction sets. fischertechnik products are „Made in Germany" and manufactured at the Waldachtal plant located in the Black Forest. All construction kits can easily be combined with one another. In addition to the building instructions, each set includes access to educational materials, background information, experiments, and solutions. The high level of regard among parents, teachers and engineers makes fischertechnik a highly respected teaching aid at schools and universities all around the globe.

STEM — **M**ATHEMATIK **I**NFORMATIK **N**ATURWISSENSCHAFT **T**ECHNIK
SCIENCE   TECHNOLOGY   ENGINEERING   MATHEMATICS

MADE IN GERMANY

Our innovative teaching material conveys basic technical understanding and optimally prepares students for technical professions. The fischertechnik learning construction sets are used all over the world to explore the following topics:

- Mechanics
- Statics
- Simple Machines
- Hydraulics
- Pneumatics
- Renewable energies

- Fuel cell
- Optics & Light
- Electronics
- Robotics
- Mechatronics
- Automation

- Industry 4.0
- Measurement value acquisition
- IoT (Internet of Things)

CLASS SETS

- Optimized for regular classes in elementary school
- Topics:
  Gearbox
  Optics
  Solar
  Elektrical circuits
  Statics
  Simple machines
- Designed for work in small groups (up to 16)
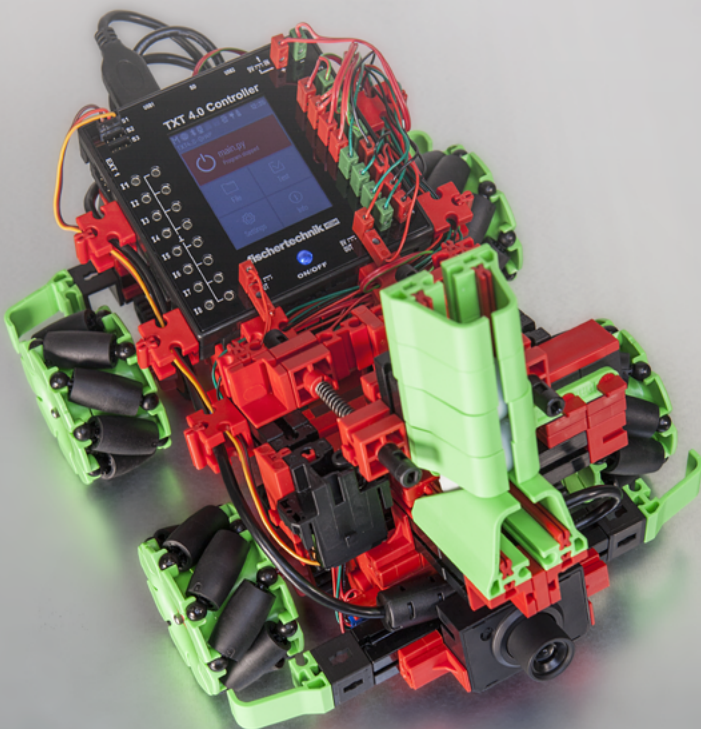
2x

16x

STEM KITS

- Educational kits for addressing various technology focused topics
- Optimized for project-oriented work from secondary school onwards

STEM ROBOTICS

- Current robotics sets from kindergarten to college and university
- Modular system from secondary level onwards

ACCESSORIES

- Supplementary products
- Adapters for Arduino® and Raspberry Pi®
- "ft-Designer" design software

IMPORTANT COMPONENTS

„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)
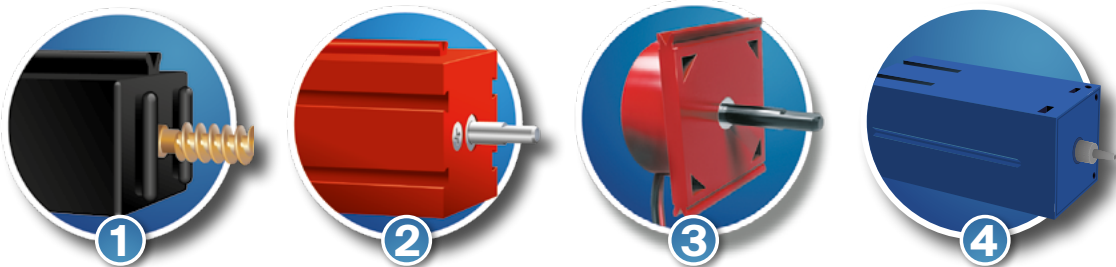
ARDUINO® ✔
BBC MICRO: BIT ✔
RASPBERRY PI® ✔

www.fischertechnik.de/third-party-compatibility

SENSORS

- Gesture sensor (RGB) in 6 directions: Color detection, ambient brightness, proximity detection up to 15cm (3.3VDC / I^2C 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 I^2C connector (9VDC)
- Environmental sensor [❹] (9VDC / 0,12A max. / I^2C interface): Measurement of temperature, air pressure, humidity, air quality

KINDERGARTEN / ELEMENTARY

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


ELEMENTARY

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

Software ROBO Pro Light
- Simple and easy to understand graphical programming ("drag & drop") for Windows

Software ROBO Pro Smart
- Easy programming of the models with the tablet (iOS/Android) using the fischertechnik ROBO Pro Smart App


SCRATCH ✔
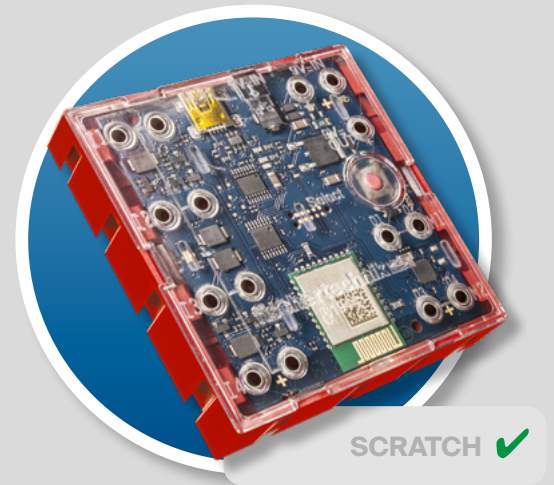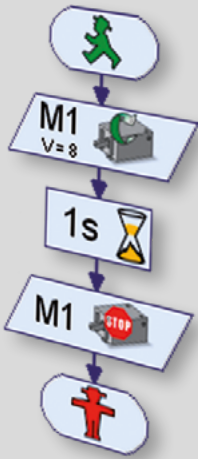
MIDDLE/ HIGH SCHOOL

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)

Software ROBO Pro Coding
- Multilingual programming environment
- Graphical programming (block-based) 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
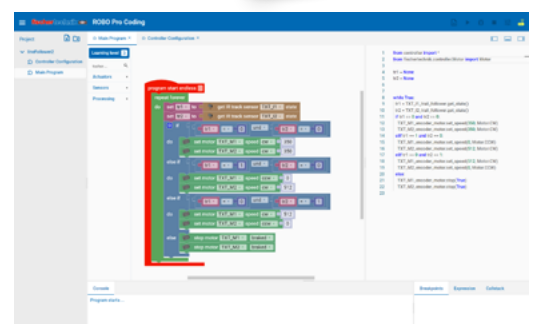
IDEAL FOR STEM

All fischertechnik Education products are developed in close cooperation with teachers, educators and didacticians in order to optimally meet the needs of classroom use. With its expertise and great innovative strength, the brand stands for quality, reliability and sustainable understanding through haptic comprehension.

