

fischertechnik **Schulprogramm**

Experimenta Computing
Bauanleitung • Assembly Manual

Die Software

Grafische Programmieroberfläche "FiPro"

Diese interaktive Programmieroberfläche ermöglicht durch visuelle Programmierung ein Steuerungsprogramm für jedes beliebige Modell zu entwickeln, das am Interface angeschlossen ist. Bereits geringe Programmierkenntnisse reichen aus, um vorhandene Beispielprogramme zu ändern und neue Programme zu entwickeln. Einfache Handhabung und schneller Lernerfolg sind wesentliche Kriterien dieser Software. Die Programme werden nicht im herkömmlichen Sinne geschrieben,

sondern mit der Maus am Bildschirm gestaltet. Einzelne Prozessschritte werden durch Bildsymbole (Icons) dargestellt. Die Icons entsprechen den jeweiligen fischertechnik Bauteilen.

Bestellnummern:

Einfach-Lizenz (3,5") 68552

Zehnfach-Lizenz (3,5") 68553

Hardwarevoraussetzung:

IBM-kompatibler AT ab 286er
640 KB Arbeitsspeicher
VGA-Farbmonitor, Maus.

The Software

"FiPro" Programming Graphical User Interface

This interactive programming GUI lets you develop a control program for any computing model connected to the interface by visual programming. Even a slight knowledge of programming is enough to change existing example programs and develop new ones. Easy to use and quick to learn: these are the main features of this software. The programs are not written in the conventional meaning of the word. They are compiled by clicking the mouse on screen. Each of the

process steps is displayed by icons which correspond to the fischertechnik components.

Order Number:

English version (3,5") 5561

Hardware requirements:

IBM-compatible AT 286 or higher, 640 KB RAM,
VGA-color monitor, mouse.

"FiTuP"—Programmieren in Turbo Pascal®

Mit dem Programm "FiTuP" können die Modelle aus dem Baukasten "Experimenta Computing" unter der Programmiersprache Turbo Pascal angesteuert werden. Über ein Menü sind fertige Anwendungsprogramme wählbar. Programmierhilfen für Pascal und ein Diagnoseprogramm ergänzen das Menü. Es bestehen umfangreiche Auswertungsmöglichkeiten für digitale und analoge Prozeßdaten. Die umfangreichen Quellprogramme gestatten einen direkten Zugriff auf den Programmablauf

und ermöglichen das Erstellen eigener Pascal-Programme.

(Turbo Pascal ist ein Warenzeichen von Borland International Inc.)

Bestellnummern:

Einfach-Lizenz (3,5") 68560

Zehnfach-Lizenz (3,5") 68561

Hardwarevoraussetzung:

IBM-kompatibler AT ab 286er
640 KB Arbeitsspeicher
VGA-Farbmonitor, Maus.

"FiTuP" Programming in Turbo Pascal®

This program "FiTuP" contains control programs for all models from the kit "Experimenta Computing" for the program language Turbo Pascal. From a menu you can select the control programs. You can also find help functions and a diagnostic program. There are many ways for the graphic evaluation of the digital and analog inputs and outputs. By means of the many source programs you have a direct access to the program flow allowing at the same time the

development of own programs.

(Turbo Pascal is a trade-mark of Borland International Inc.)

Order Numbers:

Single version (3,5") 68560

Tenfold version (3,5") 68561

Hardware requirements:

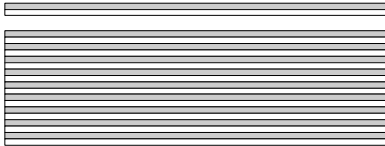
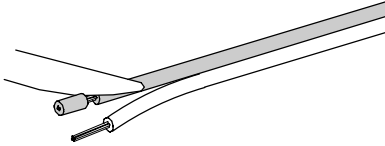
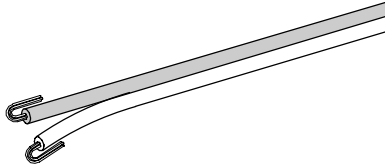
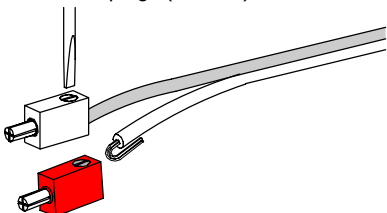
IBM-compatible AT 286 or higher, 640 KB RAM,
VGA-color monitor, mouse.

Bestellungen an / Send your orders to: Cornelsen Experimenta • Holzhauser Str. 76 • D-13509 Berlin

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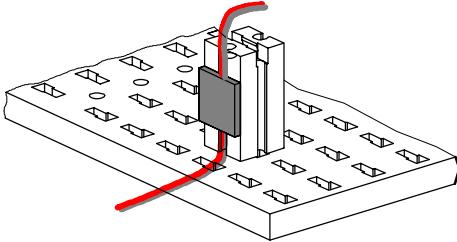
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Kabelkonfektionierung • Cable termination

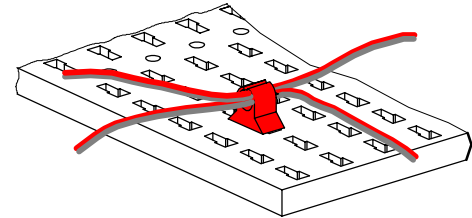
1 Flachbandkabel 50cm Ribbon cable 50cm 	2 paarweise abtrennen cut into wire-pairs 	3 10 Doppellitzen 10 wire-pairs 
4 Doppellitzen 30mm auftrennen Split open wire-pairs at ends, 30mm 	5 je 4mm abisolieren Strip 4mm off each end 	6 Litze umbiegen Bend back conductors 
7 Stecker (Buchsen) anschraubend Screw into plugs (sockets) 	8 fertiges Kabel finished cable 	

Kabelfixierung • Cable tying

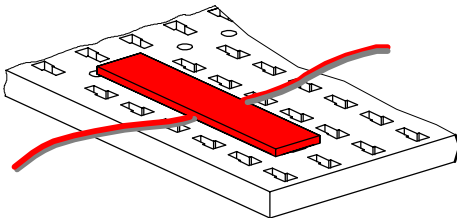
- 1** Einzelkabel in Bausteinruten
Individual cable in device groove



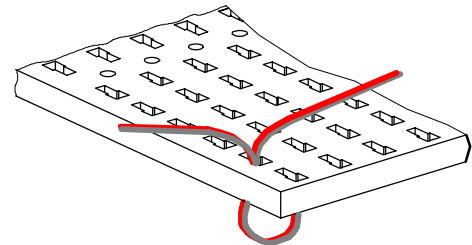
- 2** Kabel auf Experimentierplatte oder im Modell
Cable on base plate or in model



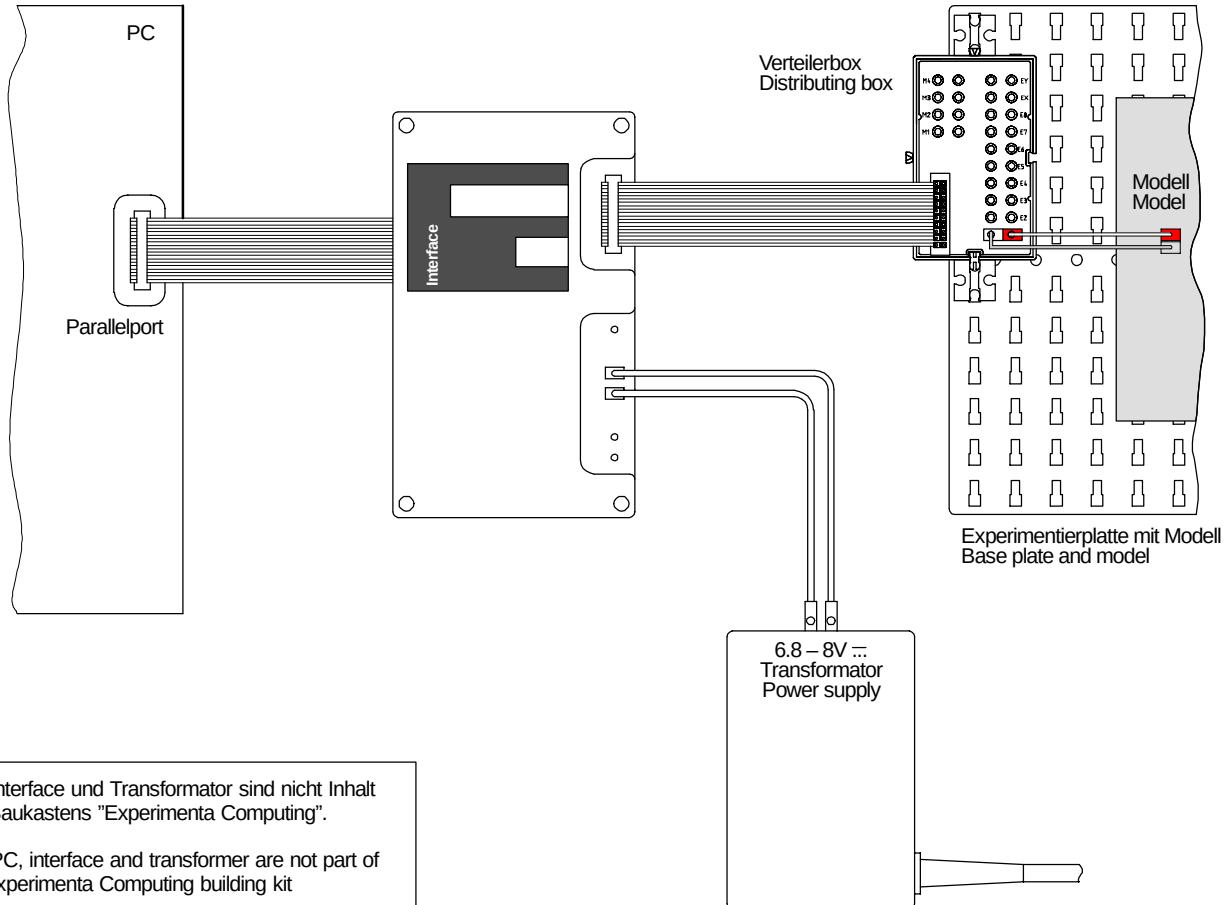
- 3** Kabel auf Experimentierplatte
Cable on base plate



- 4** Kabellänge variabel anpassen
Kabellschleife durch Nut der Experimentierplatte stecken
Adjust cable length variably
Insert cable loop through base plate

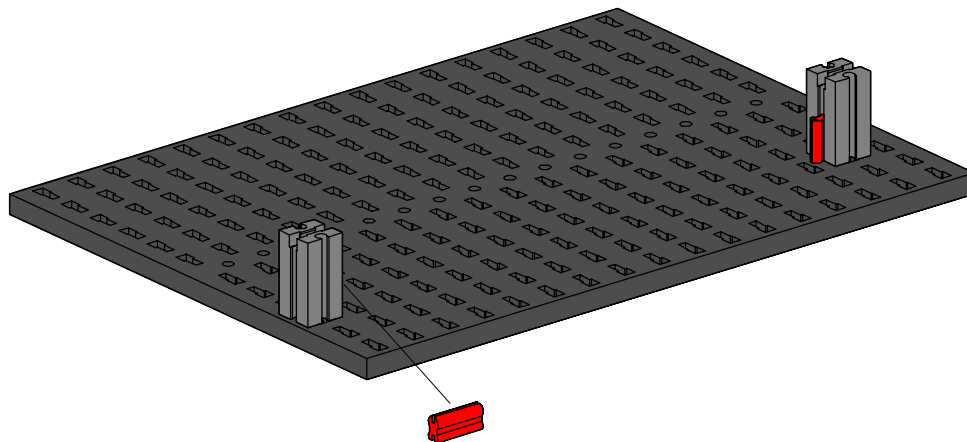
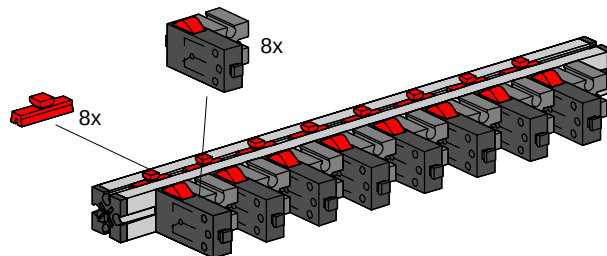
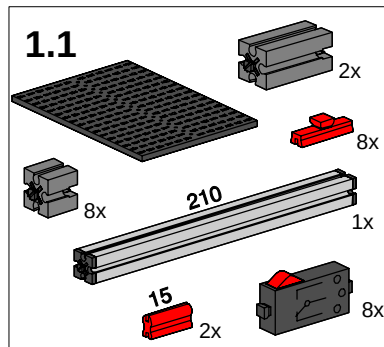


Anschlußschema • Wiring diagram



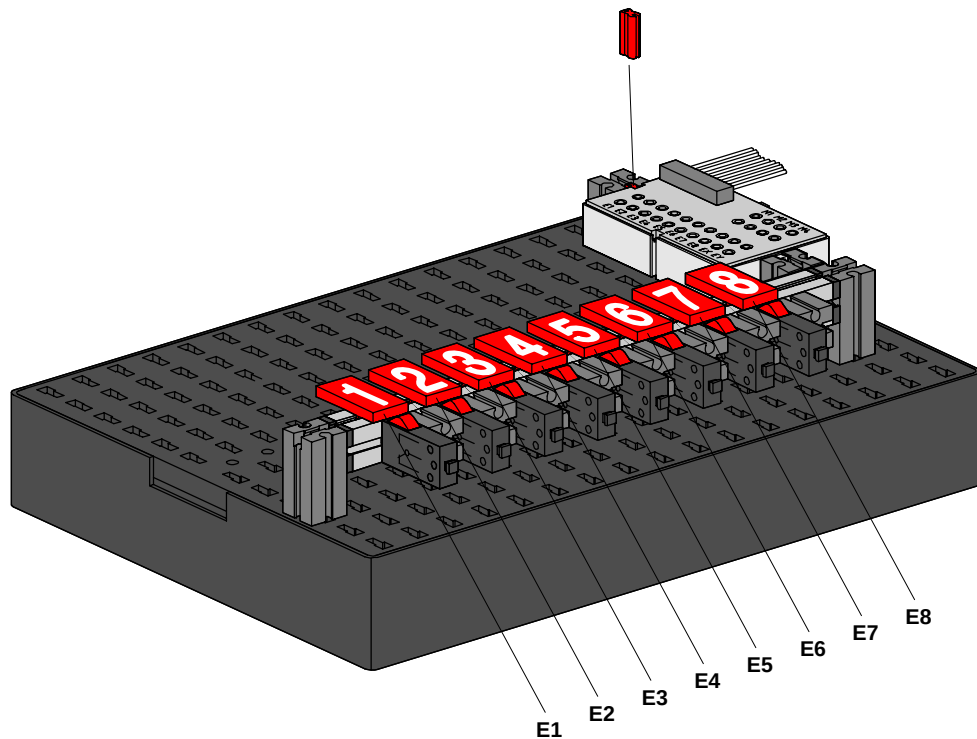
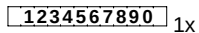
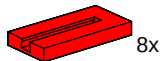
Tasterleiste Key bank

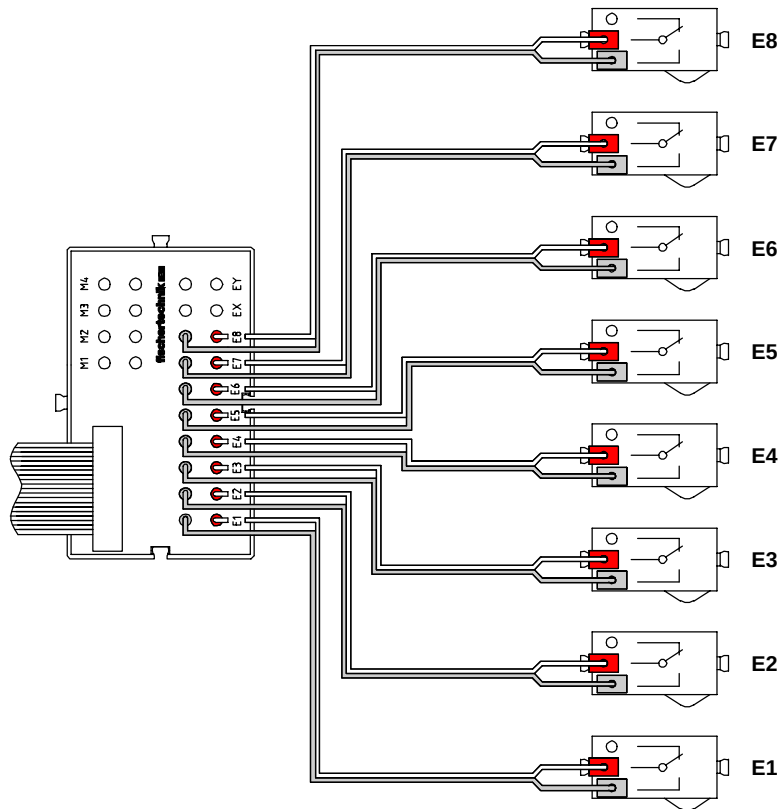
1



1

1.2





2

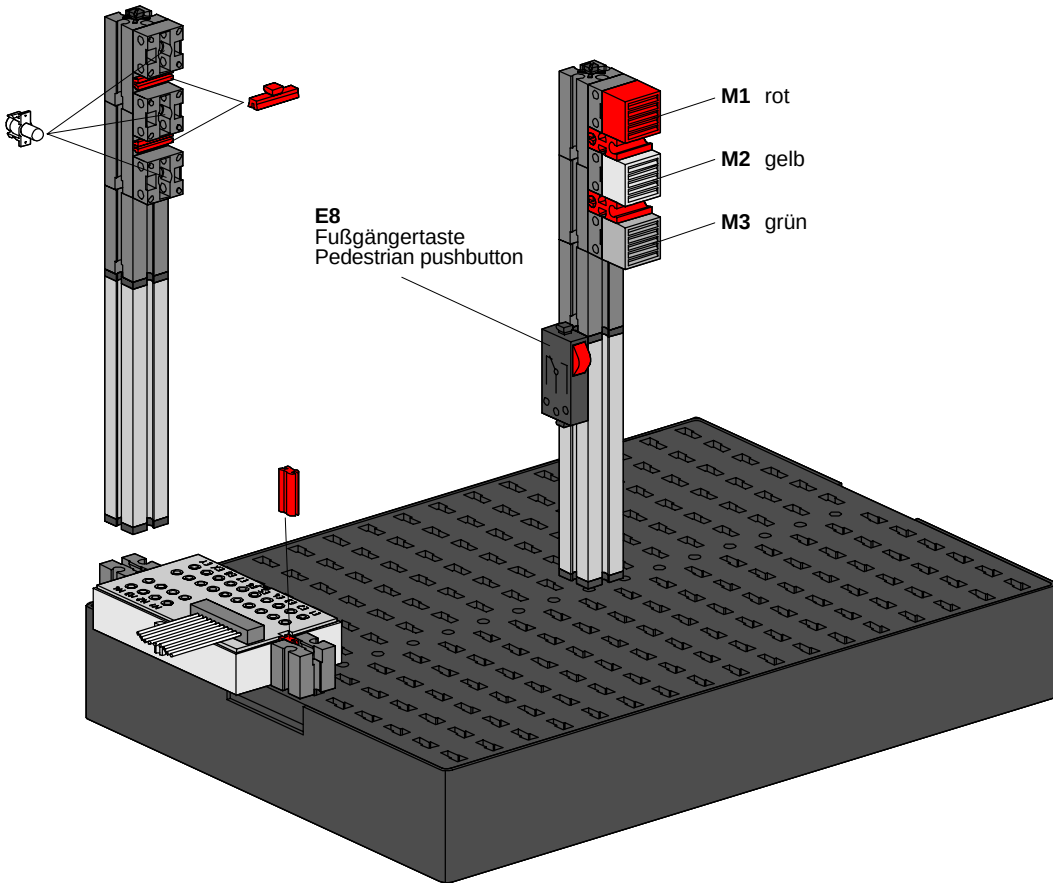
Verkehrsampel mit Fußgängertaste

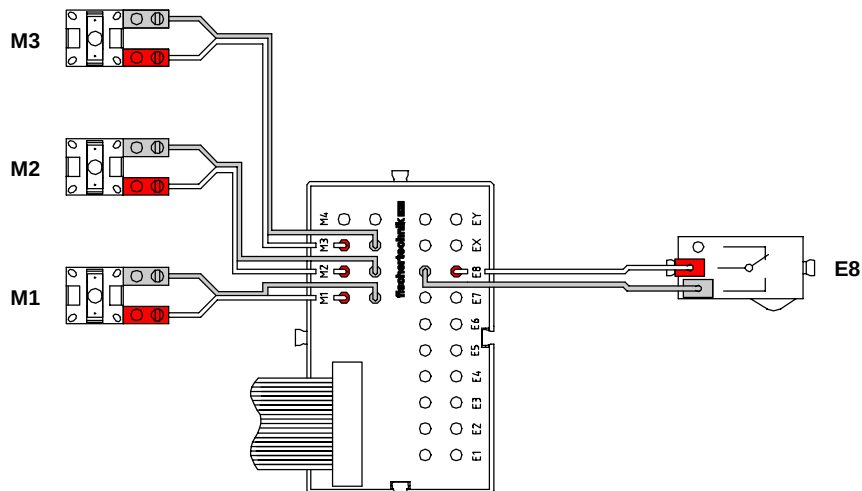
Traffic light with pedestrian pushbutton

2.1

Diagram 2.1 illustrates the assembly of a 90-degree corner joint. The components shown are:

- 1x grey 1x90 Technic beam (labeled 90 and 1x)
- 3x grey 3x3x3 corner connector (labeled 3x)
- 2x red 1x2 Technic beam (labeled 2x)
- 3x grey 3x3x3 corner connector (labeled 3x)

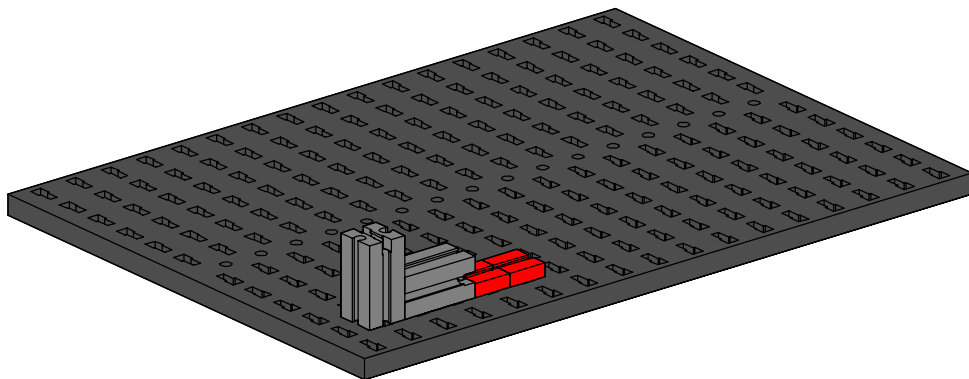
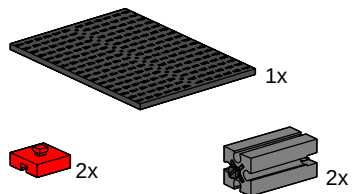
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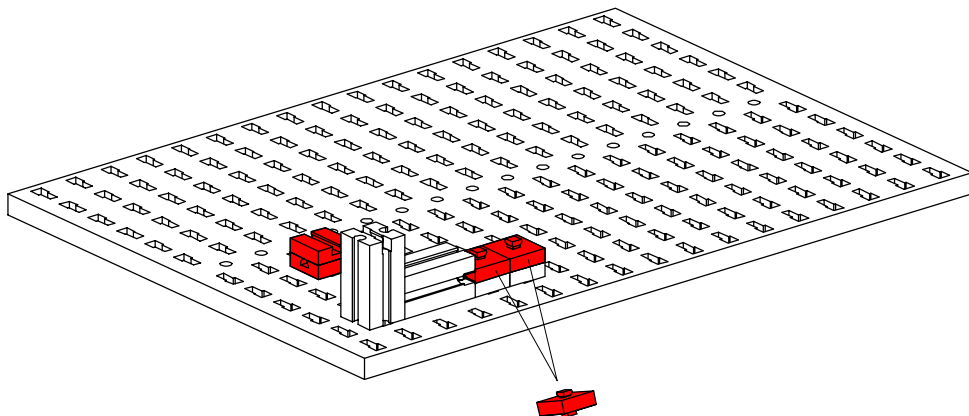
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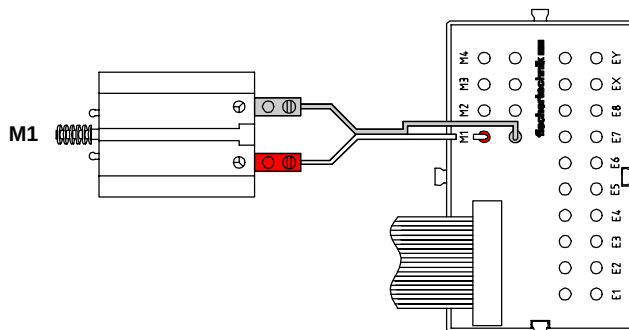
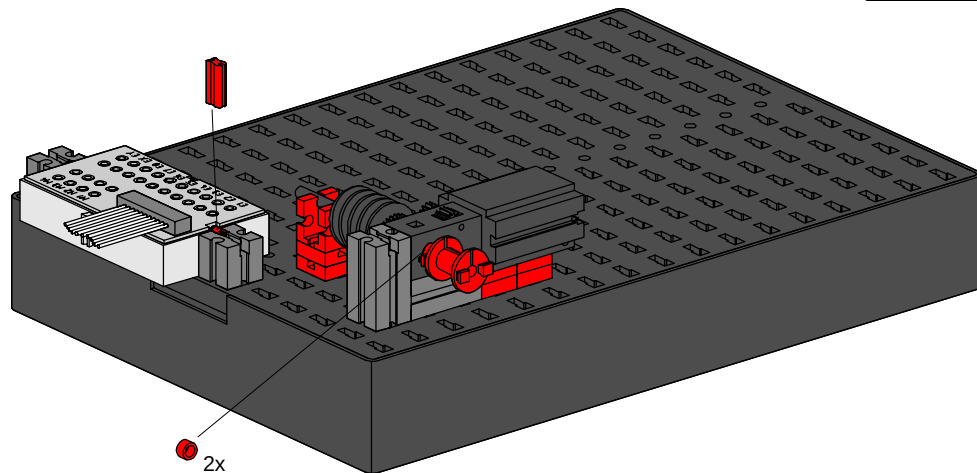
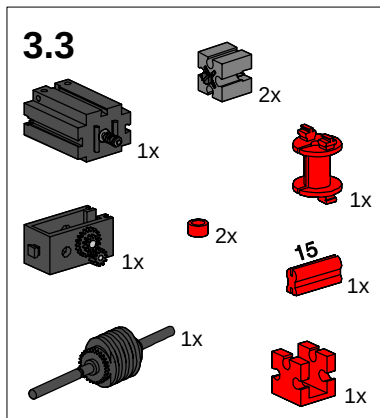
Motorwinde 1 Motor winch 1

3.1



3.2

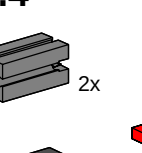




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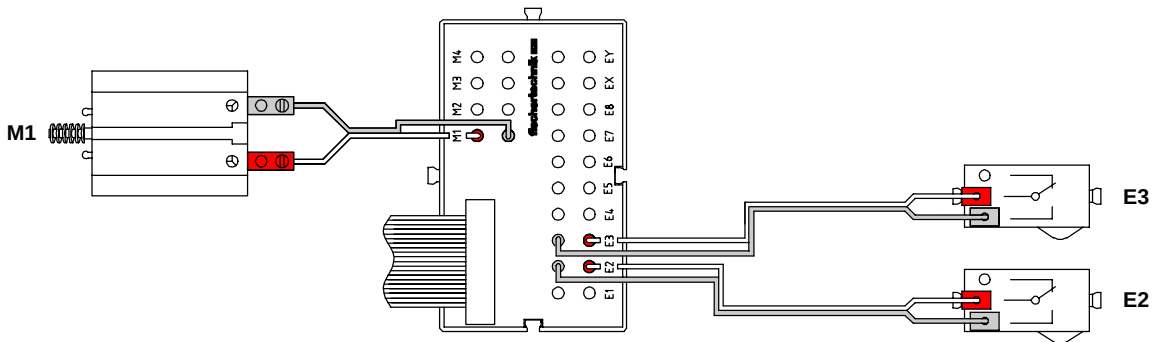
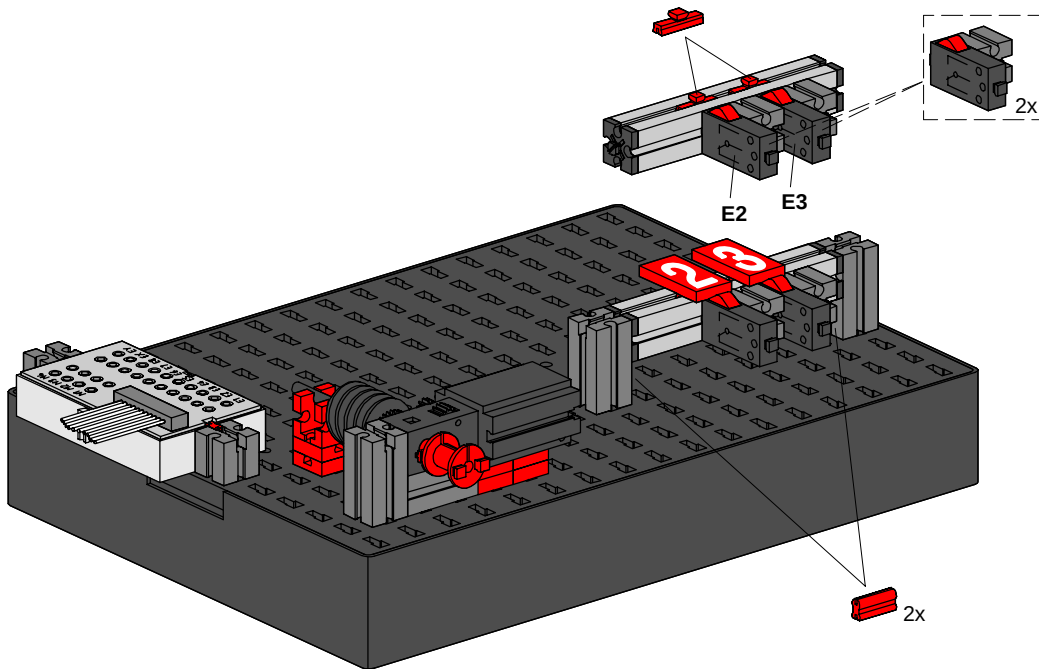
Motorwinde 2
Motor winch 2

3.4



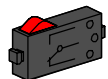
Parts list for step 3.4:

- 1x 90 (Long grey beam)
- 2x (Grey 1x3 with hole)
- 2x (Grey 1x3 with hole)
- 2x (Red 1x3)
- 15 (Red 1x3)
- 2x (Red 1x3)

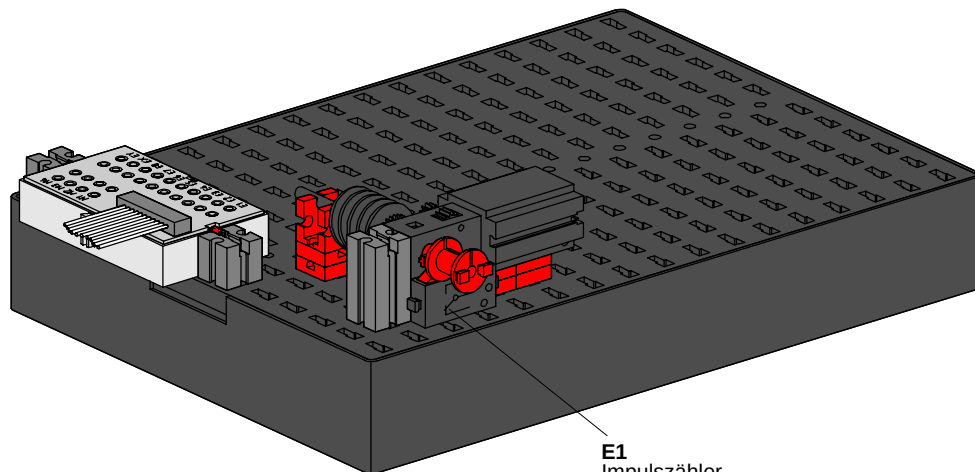


Motorwinde 3 Motor winch 3

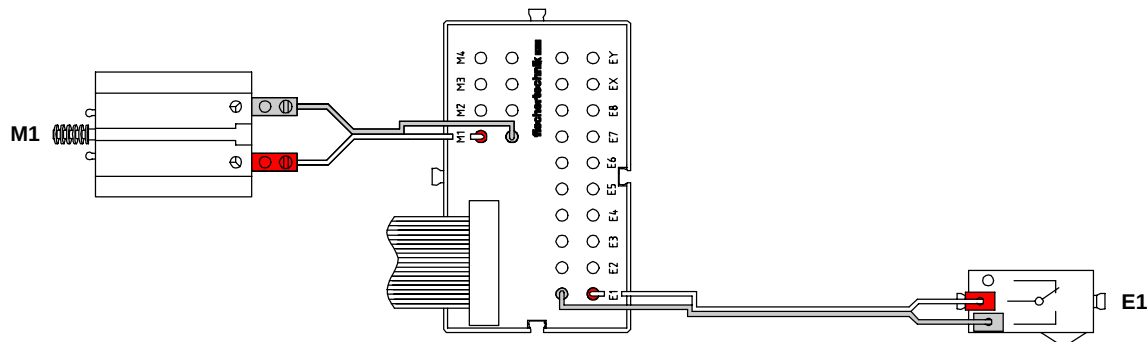
3.5



1x



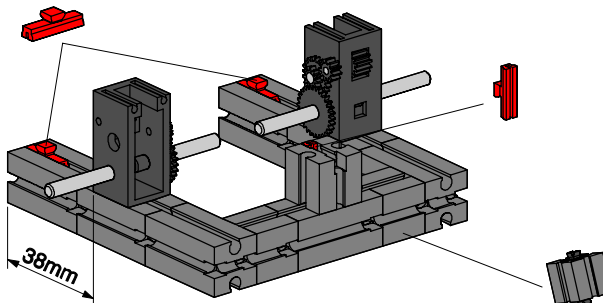
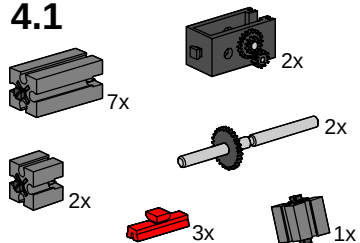
E1
Impulszähler
Pulse counter



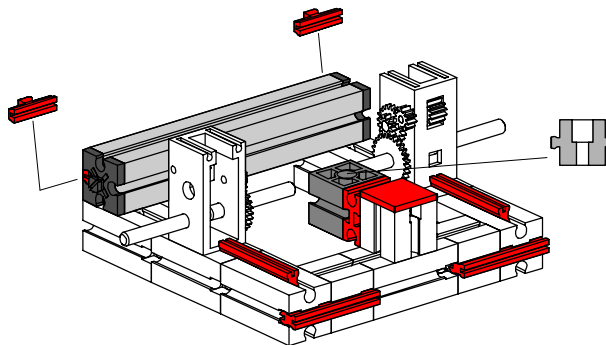
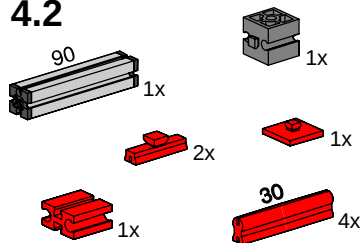
4

Schildkröte Turtle

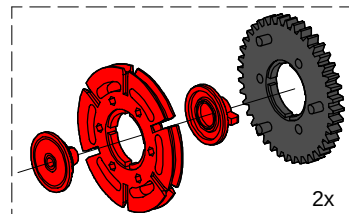
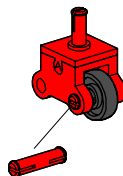
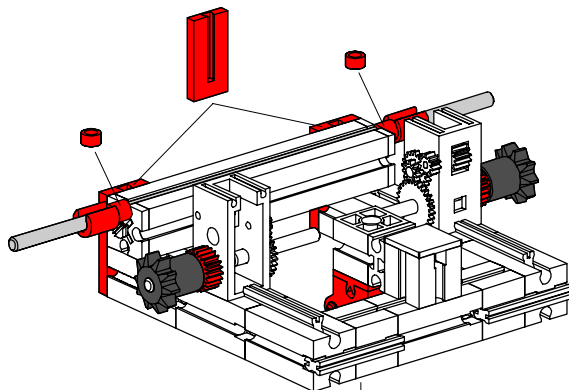
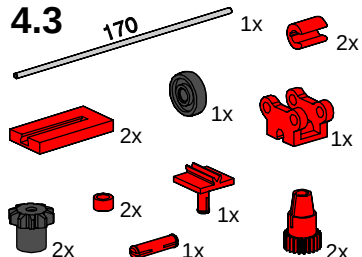
4.1



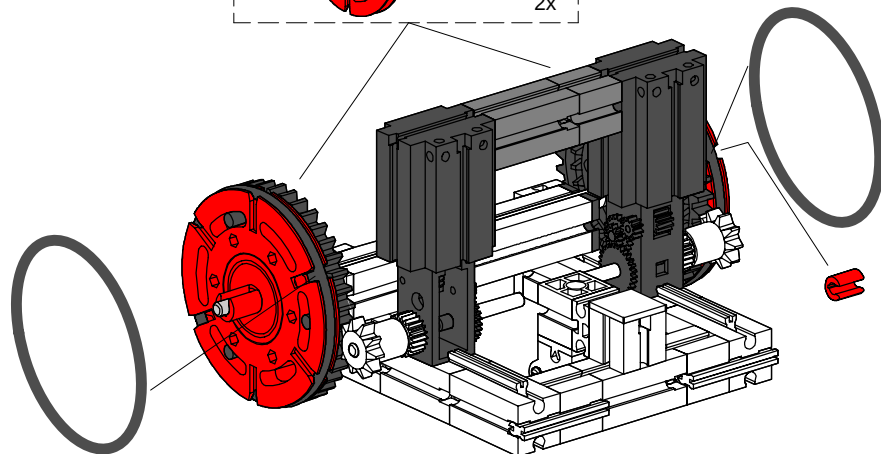
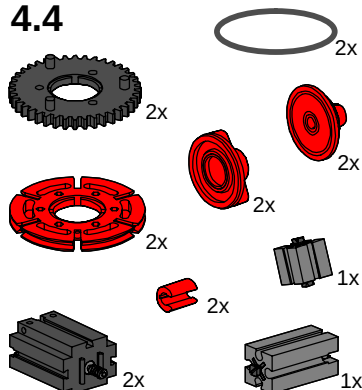
4.2