- Over 50 years of experience as a manufacturer of learning kits for the classroom
- High-quality, durable and reliable products „Made in Germany"
- Free, comprehensive didactic concept for all products incl. lesson plans with reference to educational plans
- Functional models, focus on learning content
- Compatibility of all modules - since 1965

CONSTRUCTION KIT & BUILDING INSTRUCTION

- Special storage boxes designed for the classroom
- Clear layout for quick sorting of components
- Each set includes printed building instructions designed to promote spatial thinking

FUNCTIONALITY

- All models are optimized for functionality
- The focus is placed on learning content
- Models are designed to be built quickly to optimize use in a class period

DIDACTIC CONCEPT

- All teaching material is freely accessible online
- Comprehensive introduction to the respective technology topic
- Educational planning relevance, learning objectives and time requirements are shown
- Lesson plans incl. tasks and solutions
- Class Sets for the core topics at the elementary level (from p. 8)
- STEM learning kits for the various technology topics from middle and high school onwards (from p. 10)
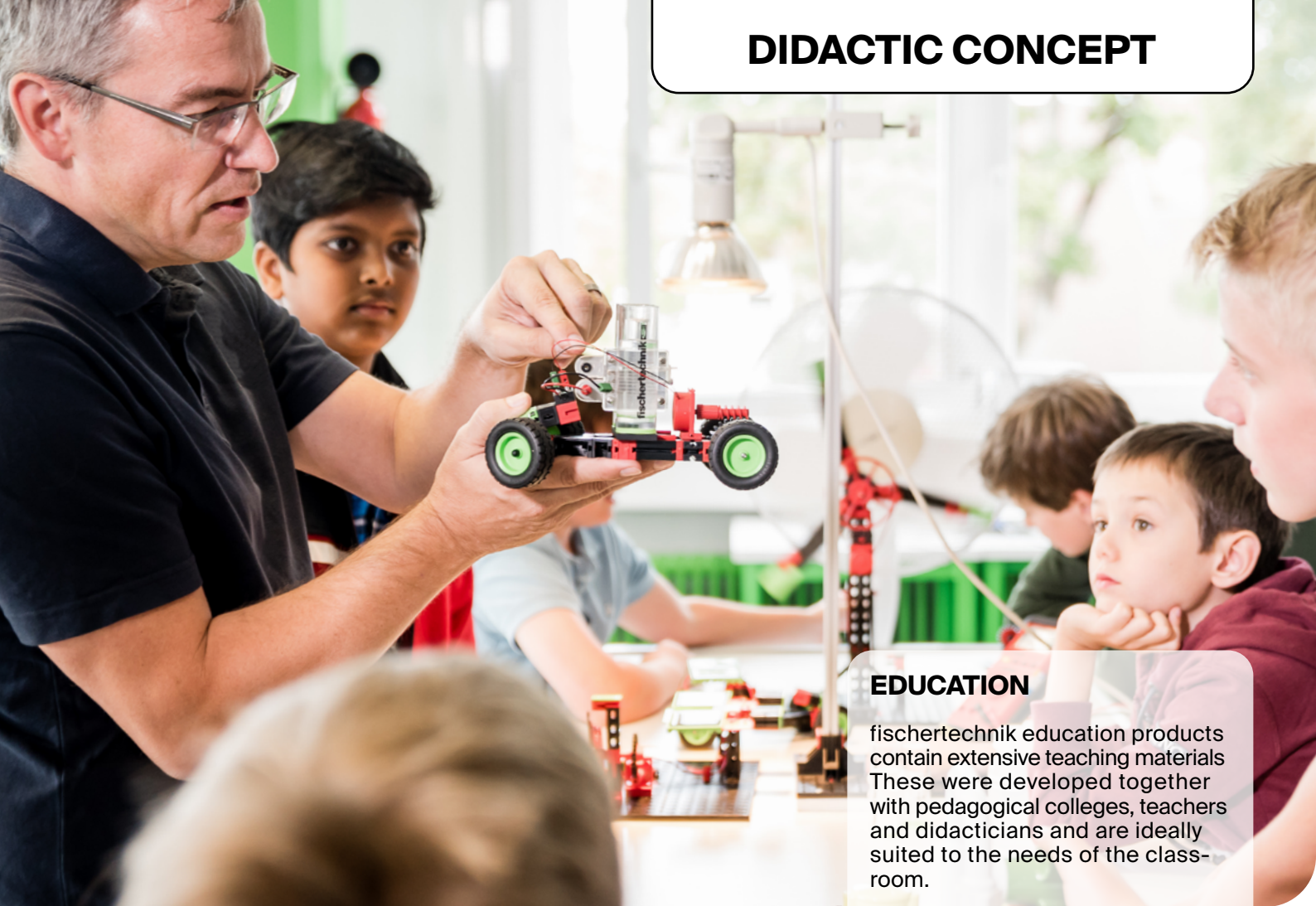
EDUCATION

fischertechnik education products contain extensive teaching materials These were developed together with pedagogical colleges, teachers and didacticians 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.

Example based on the topic "Pneumatics"

CURRICULUM REFERENCE, LEARNING OBJETIVES & 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.

Example based on the topic "Pneumatics"

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 given.
- 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 "Pneumatics"

CLASS SETS

CONCEPT

The class sets are optimized for regular lessons at the elementary 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 pupils (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.

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 them. They are exploring the stability and strength of technical structures and discovering the relationships between load-bearing 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. **didactic accompanying information & class model „Bridge"** (free download)
> Incl. **Static components**: Angle girders & struts

Item No.	564059	EAN	4048962458466
Models	8	Pieces	3200
Dim. (mm)	405x280x400	Weight (g)	7660

3200 | 24 EXPERIMENTS | 8 MODELS

CLASS SET SIMPLE MACHINES

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.

> **Key areas:** Construction, Transportation, Joints and hinges, Lever mechanisms, Rope hoists and pulleys, Rotary and linear motion, Spring mechanisms, Inclined plane
> Incl. **didactic accompanying information** (free download) & **class model „ball forwarding machine"**, built from all 16 sets
> Incl. gear wheels, cable winch

Item No.	564061	EAN	4048962458480
Models	10	Pieces	2320
Dim. (mm)	405x280x400	Weight (g)	8140

2320 | 61 EXPERIMENTS | 10 MODELS

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 six models, which can be built quickly and are therefore easy to teach, the kit offers six exciting experiments.

> **Key areas:** Optical phenomena/ light experiments, magnification, reflection, light & shadow
> Incl. **didactic accompanying information** (free download)
> Incl. lens f=25mm, lens f=80mm, mirror, 2x LED, holder for 9V battery (battery not included)

Item No.	559892	EAN	4048962424737
Models	6	Pieces	1264
Dim. (mm)	390x270x200	Weight (g)	7700

1264
6 EXPERI-MENTS
6 MODELS

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.

> **Key areas:** Energy generation from renewable solar energy, series-parallel connection
> Incl. **didactic accompanying information** (free download)
> Incl. 2x solar module 1V, solar motor, push button

Item No.	559894	EAN	4048962424751
Models	3	Pieces	1184
Dim. (mm)	390x270x200	Weight (g)	7600

1184
10 EXPERI-MENTS
3 MODELS

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 nine models and 25 xperiments. The models can be easily built in class and directly integrated with the ready-made tasks and solutions.

> **Key areas:** Electrical circuits, series-parallel connection, motor control
> Incl. **didactic accompanying information** (free download)
> Incl. 2x push button, LED, motor, holder for 9V battery (battery not included)

Item No.	559893	EAN	4048962424744
Models	9	Pieces	544
Dim. (mm)	390x270x200	Weight (g)	6600

544
25 EXPERI-MENTS
9 MODELS

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 15 models and twelve 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.