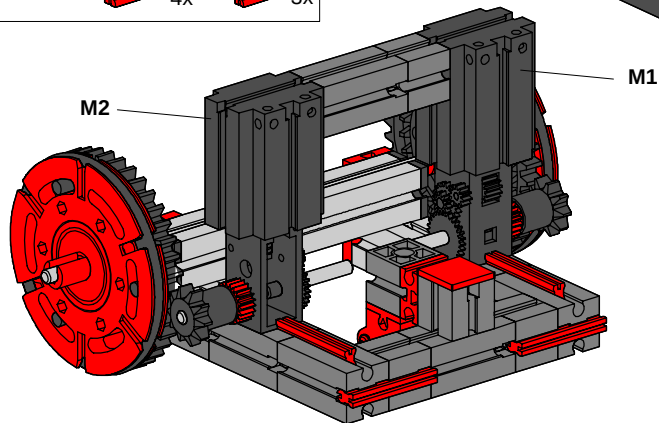
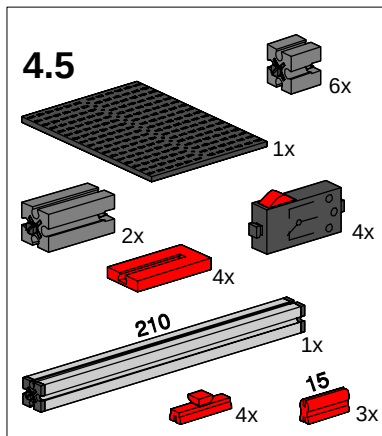
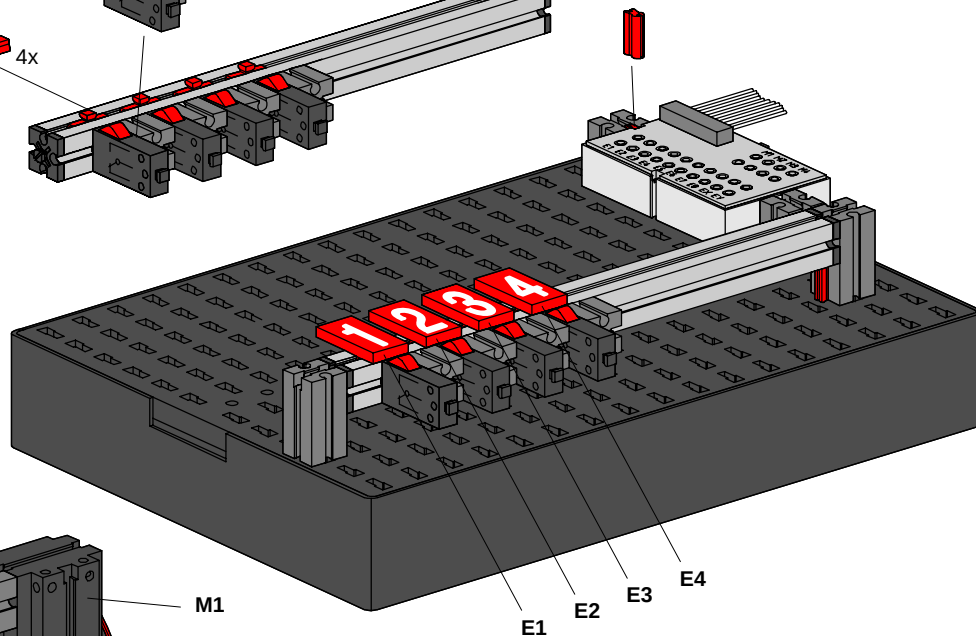
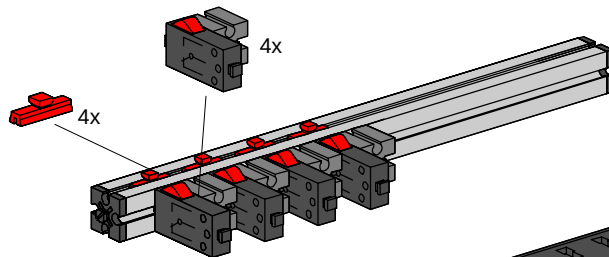
4.3

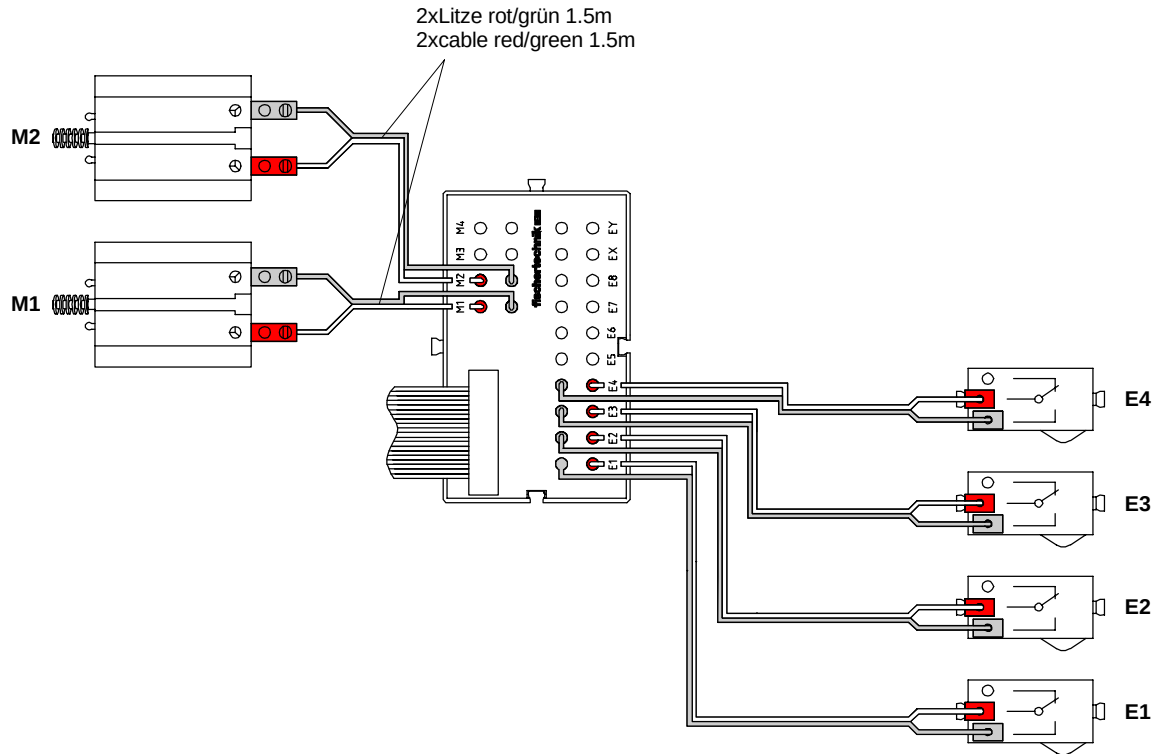


4.4



4

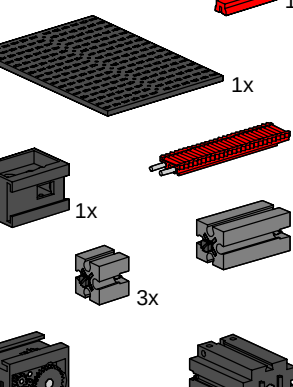






Notizen Notes

5.1



1x

1x

4x

1x

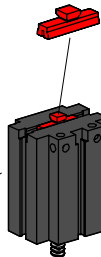
3x

8x

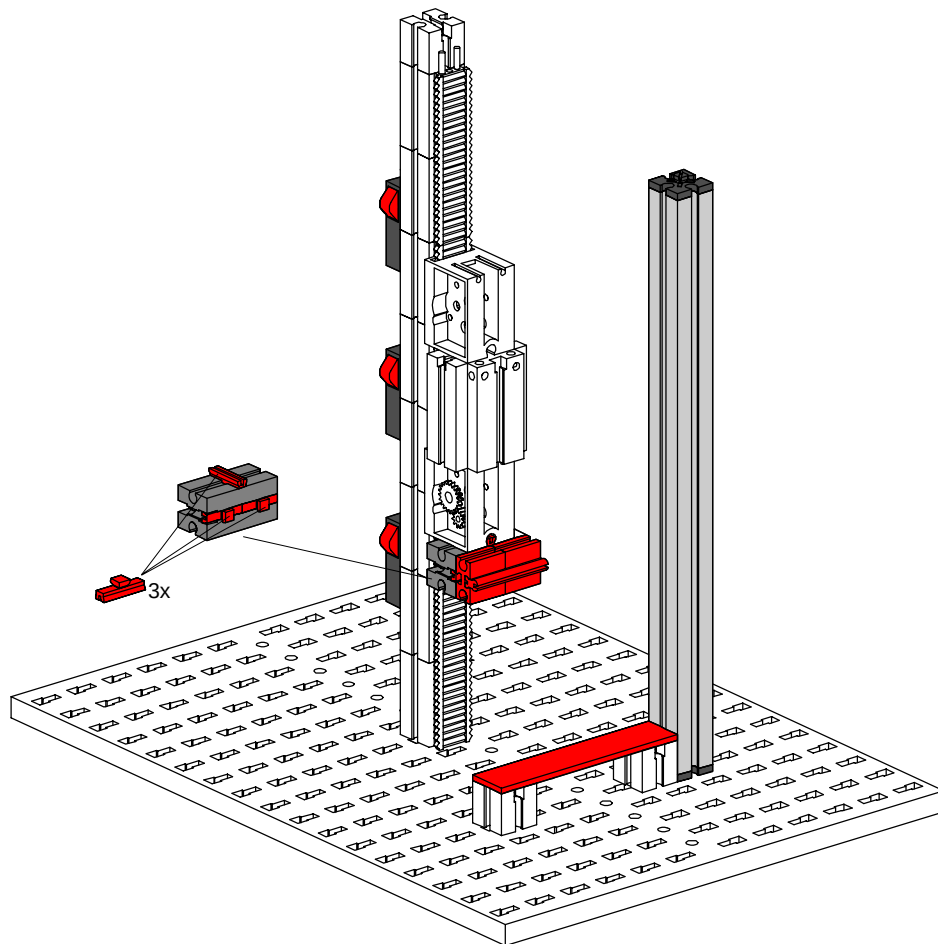
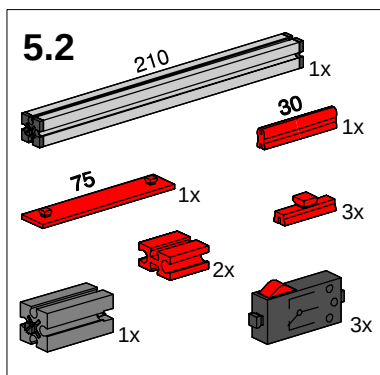
1x

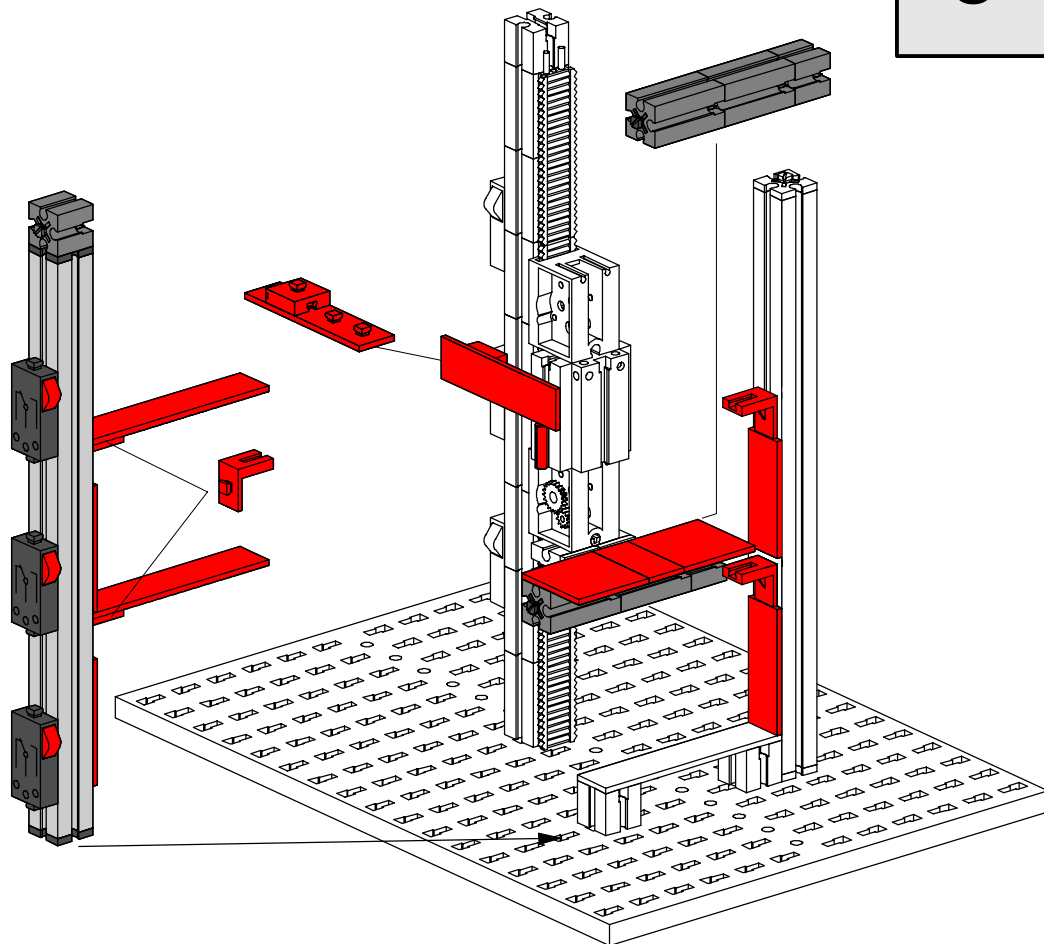
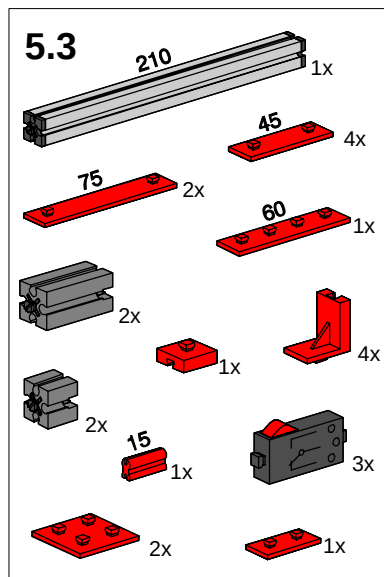
1x

Materialaufzug
Freight lift

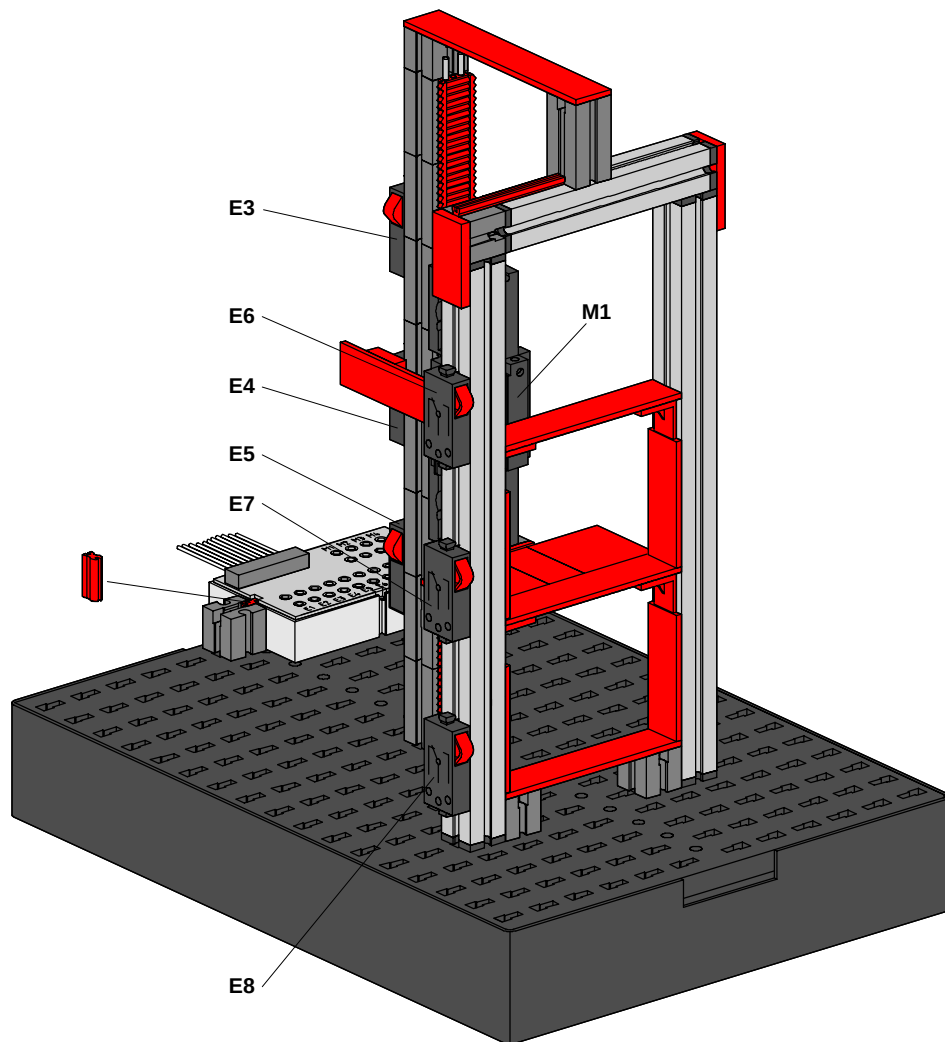
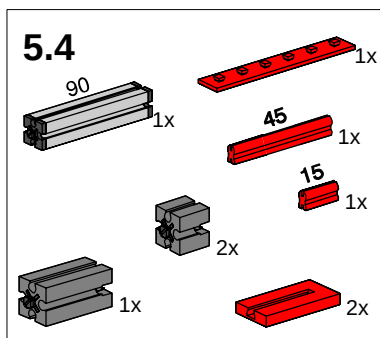


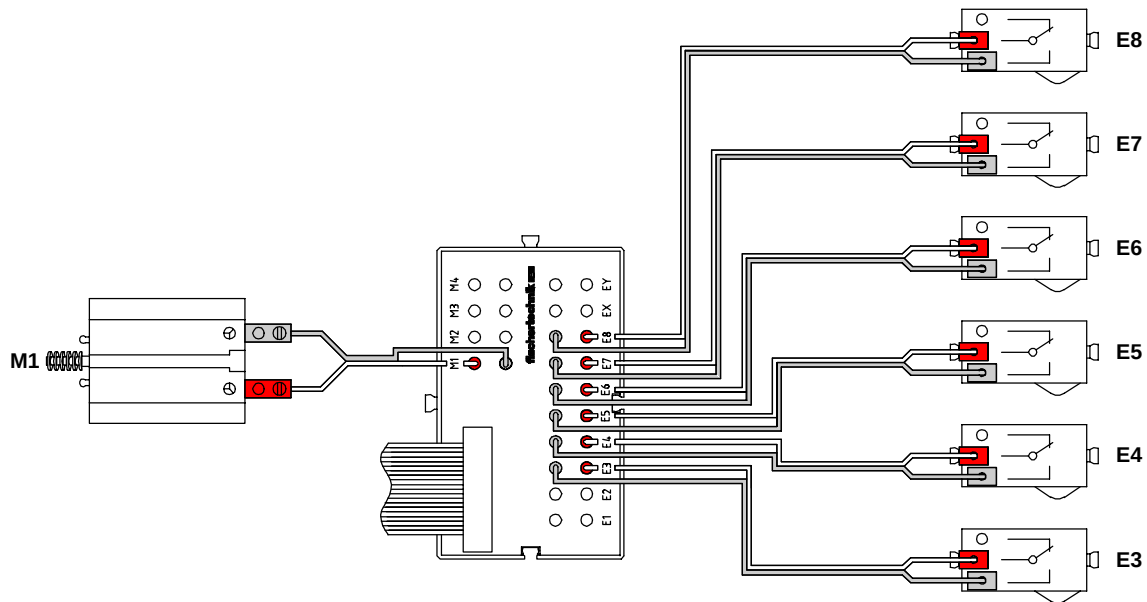
5





5

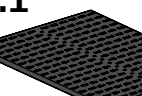




6

Werkzeugmaschine
Machine Tool

6.1



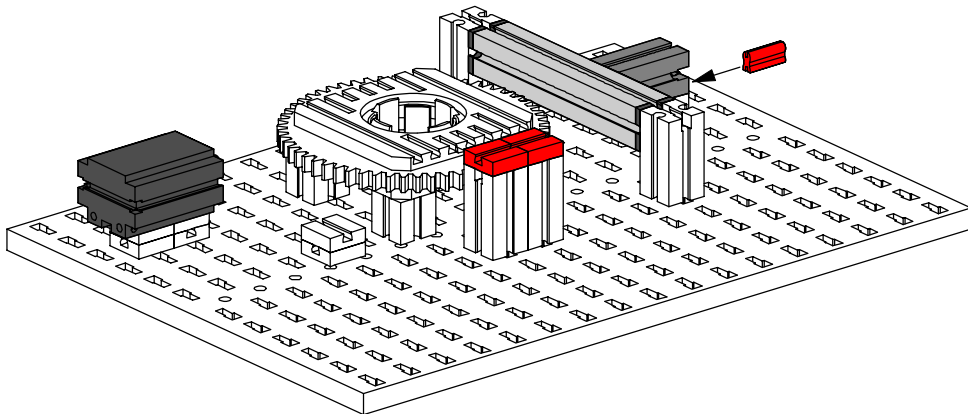
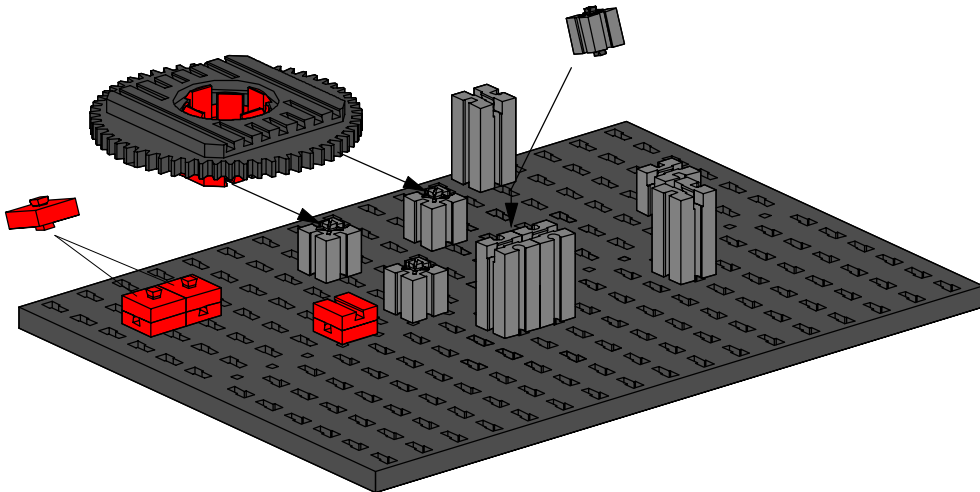
Parts list for step 6.1:

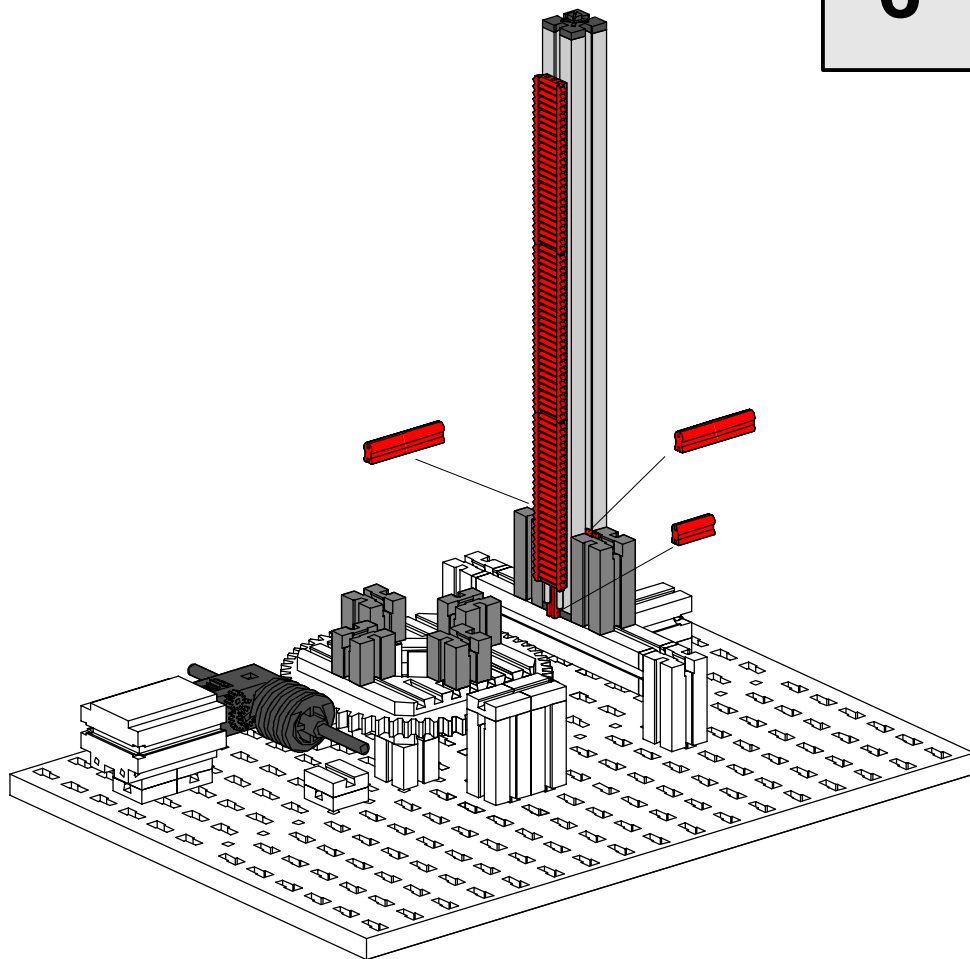
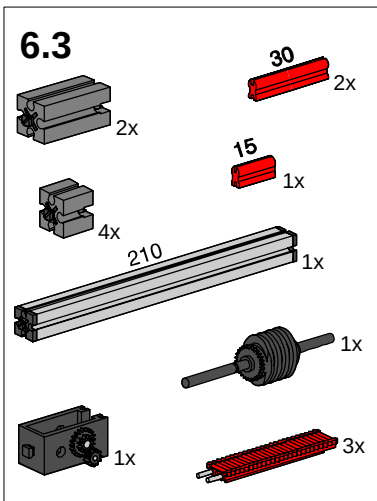
- 1x Large black Technic plate (11x11 holes)
- 2x Red Technic cross-axle connector
- 1x Black Technic gear (24 teeth)
- 1x Grey Technic axle connector (2-way)
- 4x Red Technic axle pin (with friction ridges)
- 4x Grey Technic axle pin (without friction ridges)
- 4x Grey Technic axle connector (3-way)

6.2

Diagram 6.2 shows an exploded view of a mechanical assembly. The parts are as follows:

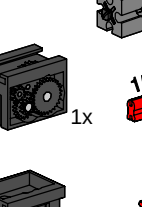
- Top grey part: 1x
- Long grey part with a 90-degree angle: 1x
- Bottom grey part with a spring: 1x
- Red part with a hole: 2x
- Red part with a 15-degree angle: 1x





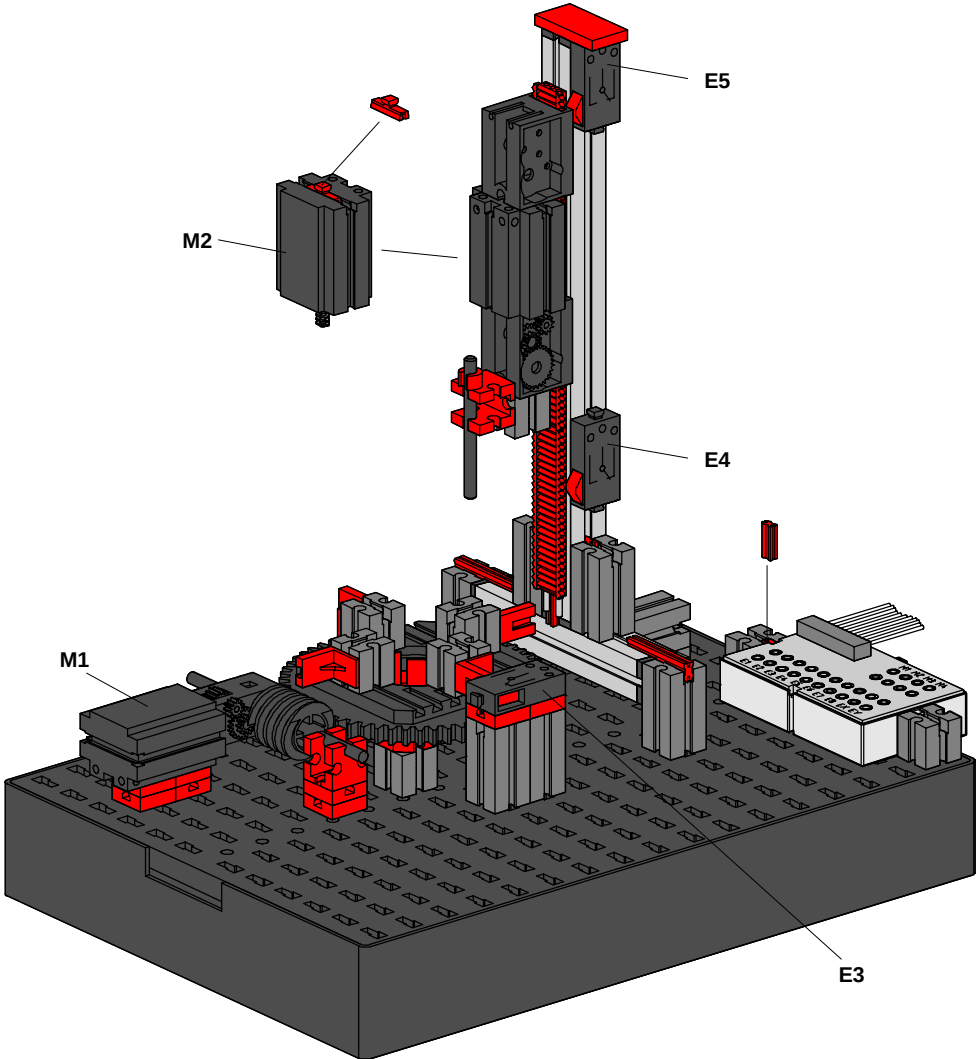
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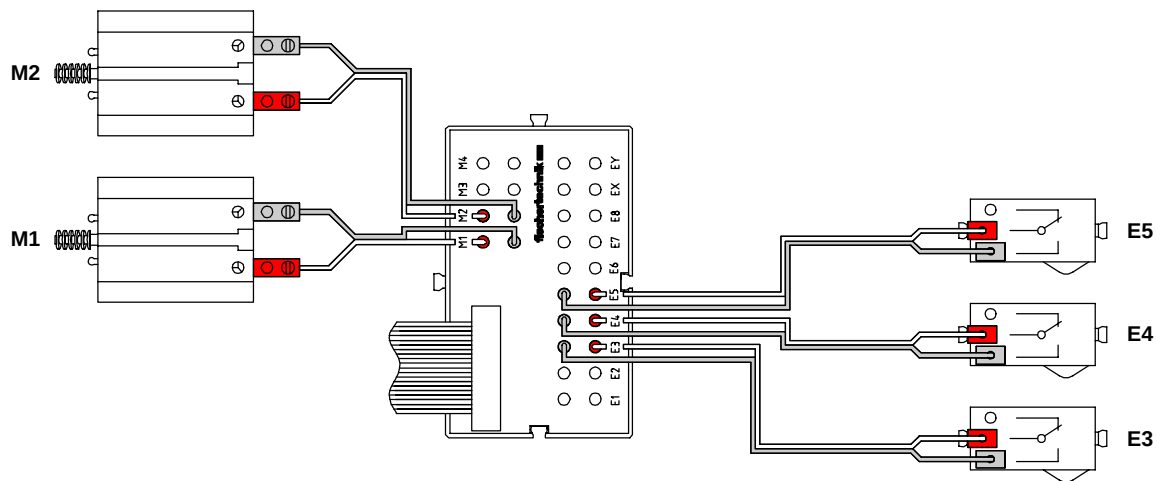
6.4



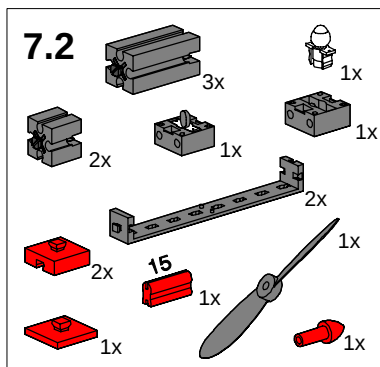
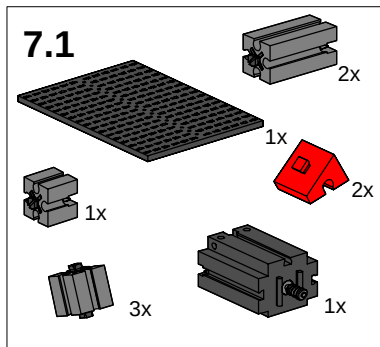
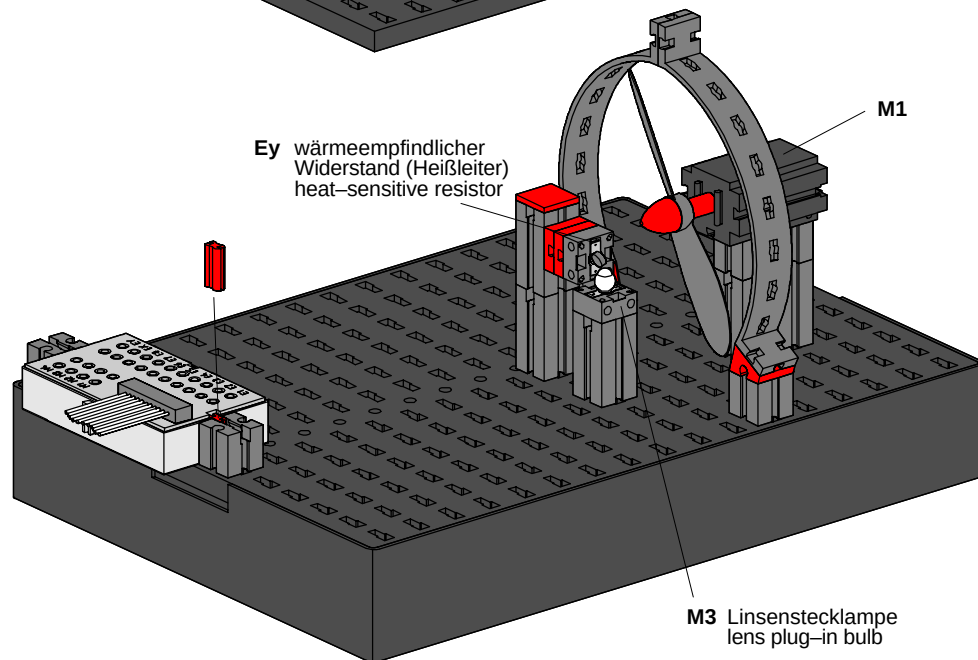
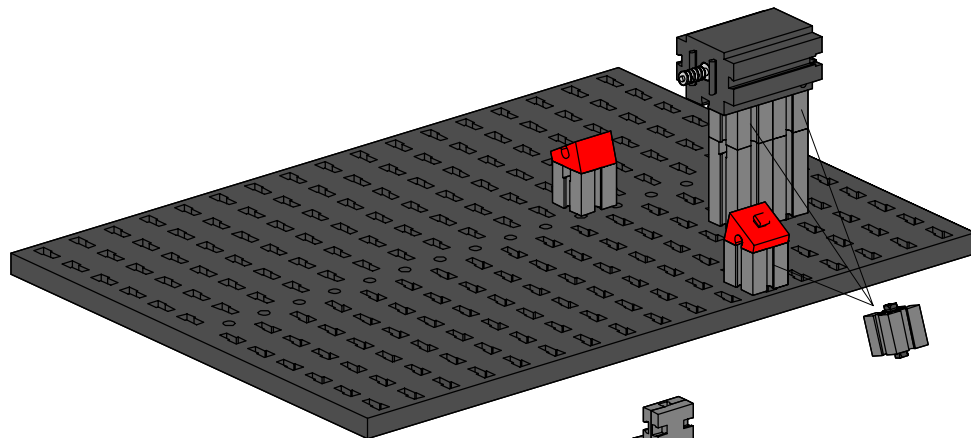
Parts list for step 6.4:

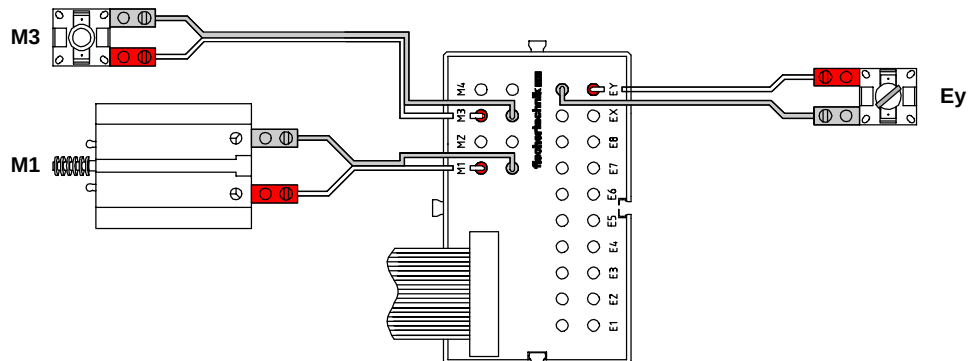
- 1x Dark Grey 2x3x3 Box with Hole
- 3x Dark Grey 1x2x2 Corner Connector
- 1x Grey 1x5 Technic Beam
- 1x Red 1x2x2 Flat Plate
- 1x Red 1x3x2 Flat Plate
- 2x Red 1x4x2 Flat Plate
- 1x Dark Grey 2x3x3 Box with Hole
- 1x Red 1x2x2 Flat Plate
- 1x Red 1x3x2 Flat Plate
- 3x Dark Grey 2x3x3 Box with Hole
- 1x Red 1x2x2 Flat Plate
- 1x Red 1x3x2 Flat Plate
- 1x Dark Grey 2x3x3 Box with Hole
- 4x Red 1x2x2 Flat Plate
- 2x Red 1x3x2 Flat Plate
- 1x Dark Grey 2x3x3 Box with Hole





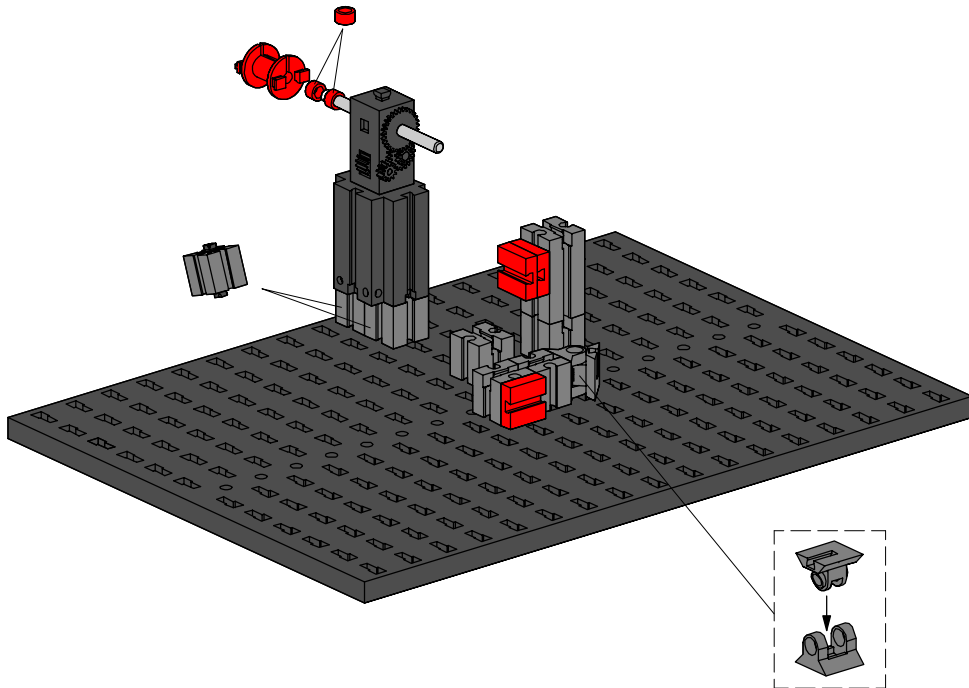
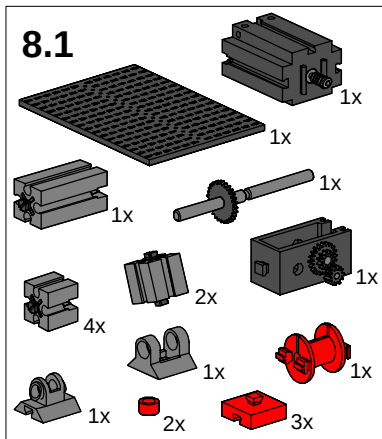
**Gebälse
Fan**