> **Key areas:** Simple gear types/ratios, directions of rotation, types of motion of gears
> Incl. **didactic accompanying information** (free download)
> Incl. gears, bevel gears, rack, belt, chain, axles, building blocks, base plate 120x60 mm
> **Ideal complement:** STEM Gear Tech

Item No.	559887	EAN	4048962424683
Models	15	Pieces	1600
Dim. (mm)	390x270x200	Weight (g)	7100

1600
12 EXPERI-MENTS
15 MODELS
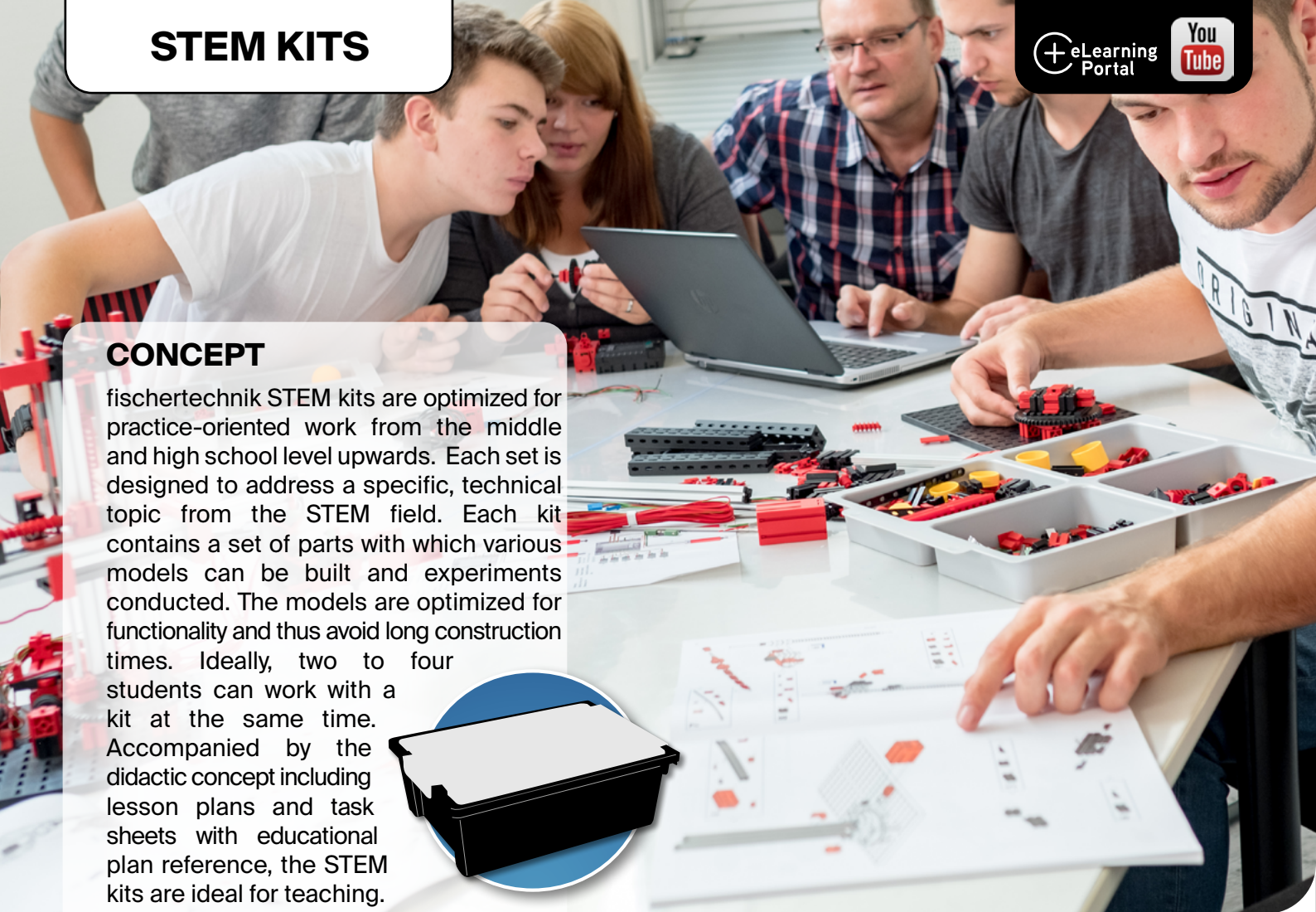
CONCEPT

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 educational plan reference, the STEM kits are ideal for teaching.

STEM STATICS

NEW

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. Pupils 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.
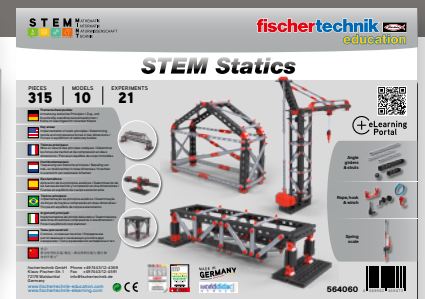
> **Key areas:** Implementation of static principles / Determining tensile and compressive forces in two dimensions / Forces in equilibrium of stationary bodies
> Incl. **didactic accompanying information** (free download)
> Incl. **structural components**: Angle girders and struts, **spring balance**, rope and rope winch as well as rope hooks

Item No.	564060	EAN	4048962458473
Models	10	Pieces	315
Dim. (mm)	440x315x80	Weight (g)	2022

315 — 21 EXPERIMENTS — 10 MODELS

NEW

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 pupils' 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.

> **Key areas:** Recognize physical laws of simple machines / Understand mechanical functions of rope and rod, lever, pulley and inclined plane / Measuring and checking with fischertechnik spring balance

> Incl. **didactic accompanying information** (free download)

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

| Item No.	564062	EAN	4048962458497
Models	14	Pieces	345
Dim. (mm)	440x315x80	Weight (g)	1800

345 · 70 EXPERIMENTS · 14 MODELS

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 9 models and 28 experiments. 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.

> **Key areas:** Extraction, storage and use of electric power/ energy sources such as water, wind, sun and hydrogen

> Incl. **didactic accompanying information** (free download)

> Incl. solar motor (2VDC), 2x solar module (1VDC, 400 mA), gold cap energy storage, LED, fuel cell, voltage converter, multimeter
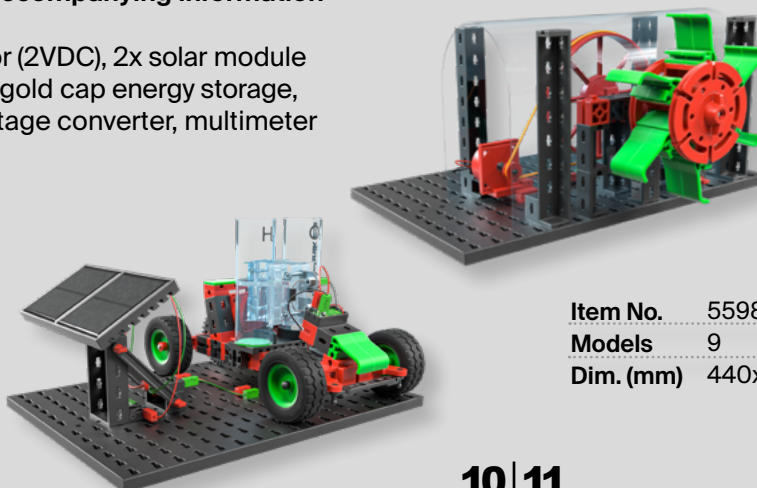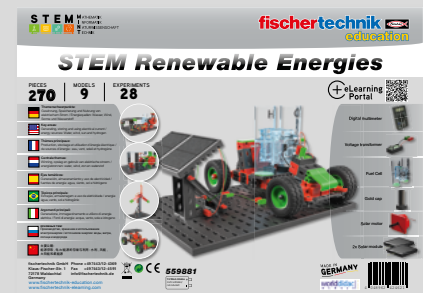
Item No.	559881	EAN	4048962424621
Models	9	Pieces	270
Dim. (mm)	440x315x150	Weight (g)	2700

270 · 28 EXPERIMENTS · 9 MODELS

STEM KITS

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.
Using 8 models and 29 experiments, 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.