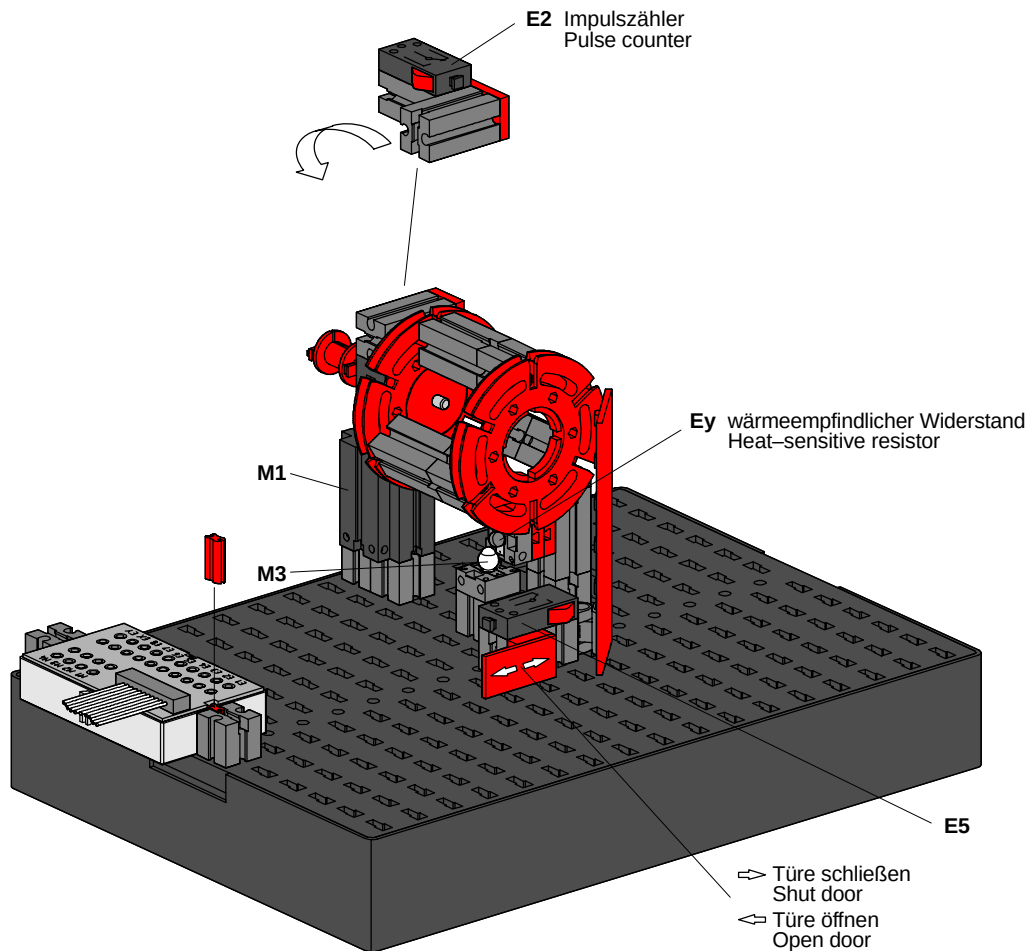
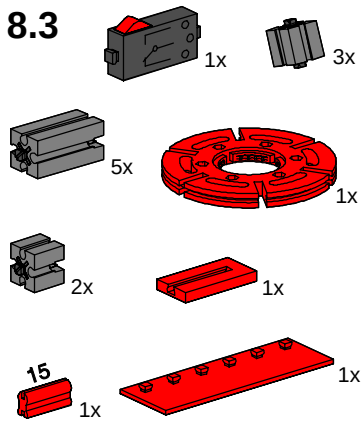
8

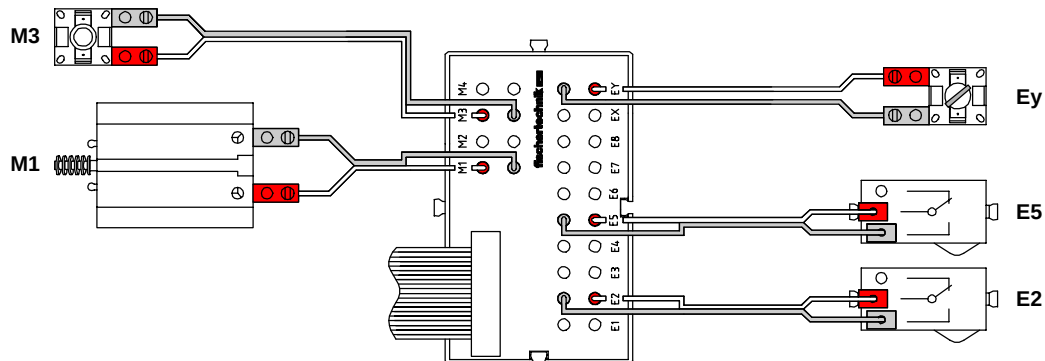
Waschmaschine
Washing machine



[illegible]

8.3

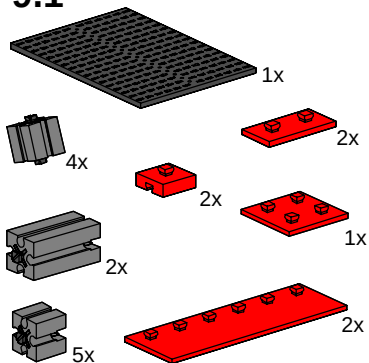




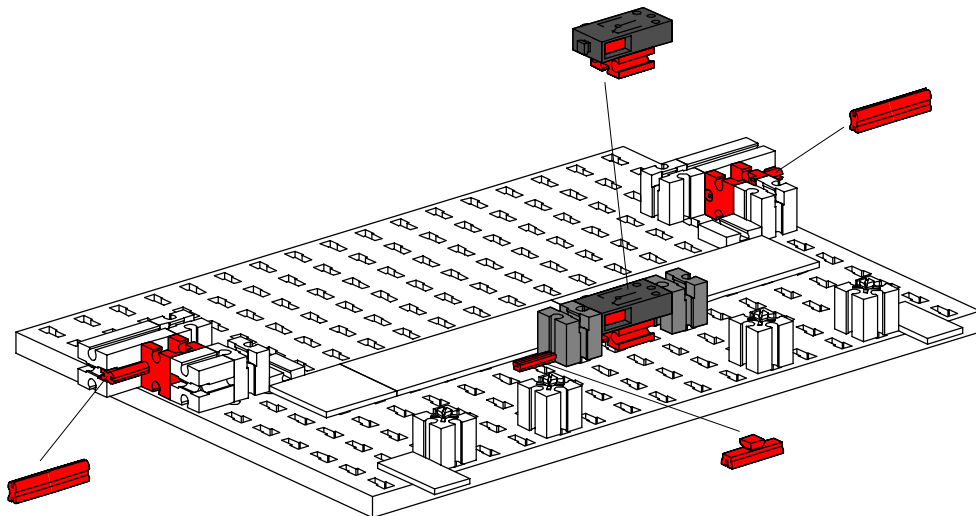
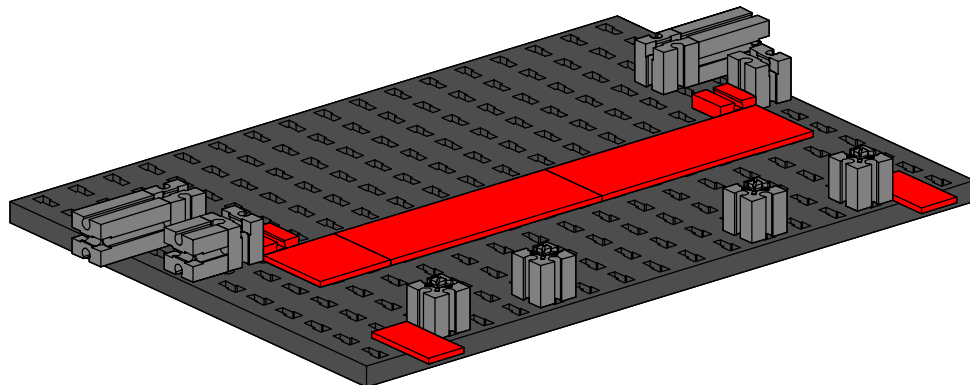
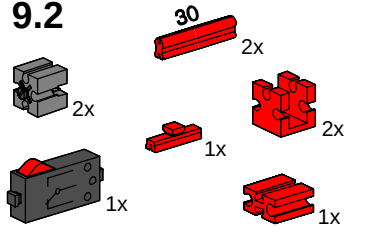
9

Sortieranlage Sorting system

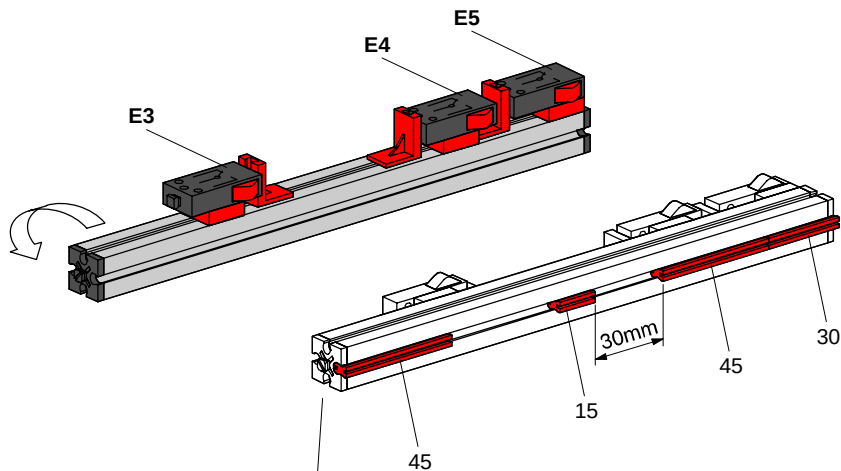
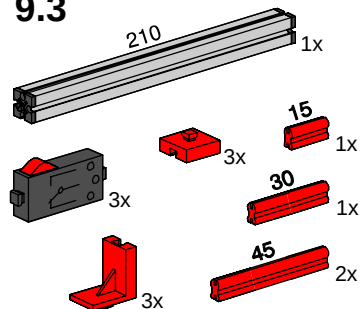
9.1



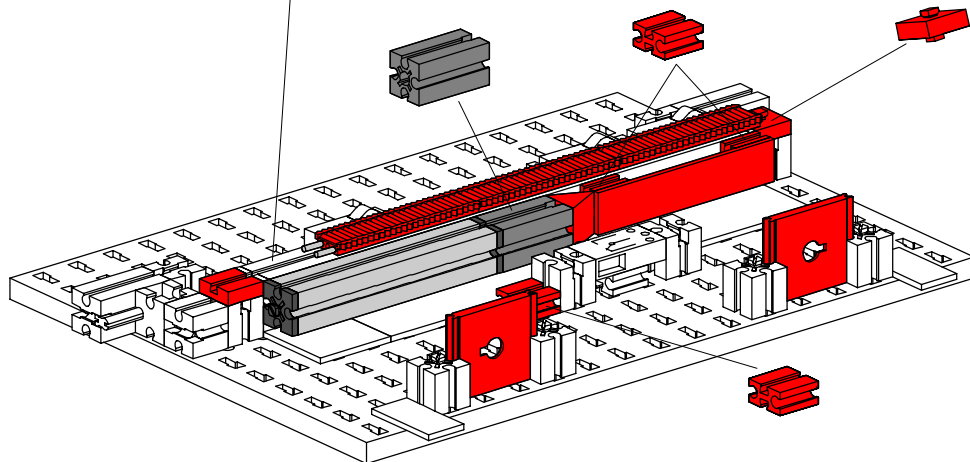
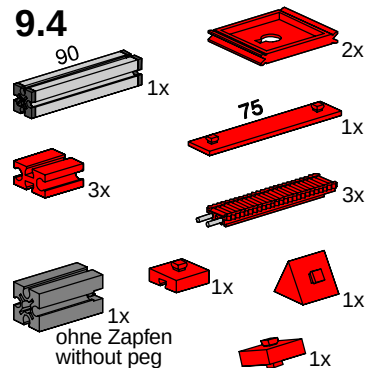
9.2



9.3

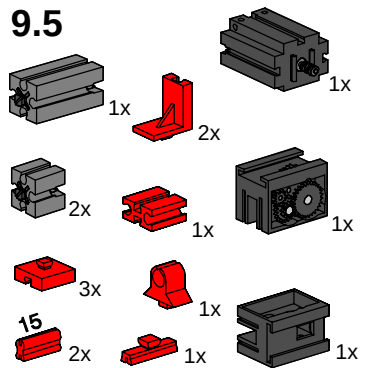


9.4

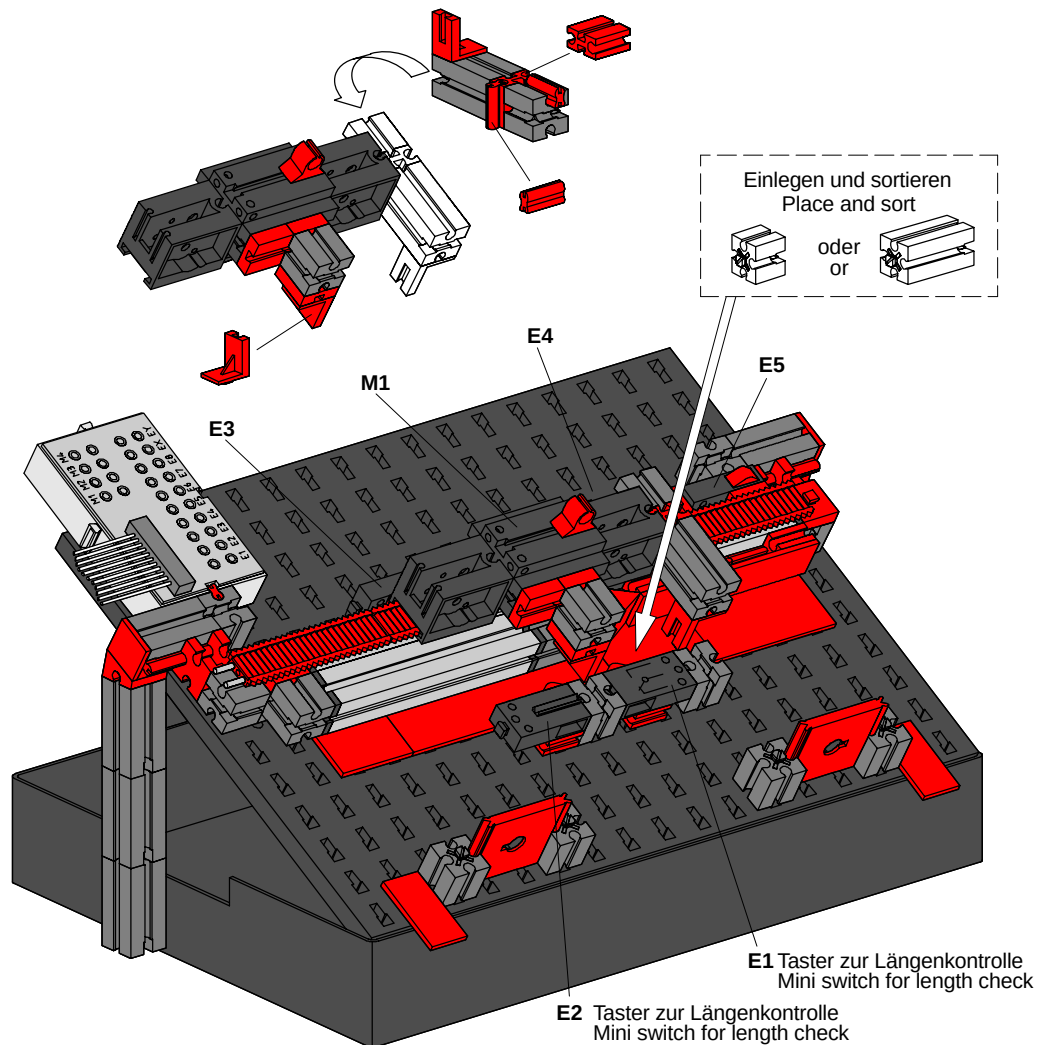
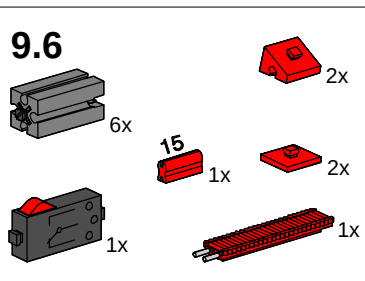


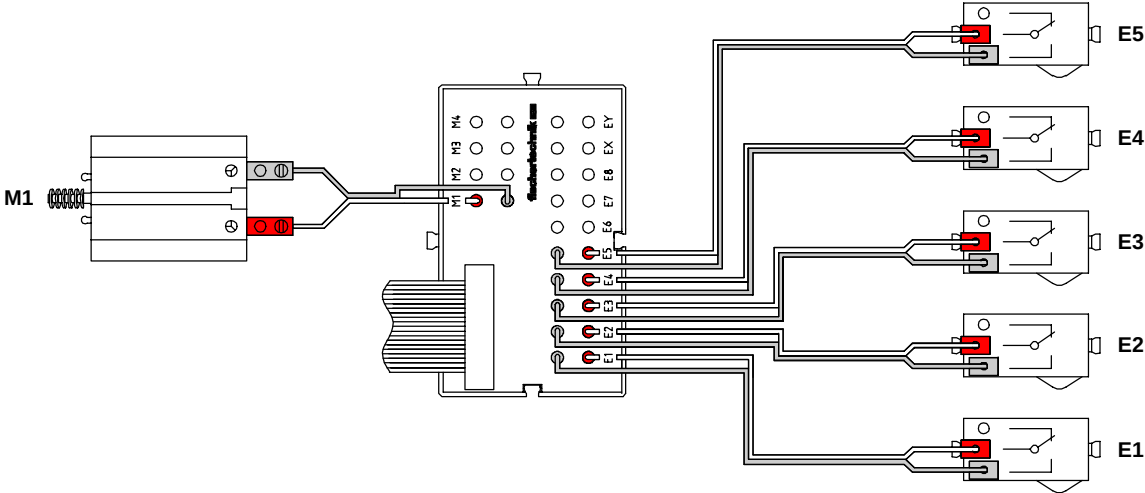
9

9.5



9.6





10

Automatische Tür Automatic door

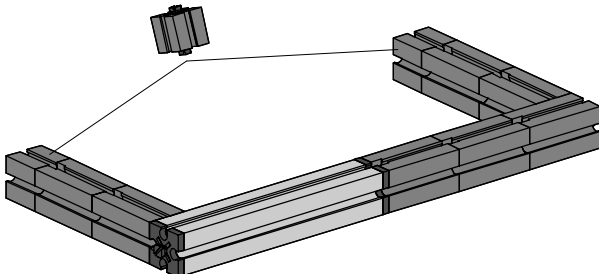
[illegible]

E3 Fototransistor

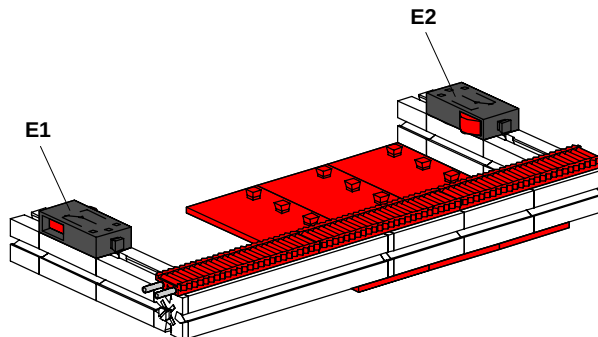
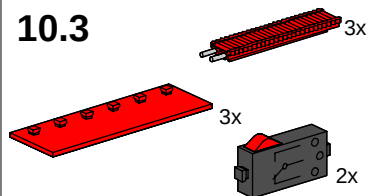
M1 Linsenstecklampe
Lens plug-in bulb

10.2

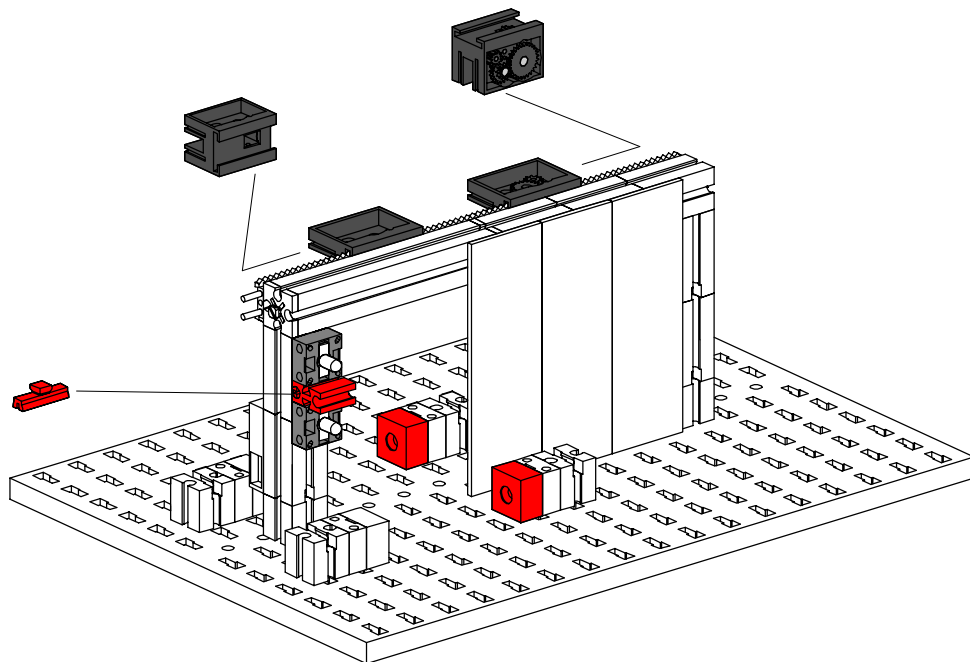
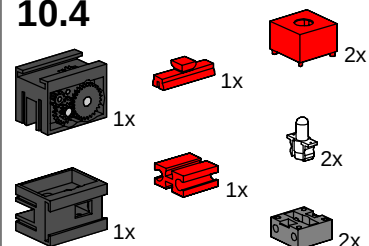
90 1x 2x 7x



10.3

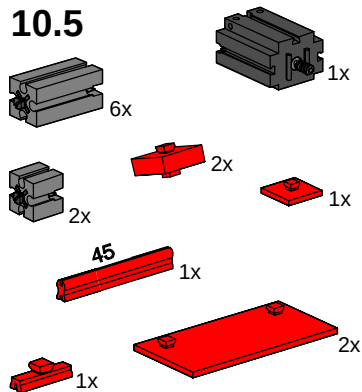


10.4

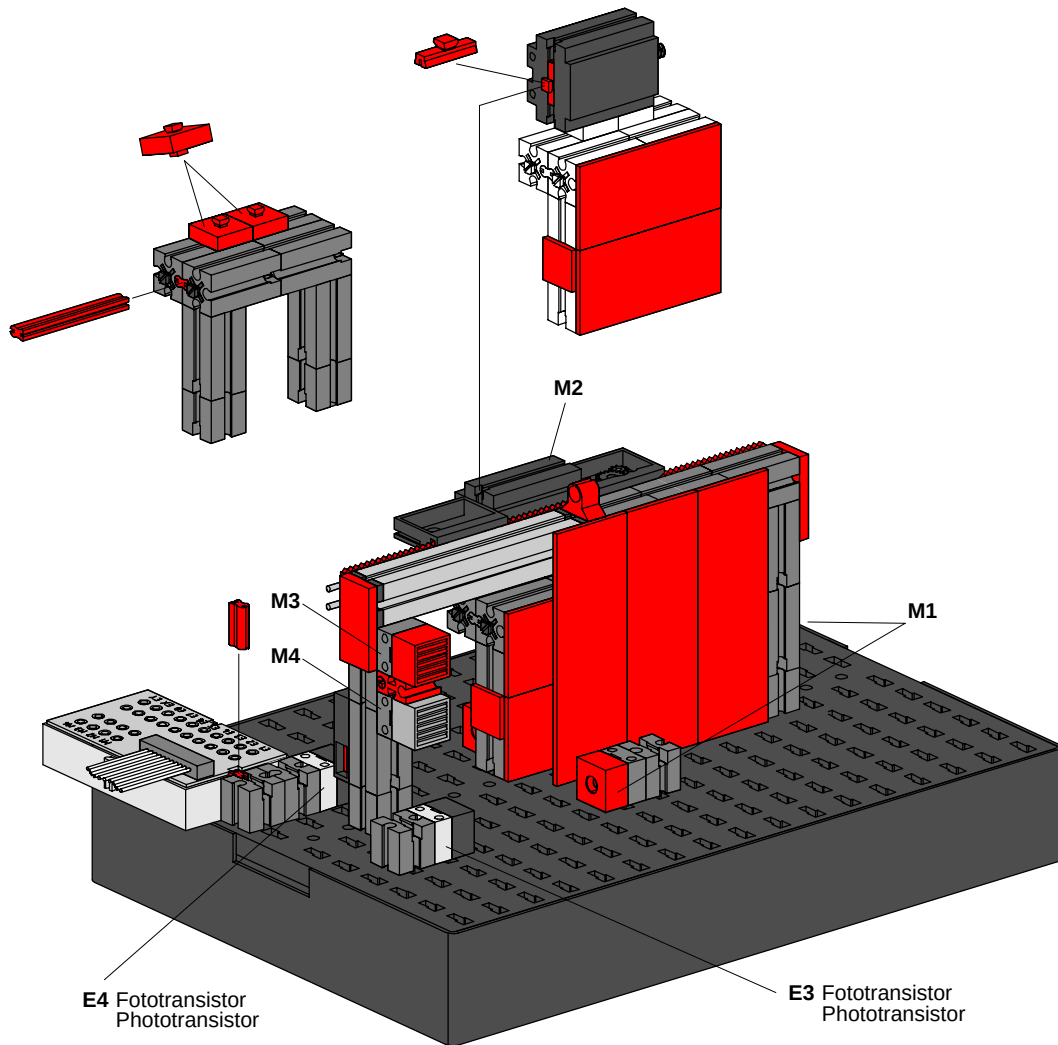
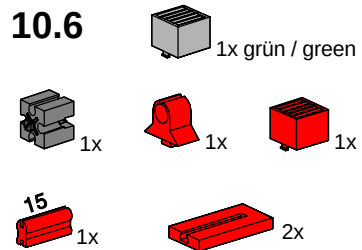


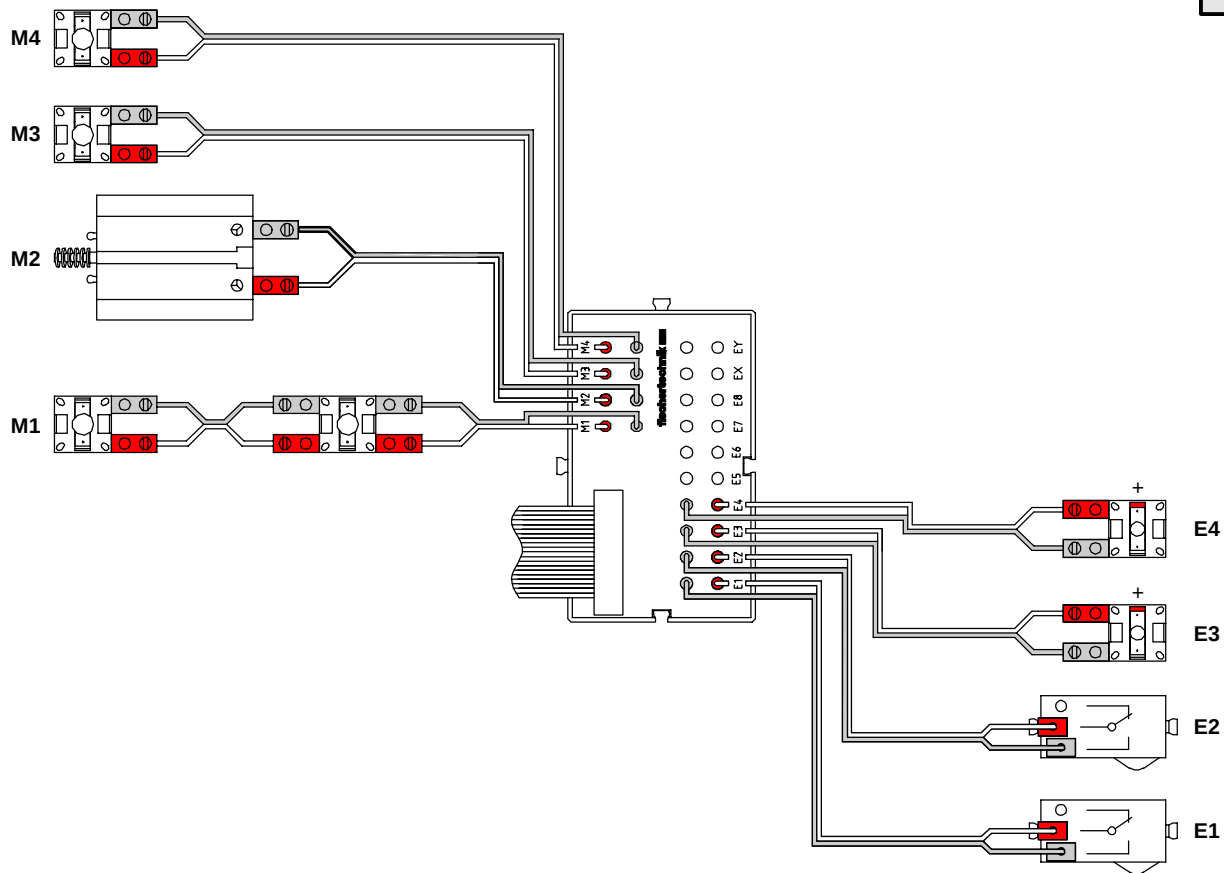
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10.5

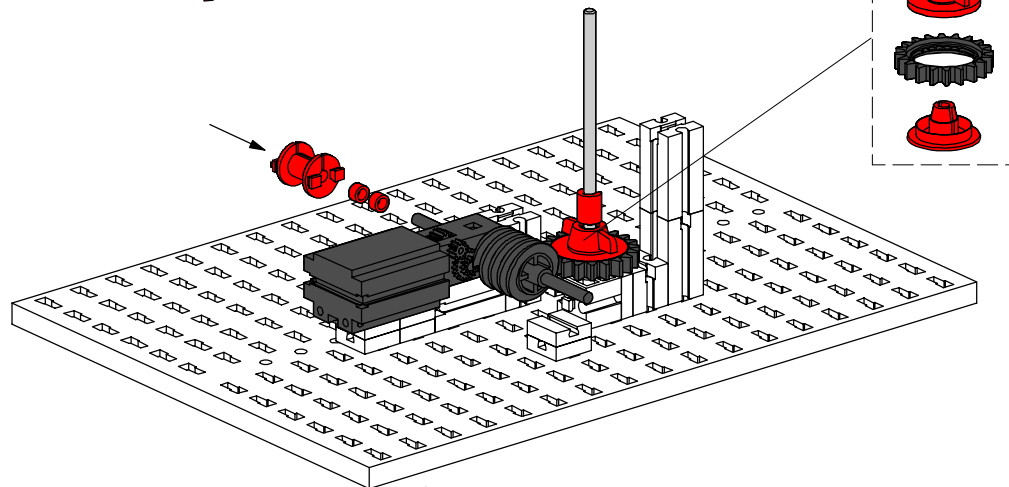
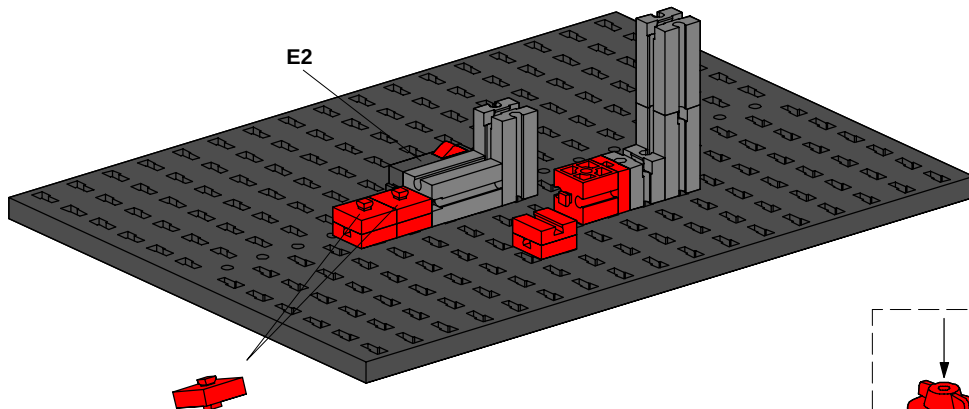


10.6



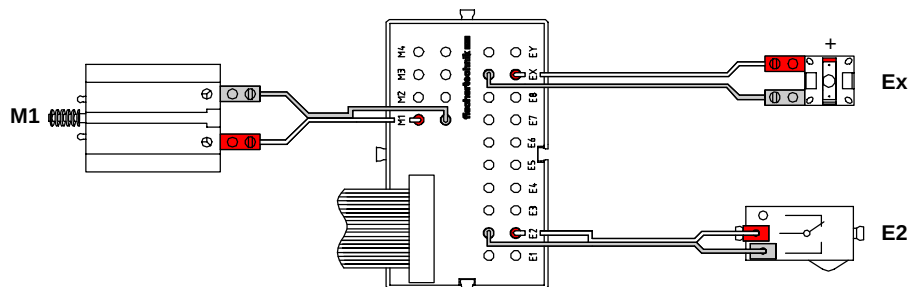
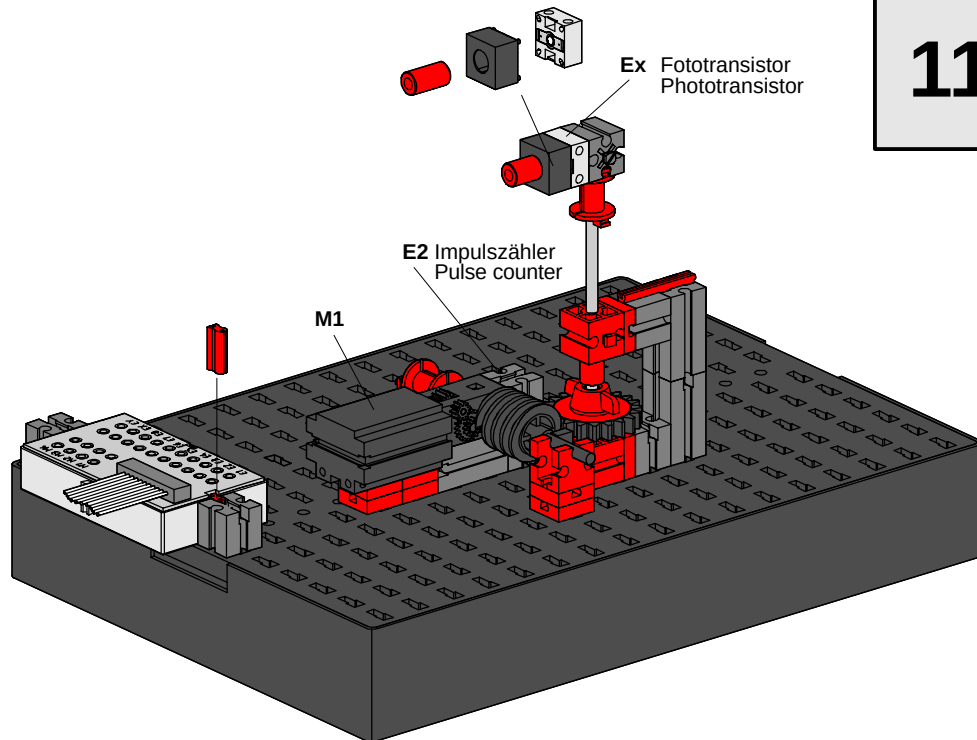


Computerauge
Computer eye



11.3

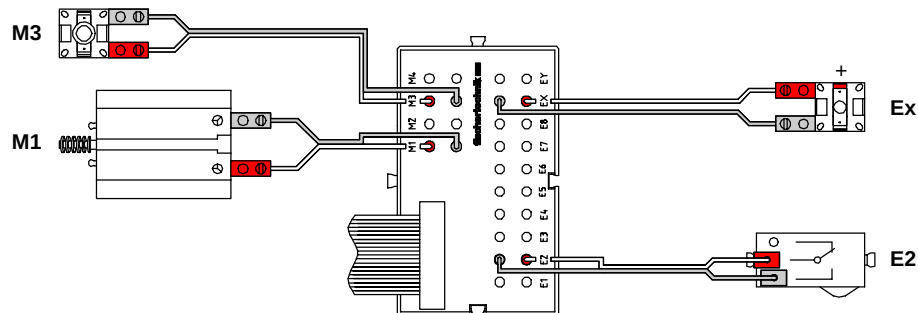
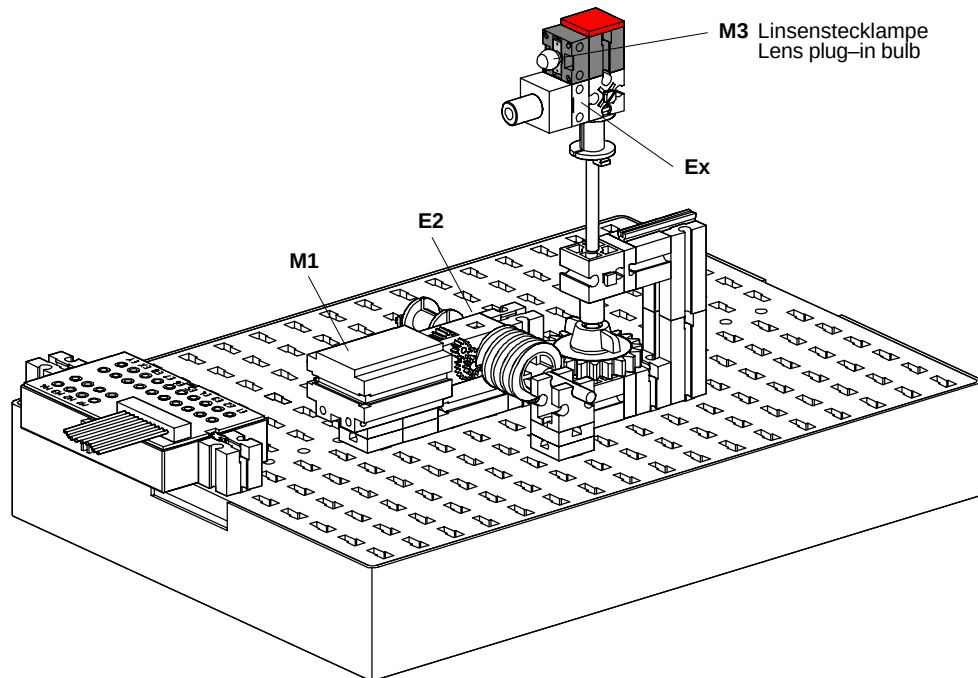
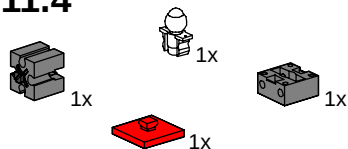
2x	1x	1x
2x	1x	1x
Ø 8 1x	1x	1x
	gelb / yellow	
		1x