> **Key areas:** Generation and distribution of compressed air/ control of pneumatic cylinders and many more
> Incl. **didactic accompanying information** (free download)
> 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)
> **Ideal accessories: Accu Set, Power Set**

Item No.	559878	EAN	4048962424591
Models	8	Pieces	273
Dim. (mm)	440x315x80	Weight (g)	1800

273 | **29** EXPERIMENTS | **8** MODELS
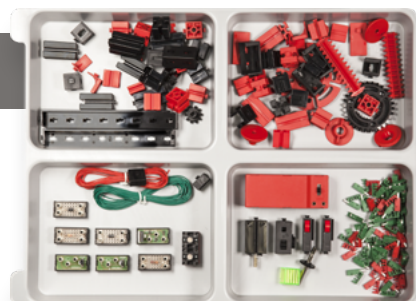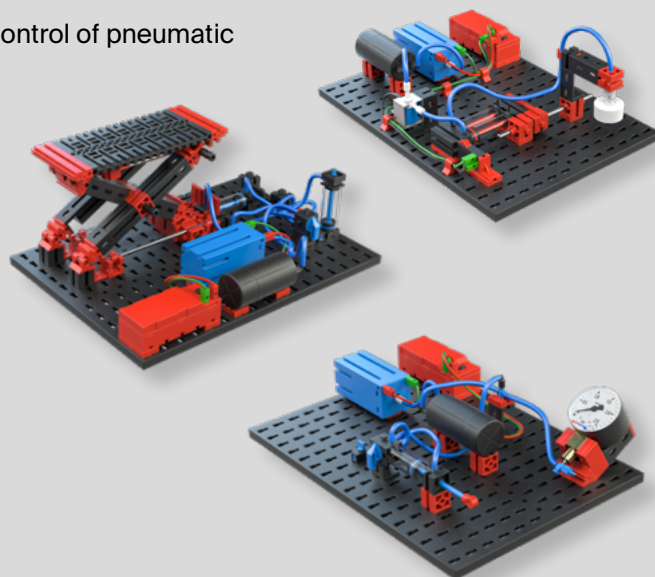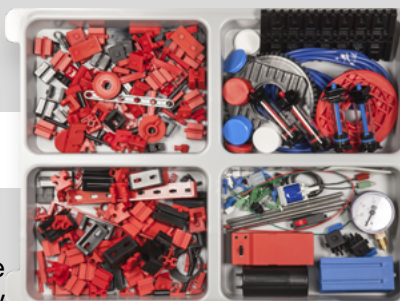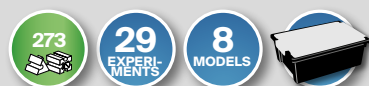
STEM ELECTRONICS

Basics of electronics

Discover the exciting world of electronics with STEM Electronics! Through a total of 23 models and 60 experiments, 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-LearningPortal.

> **Key areas:** Electrical circuits, resistors, measurement of current and voltage, principle of the electric motor, semiconductors, transistor circuits
> Incl. **didactic accompanying information** (free download)
> Incl. XS motor, 2x push button, 2x diode, 2x transistor, 3x resistor, 2x capacitor, holder for 9V battery (battery not included)
> **Ideal accessories: Accu Set, Power Set**

Item No.	559884	EAN	4048962424652
Models	23	Pieces	180
Dim. (mm)	440x315x80	Weight (g)	1600

180 | **60** EXPERIMENTS | **23** MODELS
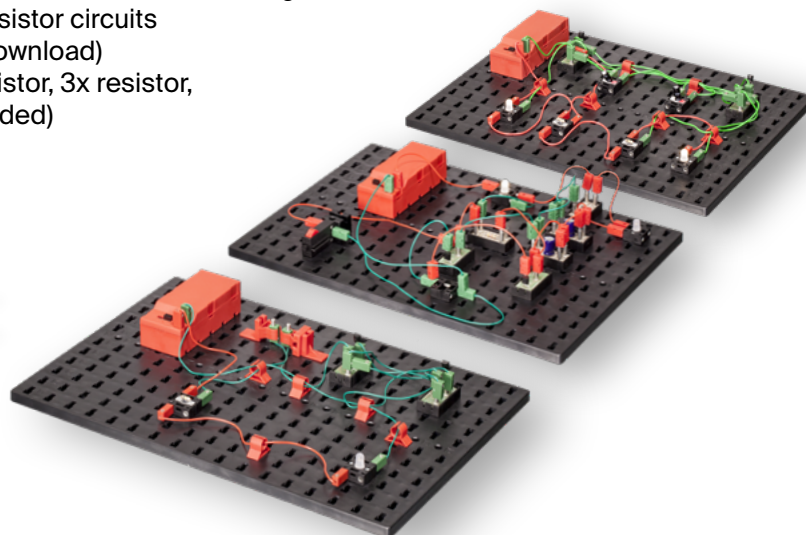
STEM GEAR TECH

Basics of gear technology

The 26 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. **didactic accompanying information** (free download)
> Incl. gears, bevel gears, internal gear, worm, various axles, rope with winch and pulleys, chain, building blocks and base plate 258x186mm

| Item No.	559886	EAN	4048962424676
Models	26	Pieces	320
Dim. (mm)	440x315x80	Weight (g)	1800

320 | 26 EXPERIMENTS | 17 MODELS

HYDRAULICS

Basics of hydraulics

Power transmission with the aid of fluids is technically applied with this learning kit. Five different models are used to illustrate how signal and force transmission works with fluid media. Among other things, a simple functional and illustrative model, an excavator and three other models can be built. The accompanying materials are made available on the eLearning portal and support teachers in preparing and designing lessons.

> **Key areas:** Power transmission with the aid of fluid
> Incl. **didactic accompanying information** (free download)
> Incl. 4x control cylinder, 4x working cylinder

500 | 5 MODELS
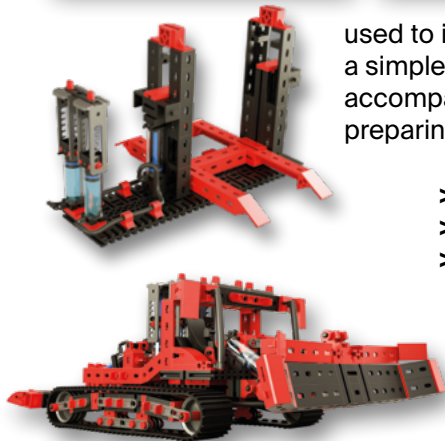
| Item No.	548896	EAN	4048962351057
Models	5	Pieces	500
Dim. (mm)	440x315x150	Weight (g)	2550

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 30 different models.