11

Radar

11.4



12.1

1x dark grey 16x16 plate
2x grey 1x3 Technic beam with pin
4x grey 1x3 Technic beam
2x red 1x2 Technic beam
4x red 1x2 Technic beam
1x black 24-tooth gear

12.2 210 1x

2x

2x

1x

2x

4x

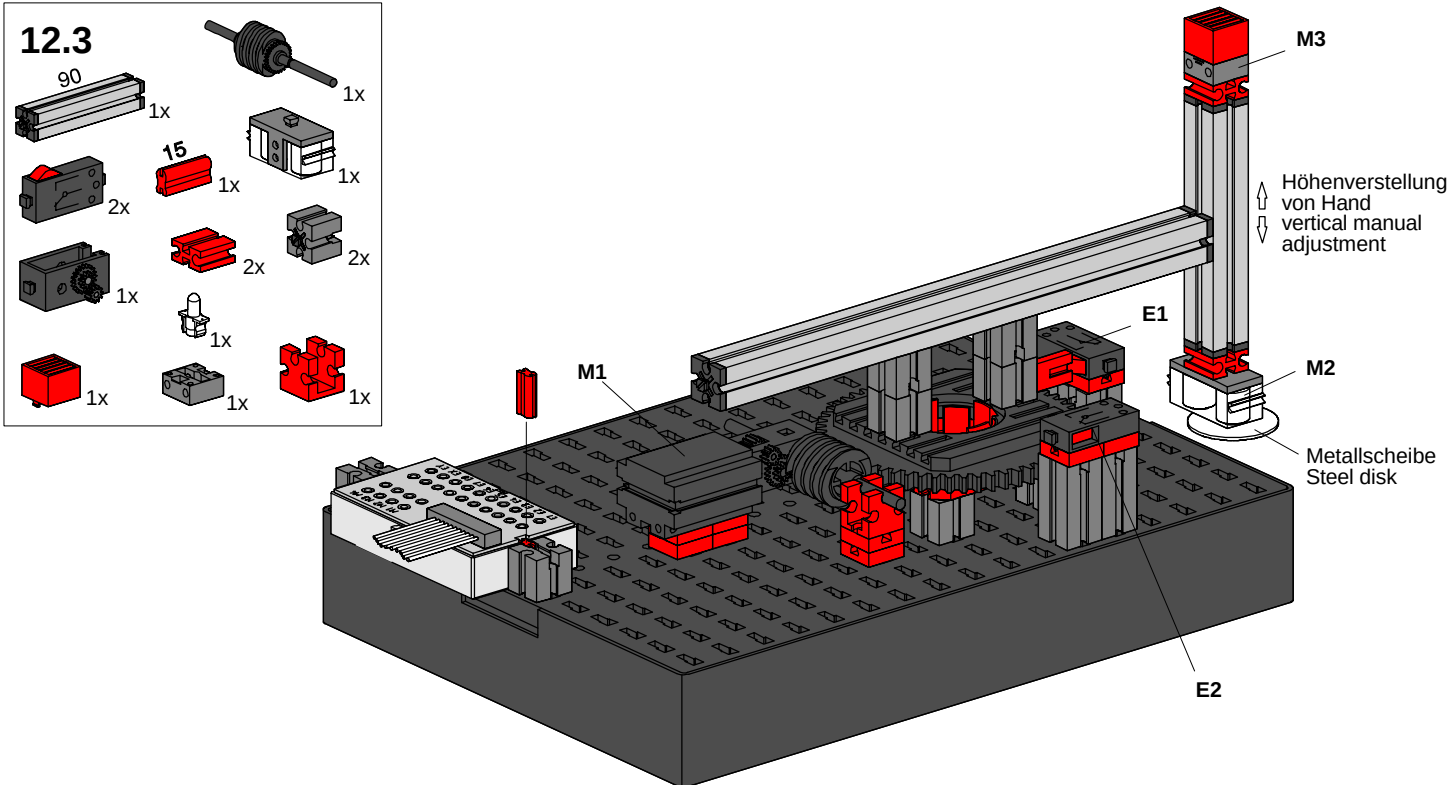
1x

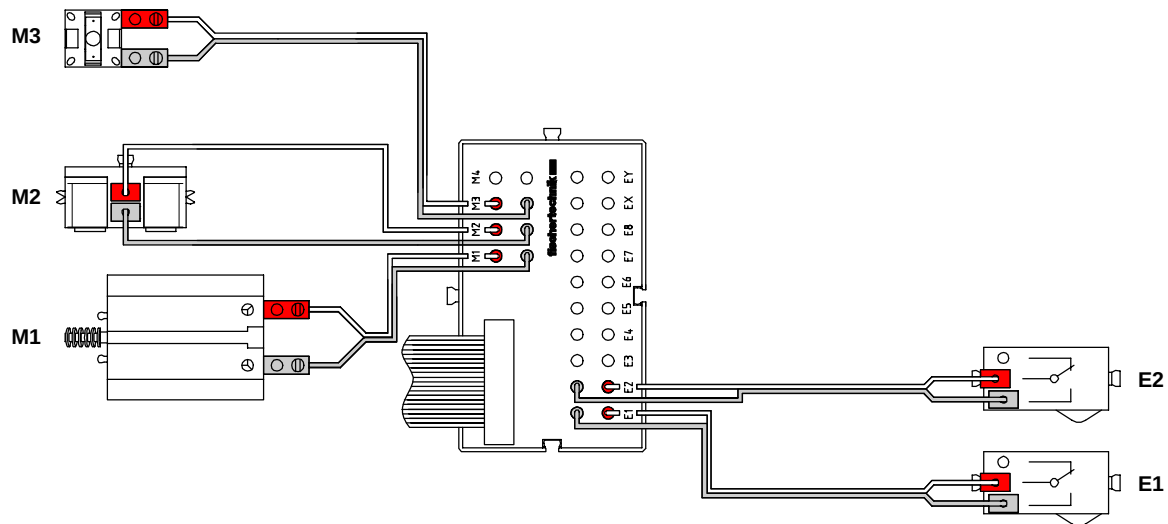


12.3

Parts list for step 12.3:

- 1x 90 (Grey Technic Beam)
- 1x (Black and Grey Technic Axle with a Grooved Wheel)
- 1x (White 3x4 Technic Plate)
- 1x 15 (Red Technic Beam)
- 2x (Grey 3x4 Technic Plate with a Red Top Piece)
- 1x (Grey 3x4 Technic Plate with a Gear)
- 2x (Red 3x4 Technic Plate)
- 2x (Grey 3x4 Technic Plate with a Pin)
- 1x (White Pin)
- 1x (Red 3x4 Technic Plate)
- 1x (Grey 3x4 Technic Plate)

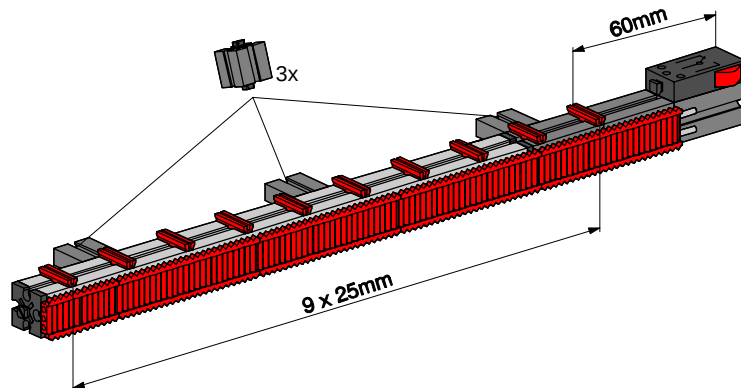
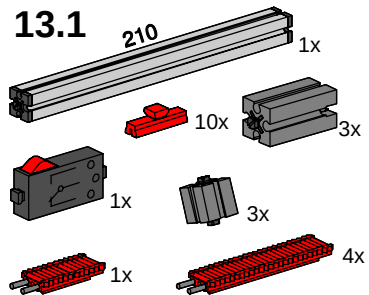




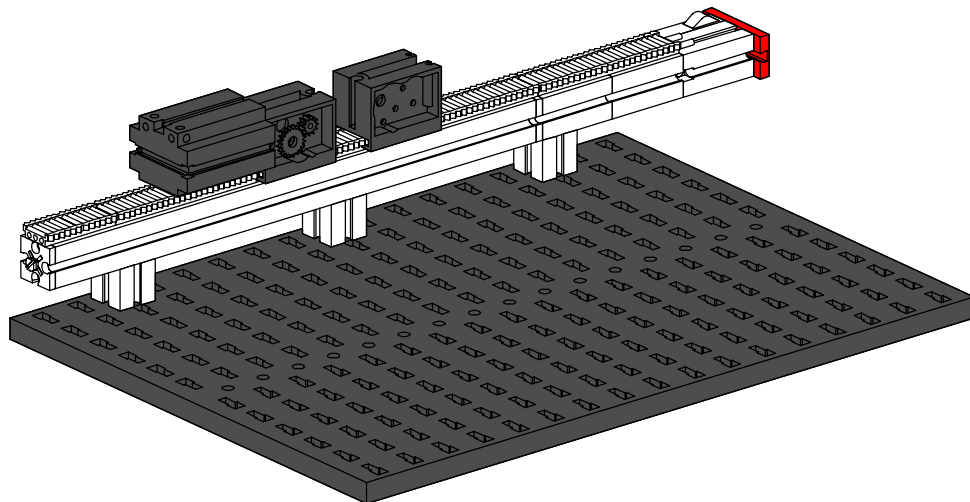
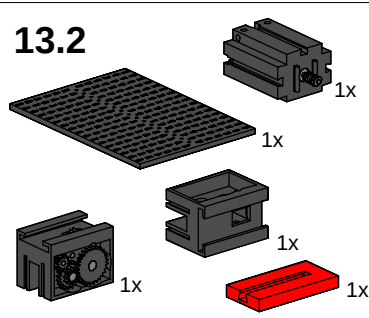
13

Lagersteuerung Storage control

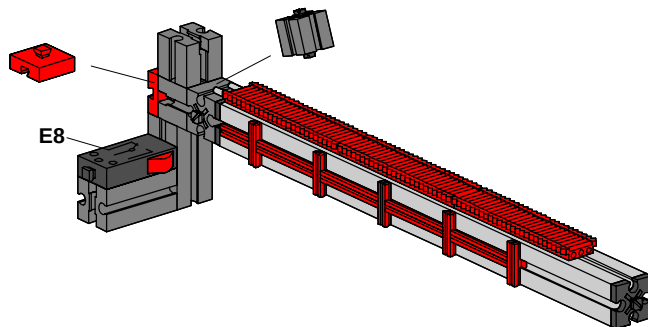
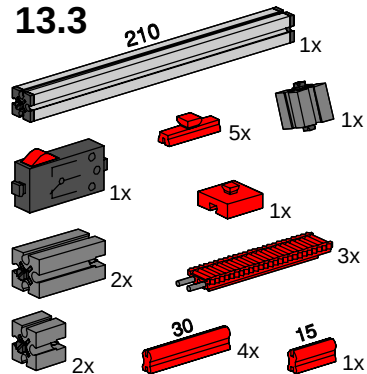
13.1



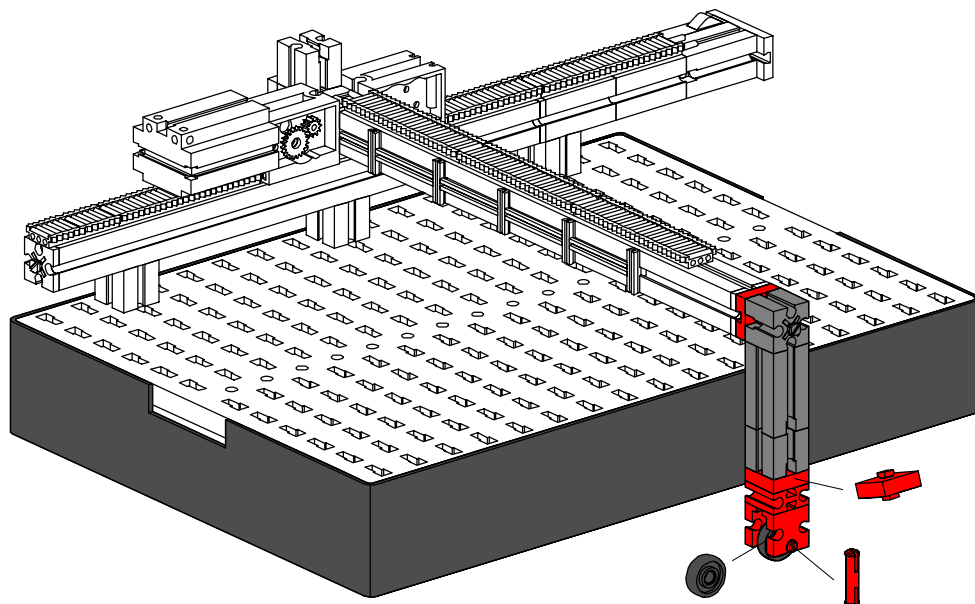
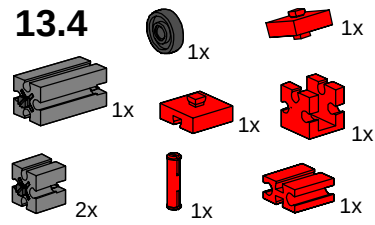
13.2



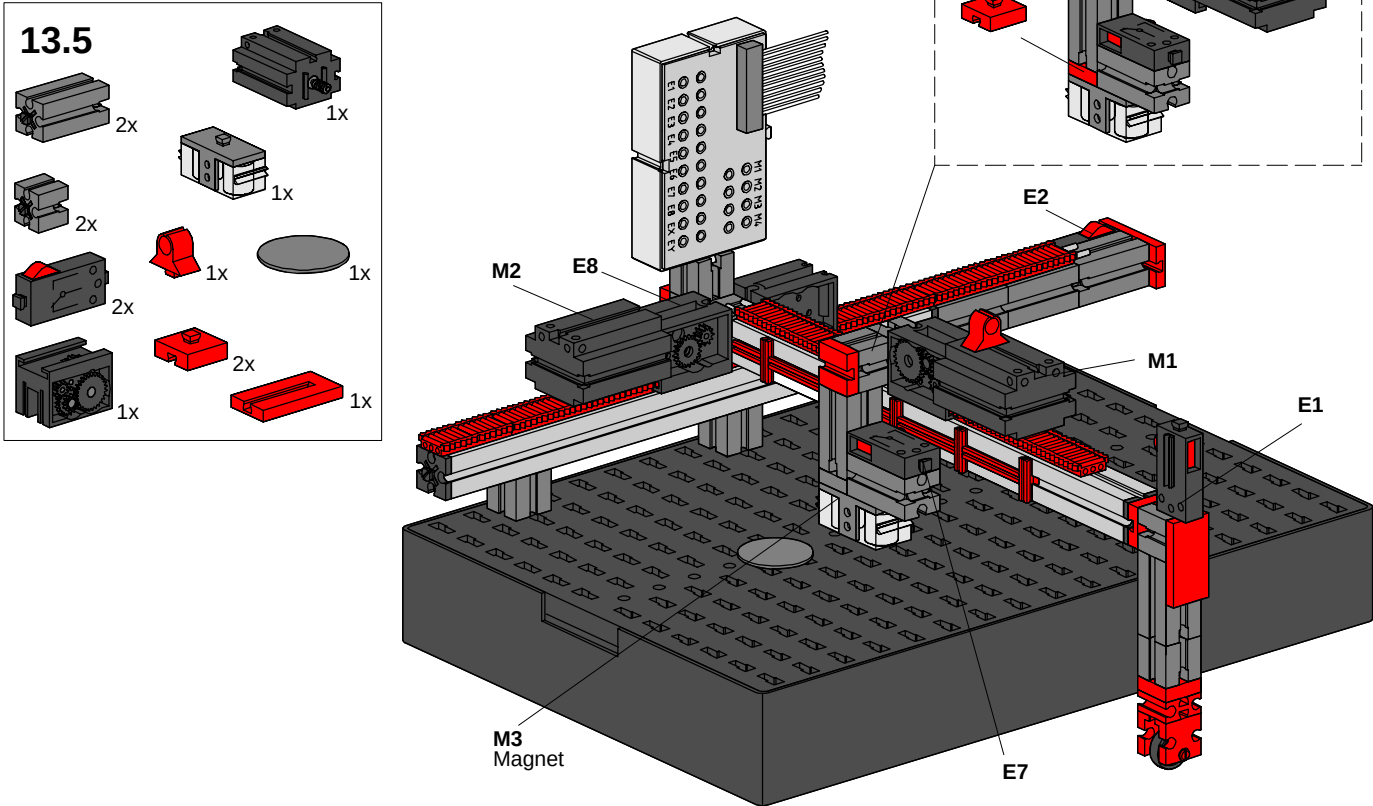
13.3

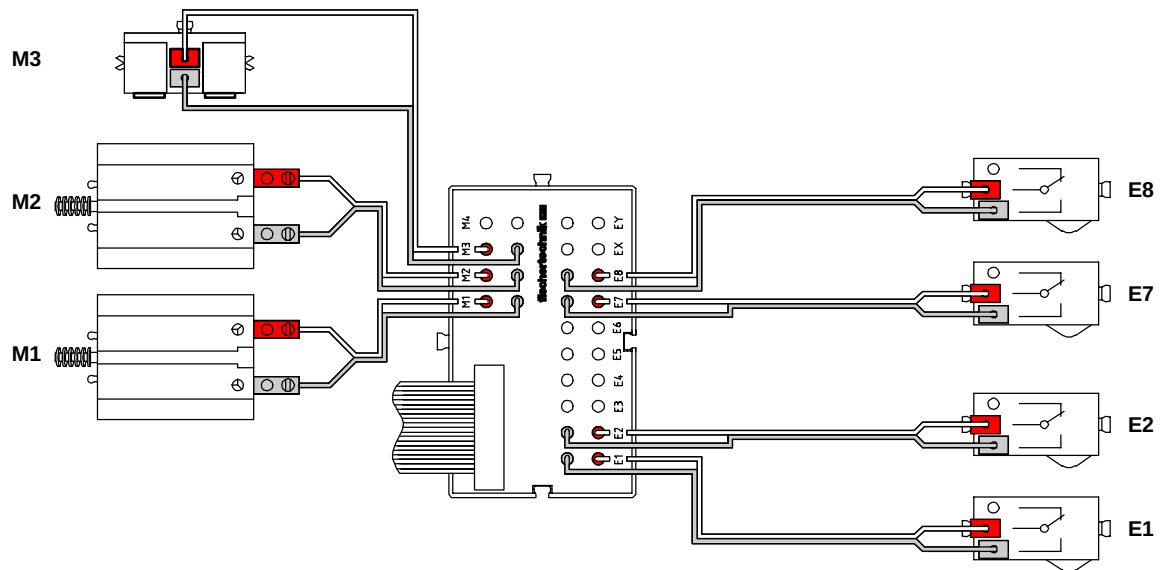


13.4



13

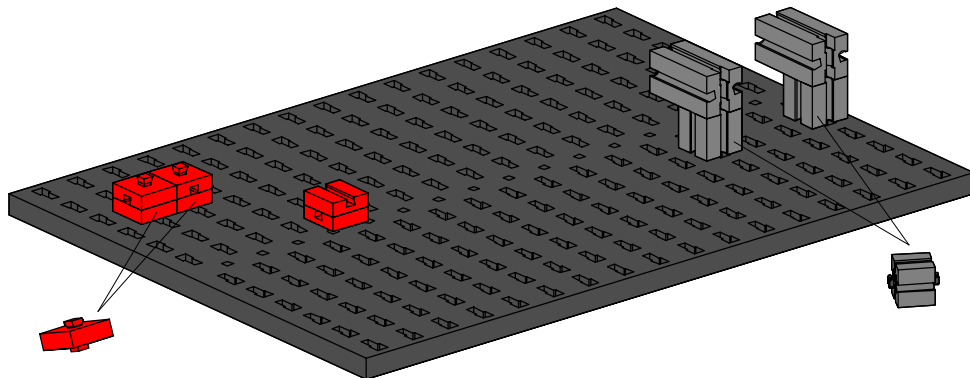
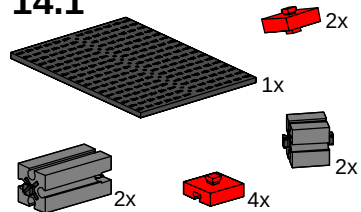
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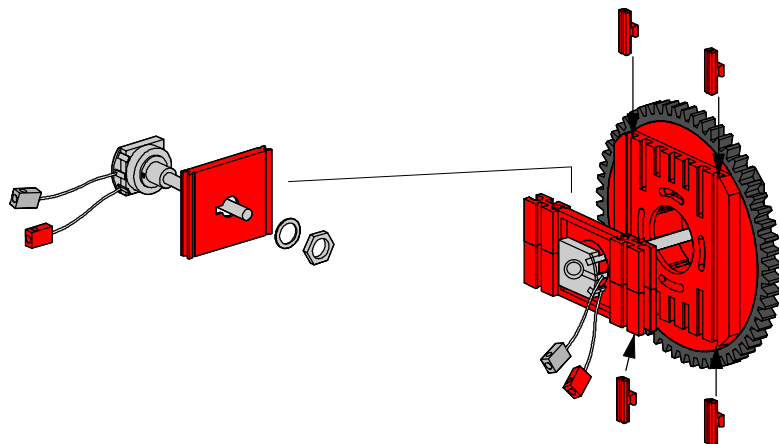
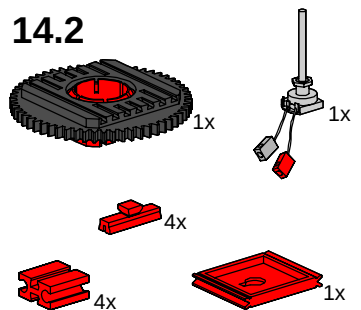
14