> **Key areas:** Mechanics, statics, dynamics, effect of forces on bodies and objects
> Incl. didactic accompanying information (free download)
> Incl. XS motor, battery holder for 9V battery (battery not included)
> **Ideal accessory: Accu Set**

Item No.	538423	EAN	4048962263350
Models	30	Pieces	500
Dim. (mm)	440x315x150	Weight (g)	3150

500 | 30 MODELS
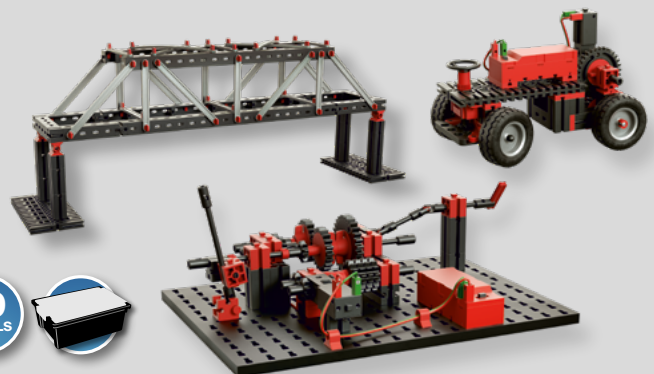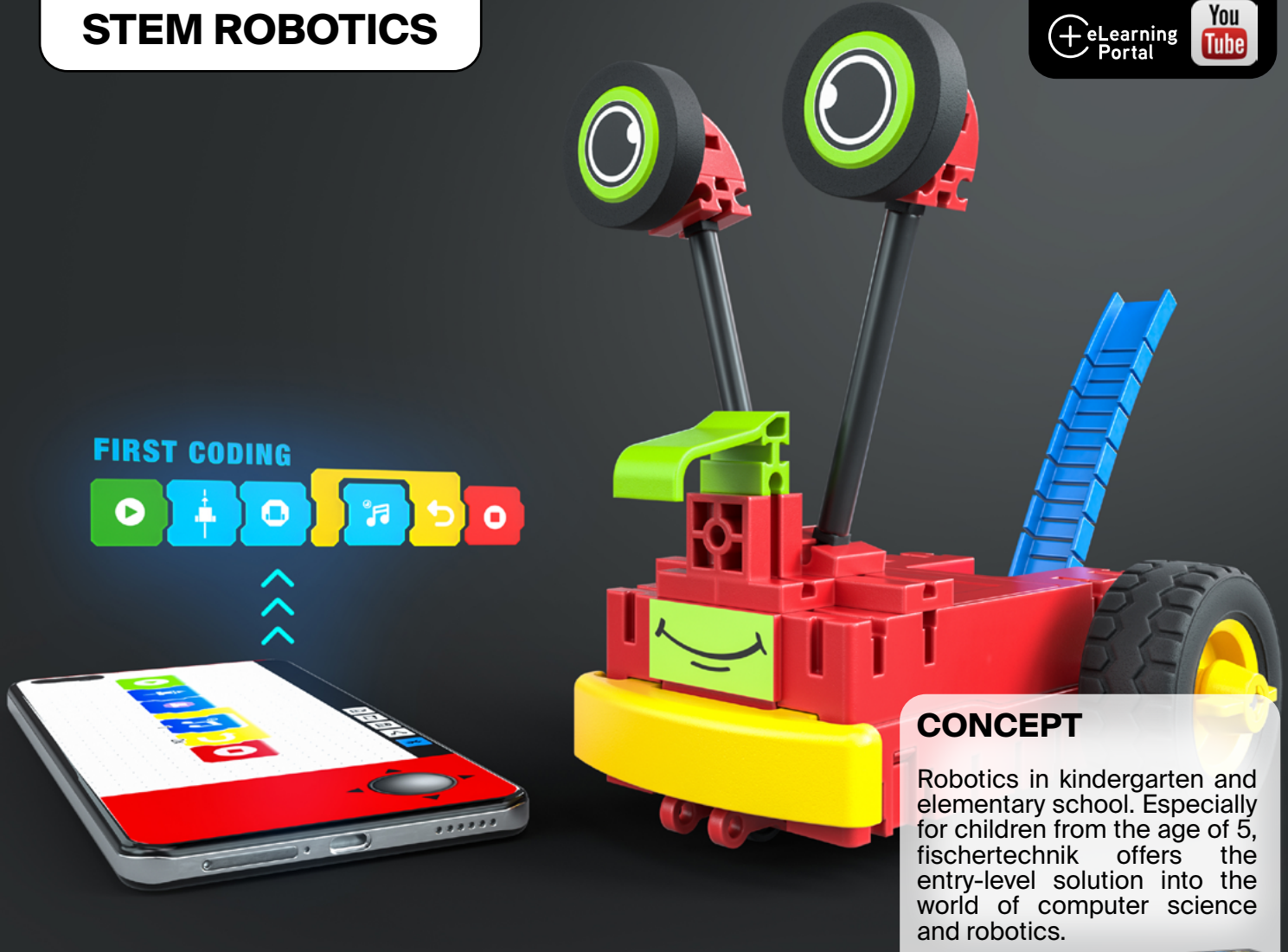
CONCEPT

Robotics in kindergarten and elementary school. Especially for children from the age of 5, fischertechnik offers the entry-level solution into the world of computer science and robotics.

ROBOTICS FIRST CODING

First programming steps!

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 hands-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.

> **Key areas:** First steps in programming with the First Coding App
> Incl. **didactic accompanying information** (free download)
> Incl. First Coding chassis consisting of 2x motor, 2x push button and infrared sensor, course, battery compartment for 3xAAA batteries (batteries not included) & **Teach-In Function**

Item No.	560843	EAN	4048962429992
Models	3	Pieces	25
Dim. (mm)	320x80x230	Weight (g)	760
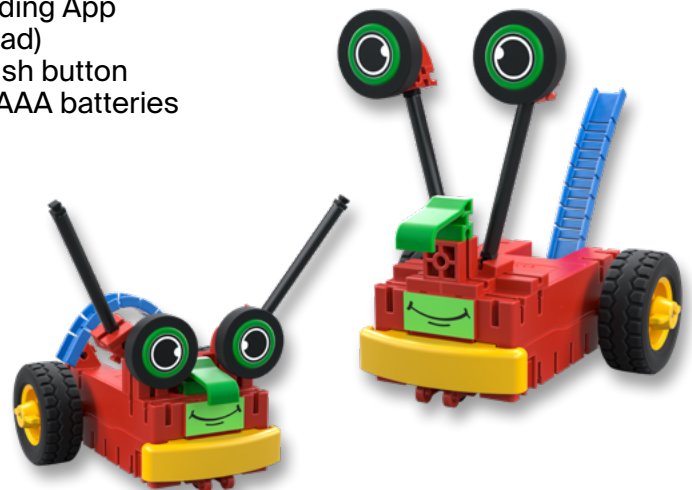
25 · 3 EXPERIMENTS · 3 MODELS

STARTER SET
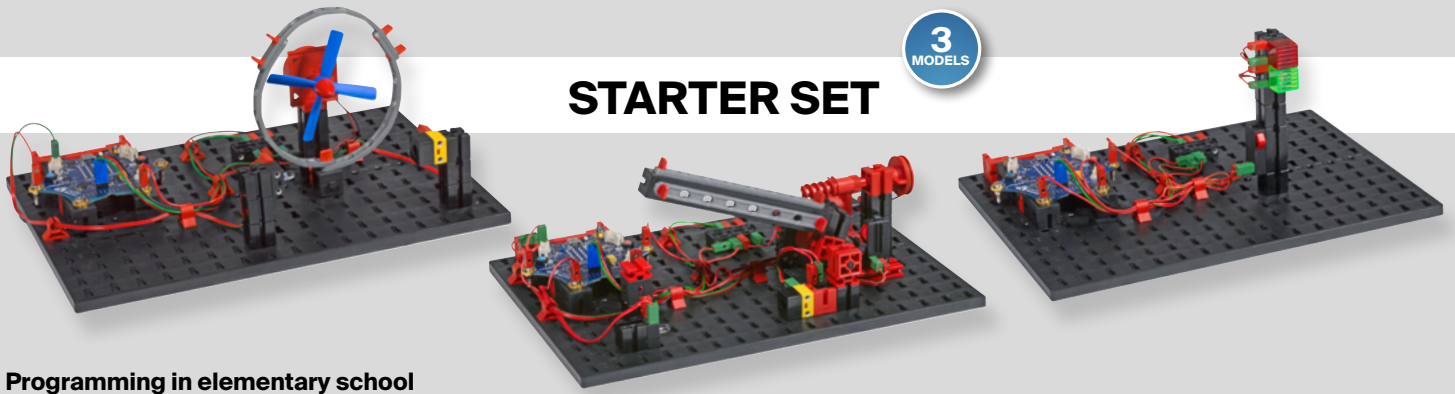
Programming in elementary school

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. The accompanying didactic information provides step-by-step instructions for commissioning as well as various tasks and their solutions.

FOR MICRO:BIT

Fig.: iO F5 adapter with micro:bit (8 outputs and 6 inputs; micro:bit not included)
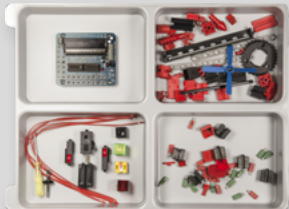
> Incl. micro:bit iO F5 adapter, XS motor, 2x light barrier LED, photo-transistor, 2x push button, printed construction manual
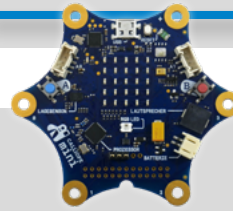> **Required: micro:bit, software „Make Code", power supply**

| Item No.	548884	EAN	4048962350944
Models	3	Pieces	90
Dim. (mm)	440x315x80	Weight (g)	1450

FOR CALLIOPE

Fig.: Calliope Board (not included)

> Incl. solar motor, 2x light barriers LED, phototransistor, 2x push buttons, printed construction manual
> Incl. special mounts for the Calliope board
> Supplied in sturdy storage box
> **Required: Calliope Board and Software „Open Roberta"**
> **Power supply: Via USB**

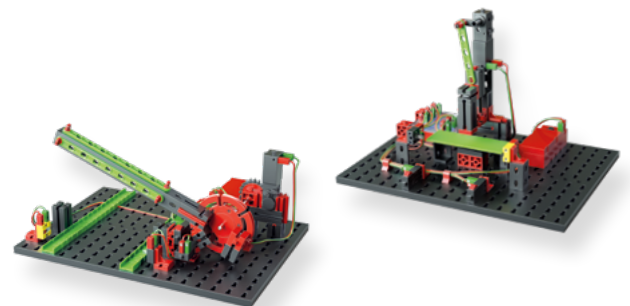| Item No.	544626	EAN	4048962316322
Models	3	Pieces	125
Dim. (mm)	270x195x40	Weight (g)	650
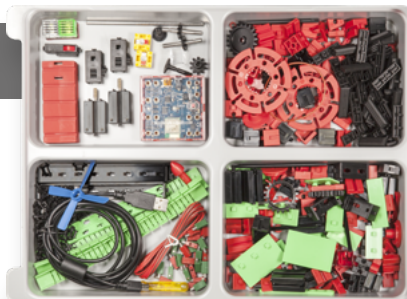
ROBOTICS BT BEGINNER

Programming and control in elementary school

ROBOTICS BT Beginner explains to students the principles of programming based on the ROBO Pro Light graphical programming software for controlling stationary and mobile fischertechnik models. With the help of various sensors and actuators, students can first construct and then control easy-to-understand models such as a hand dryer, carousel, barrier, conveyor belt with punching machine, or even mobile caterpillar models. The BT Smart Controller with 4 inputs for sensors and 2 outputs for motors and lamps has a USB and a Bluetooth 4.0 LE interface. The ROBO Pro Light software (free to download) enables younger students in particular to program quickly, clearly and easily. In addition, there is the possibility to program and control all models with tablet (iOS / Android) via the free ROBO Pro Smart app.
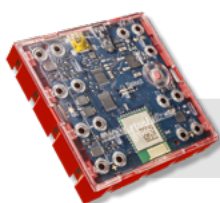
> **Key areas:** Programming, control, interaction of hardware and software, use of actuators and sensors
> Incl. **didactic accompanying information** (free download)
> Incl. BT Smart Controller as control (USB interface/ Bluetooth 4.0, Low Energy), software ROBO Pro Light (for Windows 10) or ROBO Pro Smart (iOS/ Android), 2x XS motor, 2x photocells, LED, 2x phototransistor, 2x push buttons, holder for 9V battery (battery not included)
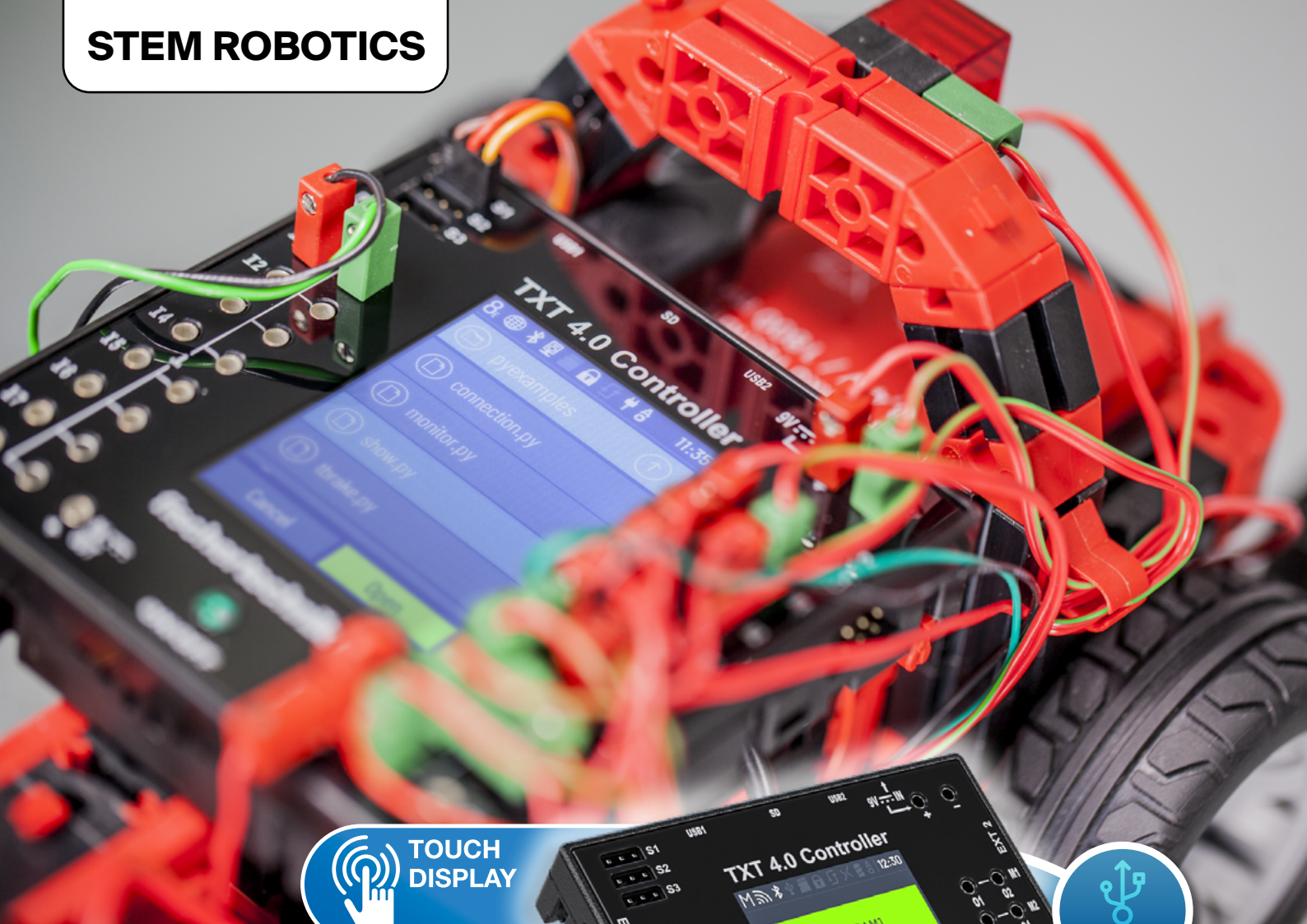
SCRATCH ✔

Item No.	540587	EAN	4048962280067
Models	12	Pieces	380
Dim. (mm)	440x315x80	Weight (g)	2300

STEM ROBOTICS

TOUCH DISPLAY

USB HOST

CARD SLOT

SPEAKER

VOICE RECOGNITION

BLUETOOTH

WIFI

APP

TXT 4.0 CONTROLLER

The TXT 4.0 controller 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!mROBO Pro Coding is operating system independent and can also be used with mobile devices (Android / iOS). With an additional app (Android / iOS), the TXT 4.0 controller can also be controlled via voice recognition.

Further features of the controller are:

> 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 (graphical 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**

Item No.	560166
EAN	4048962426724

ROBO PRO CODING SOFTWARE

The software ROBO Pro Coding offers in its multilingual environment, in addition to the possibility of graphical programming, text-based programming via Python, and runs under Windows, Linux or macOS and on mobile devices (Android/ iOS). 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 storage between users. Actuators and sensors can be tested quickly via the interface test.

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 programmed and controlled with the ROBO Pro Coding programming software and the ROBOTICS TXT 4.0 controller. 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 Controller canalso 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. In addition to introductory and basic information, the comprehensive teaching material includes 25 experiments with solutions for the 12 models.

ROBO PRO CODING

2x

Robotics TXT 4.0 Base Set
244 | 12 | 25

Item No.
Models
Dim. (mm)
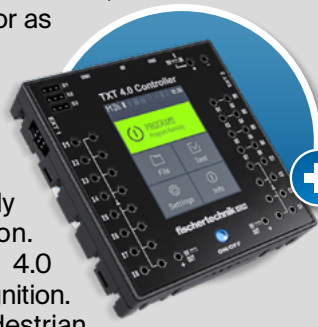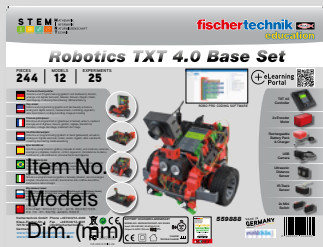
> **Key areas:** Robotics and programming (graphical and text-based), actuators, analog and digital sensors, measurement, control, data transmission, coding–decoding, image processing
> Incl. **didactic accompanying information** (free download)
> Incl. **Robotics TXT 4.0 Controller, Robo Pro Coding Software,** Accu Set, 2x Encoder Motor, USB Camera, Ultrasonic Sensor, Track Sensor, 2x Push Buttons, 2x LED, phototransistor

Item No.	559888	EAN	4048962424690
Models	12	Pieces	244
Dim. (mm)	440x315x150	Weight (g)	2850

244 PIECES

25 EXPERI-MENTS

12 MODELS

MODULAR CONCEPT

The fischertechnik STEM Robotics concept for middle and high schools is modular:

ONE base for regular classes and **FOUR** high-tech extensions for use in advanced classes and international robotics competitions.

The ROBOTICS TXT 4.0 Base Set and the ADD ON extension sets

This Robotics basic construction kit provides the basis for use in control classes: Controller, software, power supply, actuators and sensors and many basic building blocks are included here. The four separately available Add On sets expand the TXT 4.0 Base Set by theirrespective focus and can be clearly integrated in the lower tray provided for this purpose.

12 MODELS

Building on this, the various ADD ON expansion sets with specific high-tech themes such as autonomous driving, omniwheels and IoT (Internet of Things) or the ideal expansion set for robotics competitions. 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

OMNI-WHEELS

IOT

COMPETITION

+1 MODEL

+4 MODELS

+1 MODEL

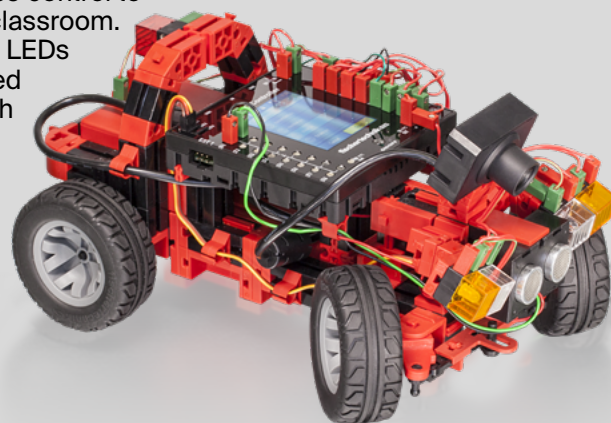add ons

STEM ROBOTICS ADD ONS

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 break-throughs 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.

> **Key areas:** Autonomous driving, control technology, analog sensor technology, speed measurement, distance calculation, distance measurement
> Incl. **didactic accompanying information** (free download)
> Incl. chassis (differential, wheels), servo, LED, steering

> **Ideal complement: Add On: Omniwheels, Add On: Competition**
> **Required: Robotics TXT 4.0 Base Set**

Item No.	559896	EAN	4048962424775
Models	1	Pieces	115
Dim. (mm)	280x180x65	Weight (g)	530

**115** · **7** EXPERI-MENTS · **1** MODEL

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!

> **Key areas:** Omniwheels vehicle control, object recognition, image processing, soccer robotics
> Incl. didactic accompanying information (free download)
> Incl. 4x Mecanum Omniwheels, servo, 2x gear motor

> **Ideal complement: Add On: Autonomous Driving**
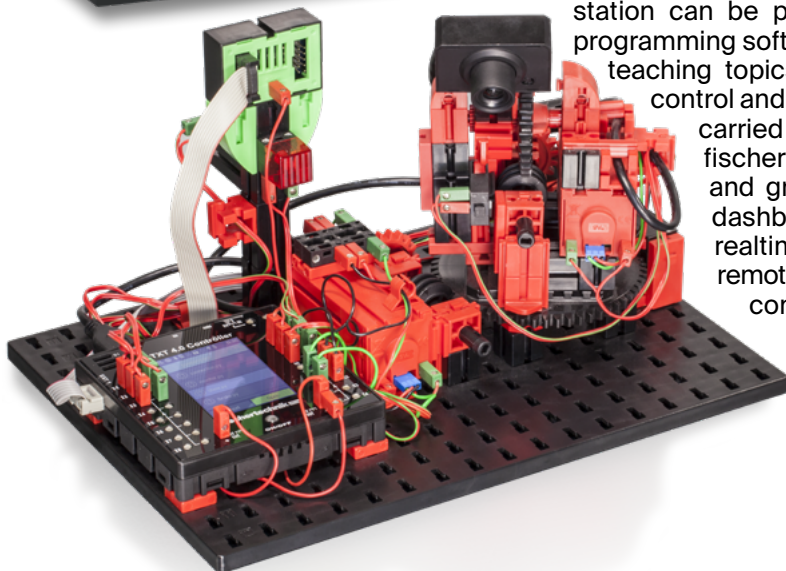> **Required: Robotics TXT 4.0 Base Set**

Item No.	559898	EAN	4048962424799
Models	4	Pieces	331
Dim. (mm)	320x230x80	Weight (g)	820

331 · **7** EXPERI-MENTS · **4** MODELS
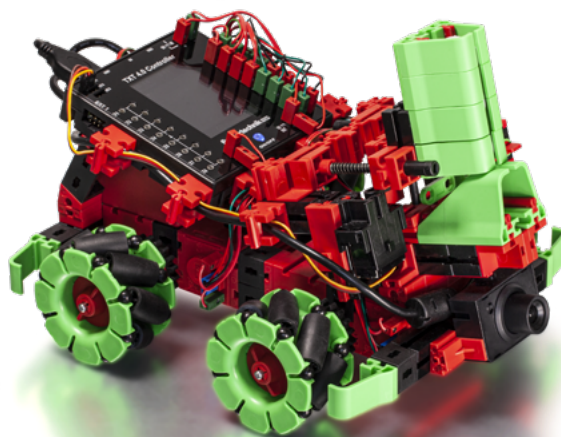
IOT [INTERNET OF THINGS]

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 Controller, 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 Controller 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.

> **Key areas:** Robot competitions, project work and workshops in robotics
> Incl. **didactic accompanying information** (free download)
> Incl. environmental sensor, brightness sensor

> **Ideal complement: Power Set**
> **Required: Robotics TXT 4.0 Base Set**

Item No.	559897	EAN	4048962424782
Models	1	Pieces	72
Dim. (mm)	280x180x65	Weight (g)	450

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 ehanced 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.
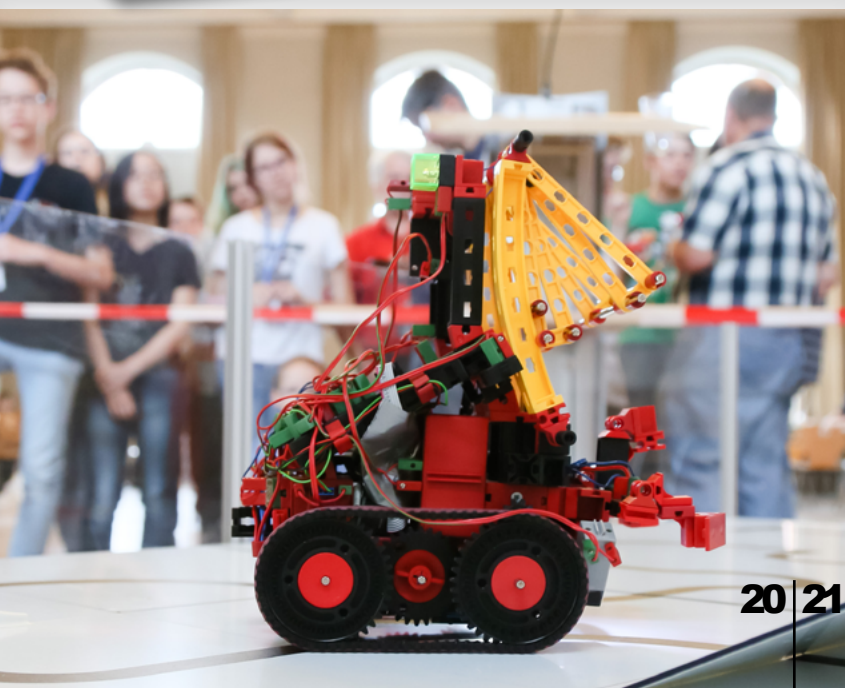
> **Key areas:** Robot competitions, project work and workshops in robotics
> Incl. didactic accompanying information (free download)
> Incl. RGB gesture sensor in 6 directions, color detection, ambient brightness, proximity detection up to 15cm, ultrasonic sensor, combi sensor (gyroscope, acceleration and compass), more powerful motors, snap-on track pads

> **Required: Robotics TXT 4.0 Base Set**

Item No.	560842	EAN	4048962429985
Models	–	Pieces	240
Dim. (mm)	320x230x80	Weight (g)	600

ACCESSORIES

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
Models	–	Weight (g)	1889
Dim. (mm)	390x270x100		

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.

Item No. 220V	34969	EAN	4006209349694
Item No. 120V	57487	EAN	4006209574874
Item No. 240V UK	79833	EAN	4006209798331
Item No. 220V AUS	52091	EAN	4006209520918
Components	–	Weight (g)	490
Dim. (mm)	225x150x65		

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

Item No. 220V	505283	EAN	4048962069440
Item No. 120V	91087	EAN	4006209910870
Components	–	Weight (g)	431
Dim. (mm)	225x150x65		

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

Item No.	505281	EAN	4048962069426
Models	45	Weight (g)	201
Dim. (mm)	225x150x65		

45

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

Item No.	505282	EAN	4048962069433
Models	40	Weight (g)	278
Dim. (mm)	225x150x65		

40

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 uses.

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.

Item No.	554195	EAN	4048962390490
Dim. (mm)	390x270x100	Pieces	630
		Weight (g)	2800

630

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.

Item No.	554196	EAN	4048962390506
Dim. (mm)	270x195x80	Pieces	290
		Weight (g)	1050

290

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.

Arduino UNO - Uno-F5 board
fischertechnik compatible

Arduino MEGA - Mega-F5 board
fischertechnik compatible

Raspberry Pi - Pi-F5 board
fischertechnik compatible

Arduino® UNO	
Item No.	179450

Arduino® MEGA	
Item No.	179449

Raspberry Pi®	
Item No.	179448

FT DESIGNER

The perfect software for virtually planning, developing and implementing fischertechnik models. Easy to use and with a huge range of functions. Ideal for school, training and study to visualize technical processes.

• Ca. 1000 components from all areas incl. pneumatics, motor, gearbox, aluminum profiles and stickers.
• Animation of the models in real time incl. tracking shots, zoom
• Laying of elastic pneumatic hoses possible, as well as power supply and wiring.
• All models can be divided into any number of construction phases to create easy-to-understand building instructions. Construction phases can be hidden or individual components can be colored white.
• For large models (or slow computers), the animation can also be calculated as an AVI file.
• Support of the free raytracer „POV-Ray" and „Blender" for realistic images with shadows, reflections and radiosity.
• Export of 3D CAD data: RAW, VRML, POV and X3D. Due to the VRML format, the models can be further processed with almost all professional CAD systems.

System requirements:
Microsoft Windows 10, Intel processor with at least 1GHz, at least 1GByte main memory, graphics card with OpenGL support, Internet connection for updates, mouse or trackpad

Item No.	14851
EAN	4006209148518

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.

simulation

More information: www.fischertechnik.de/en/simulating and in the separate „Training Models" catalog.

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. Further information at: www.fischertechnik.de/industry40

SAP University Alliances

SAP UCC Magdeburg

fischertechnik GmbH

Klaus-Fischer-Str. 1, D-72178 Waldachtal
Tel. +49 74 43/12-43 69
Fax +49 74 43/12-45 91
E-Mail: info@fischertechnik.de

www.fischertechnik-education.com
www.fischertechnik-elearning.com

DEUTSCHLAND TEST
BESTE PRODUKTQUALITÄT
fischertechnik
PLATZ 1
KUNDENZUFRIEDENHEIT
UMFRAGE (FOCUS 21/22)
www.deutschlandtest.de

DEUTSCHLAND TEST
PREISTRÄGER
NACHHALTIGES ENGAGEMENT
PRÄDIKAT „TESTSIEGER"
fischertechnik
UMFRAGE (FOCUS 11/21)
www.deutschlandtest.de
€MONEY

STEM
MATHEMATIK
INFORMATIK
NATURWISSENSCHAFT
TECHNIK

MADE IN GERMANY

RoboCup

worlddidac MEMBER

eLearning Portal