Antennenrotor Aerialrotor

14.1

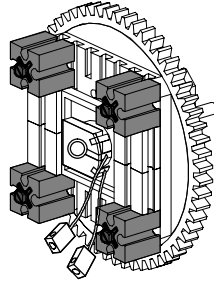
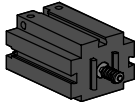
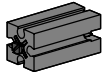


14.2

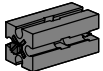


14.3

 4x

[illegible]

1x



1x



1x

15

1x

0

1x

0

11



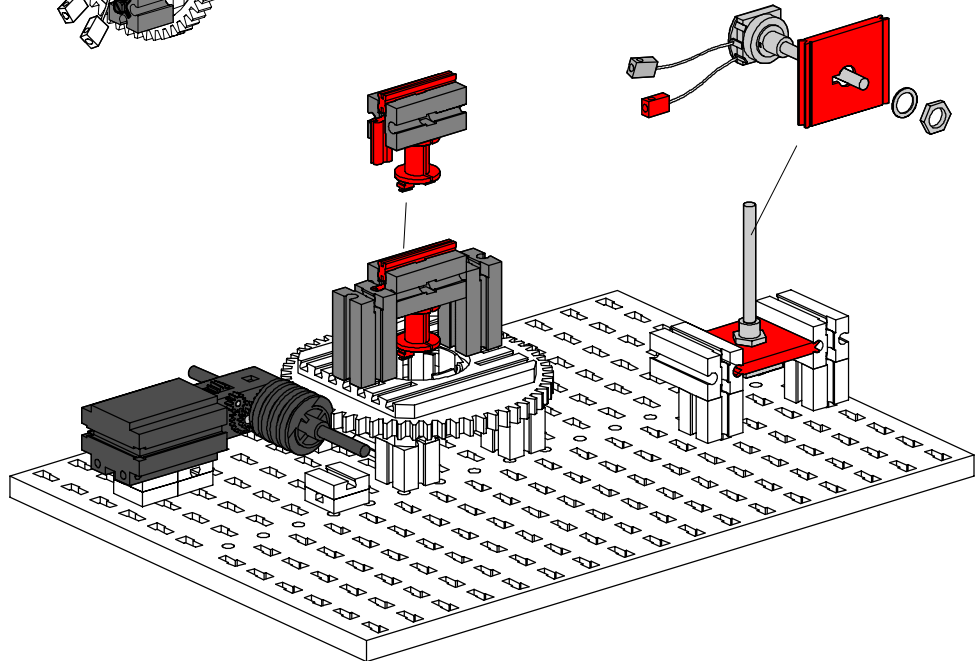
1x

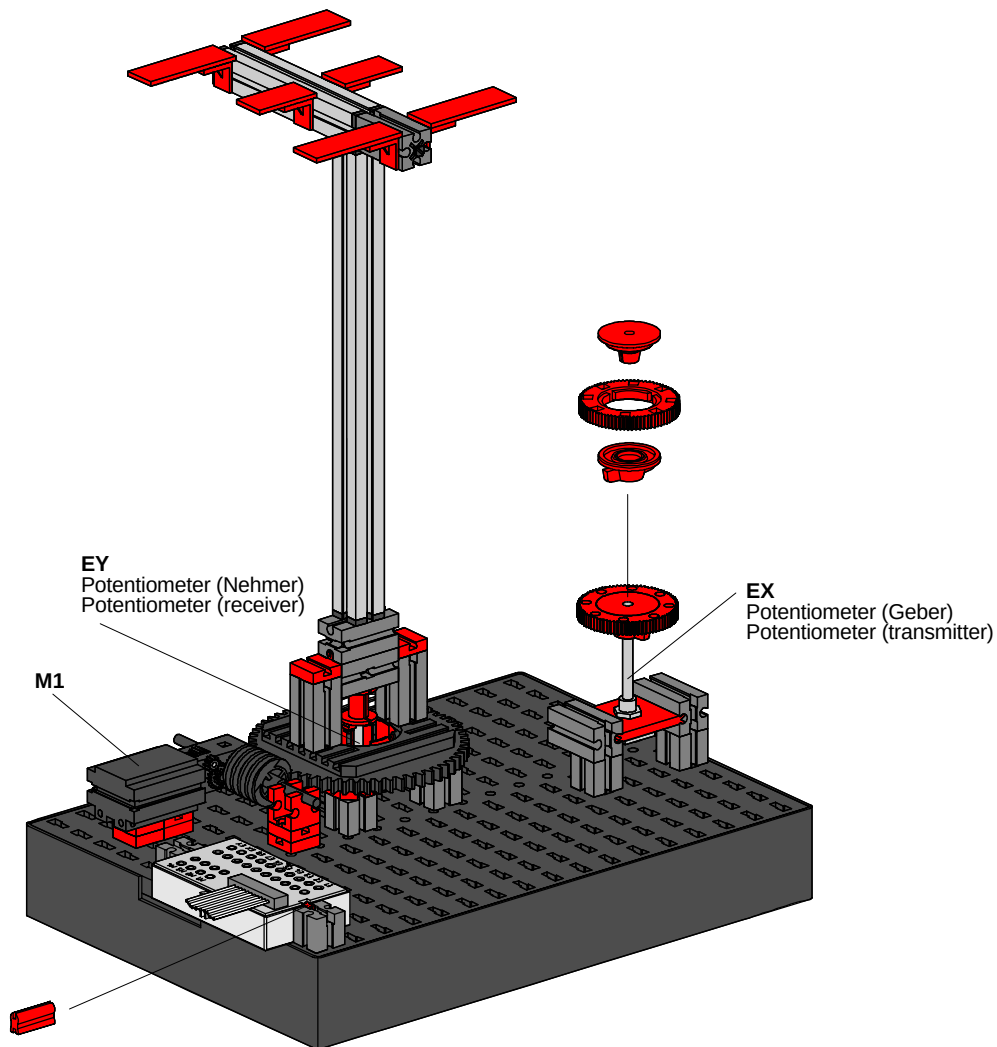
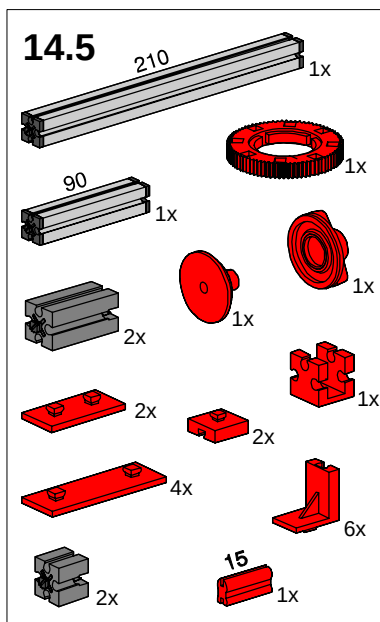


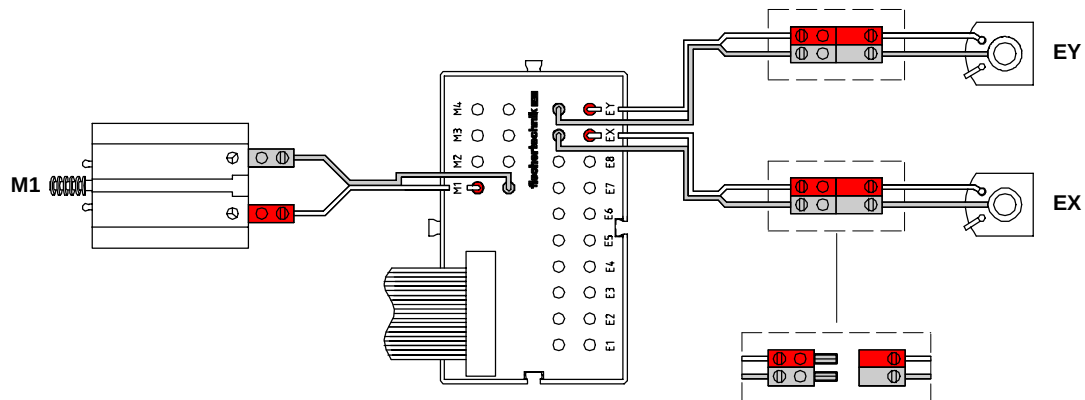
1x

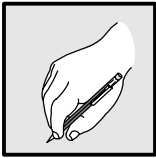


1







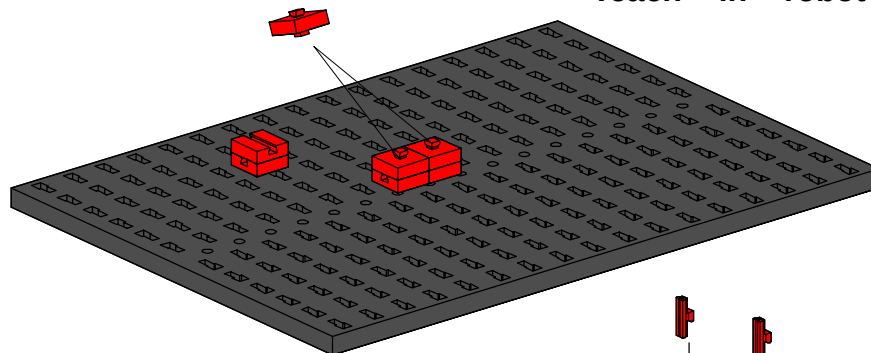
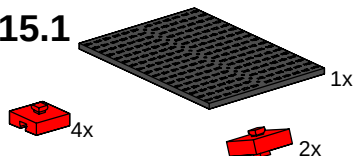


Notizen Notes

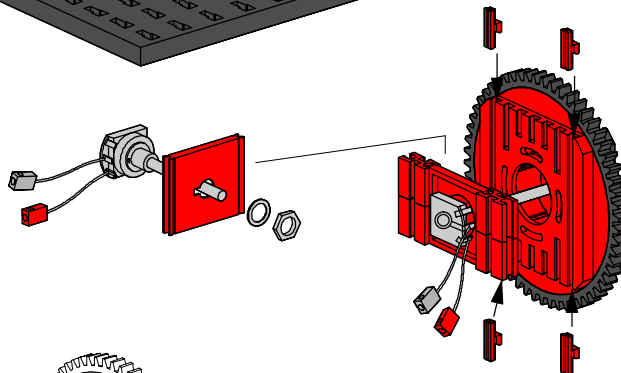
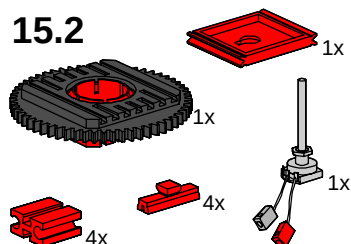
Teach – in – Roboter

Teach – in – robot

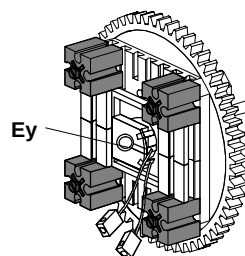
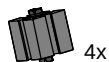
15.1



15.2



15.3



15

15.4



2x

1x

1x

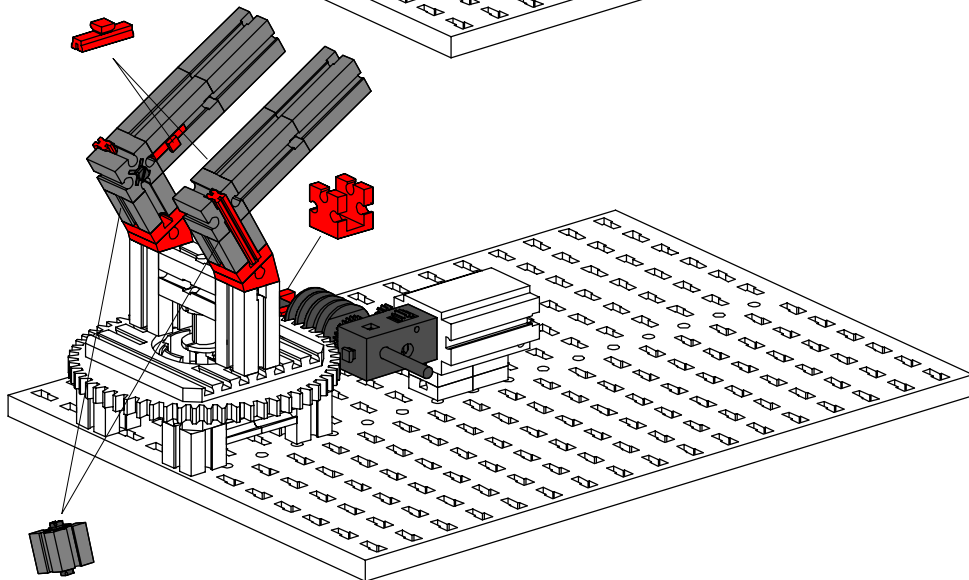
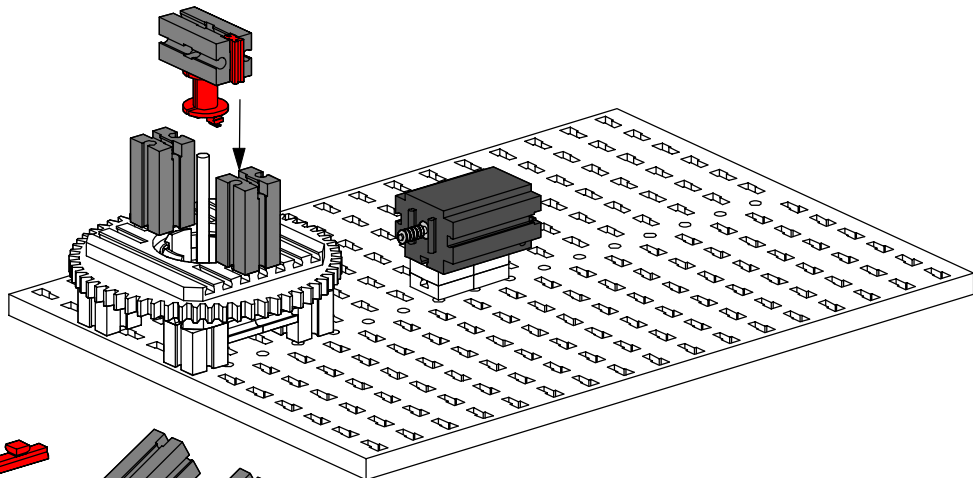
15 1x

1x

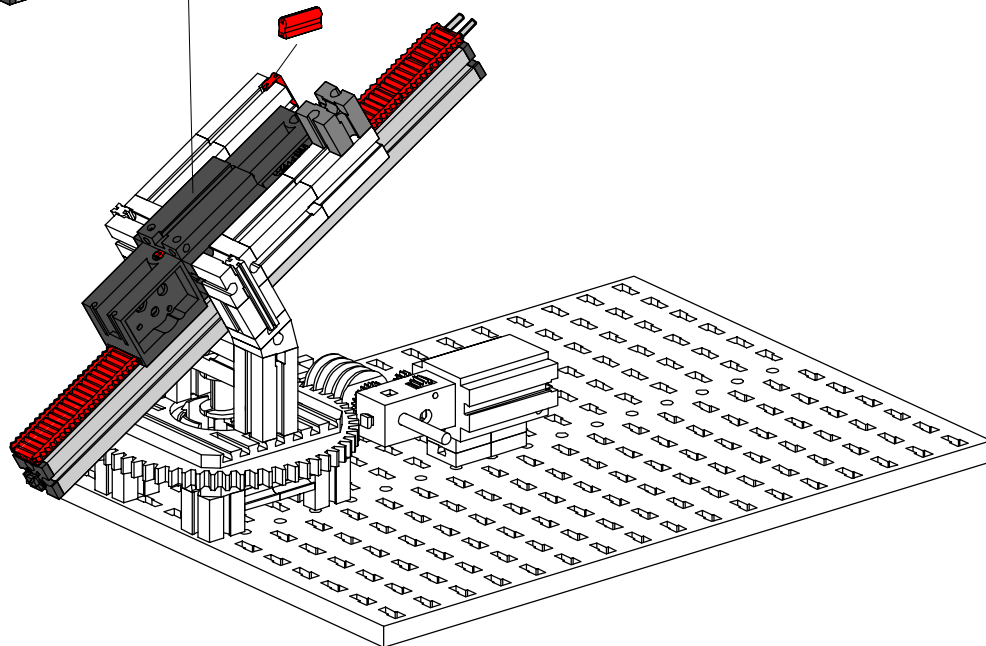
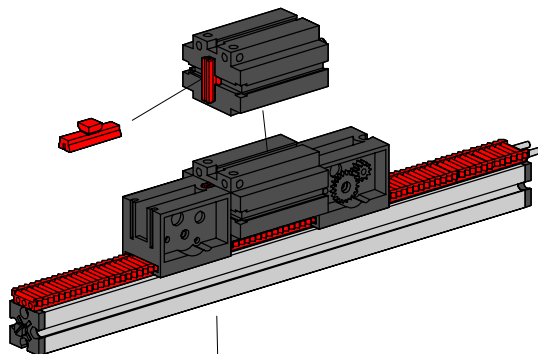
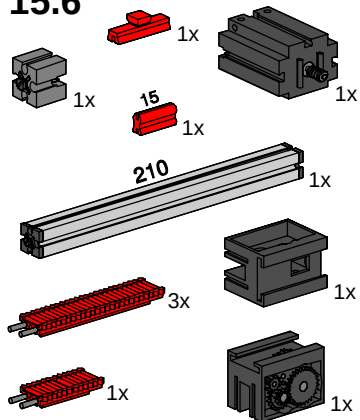
15.5

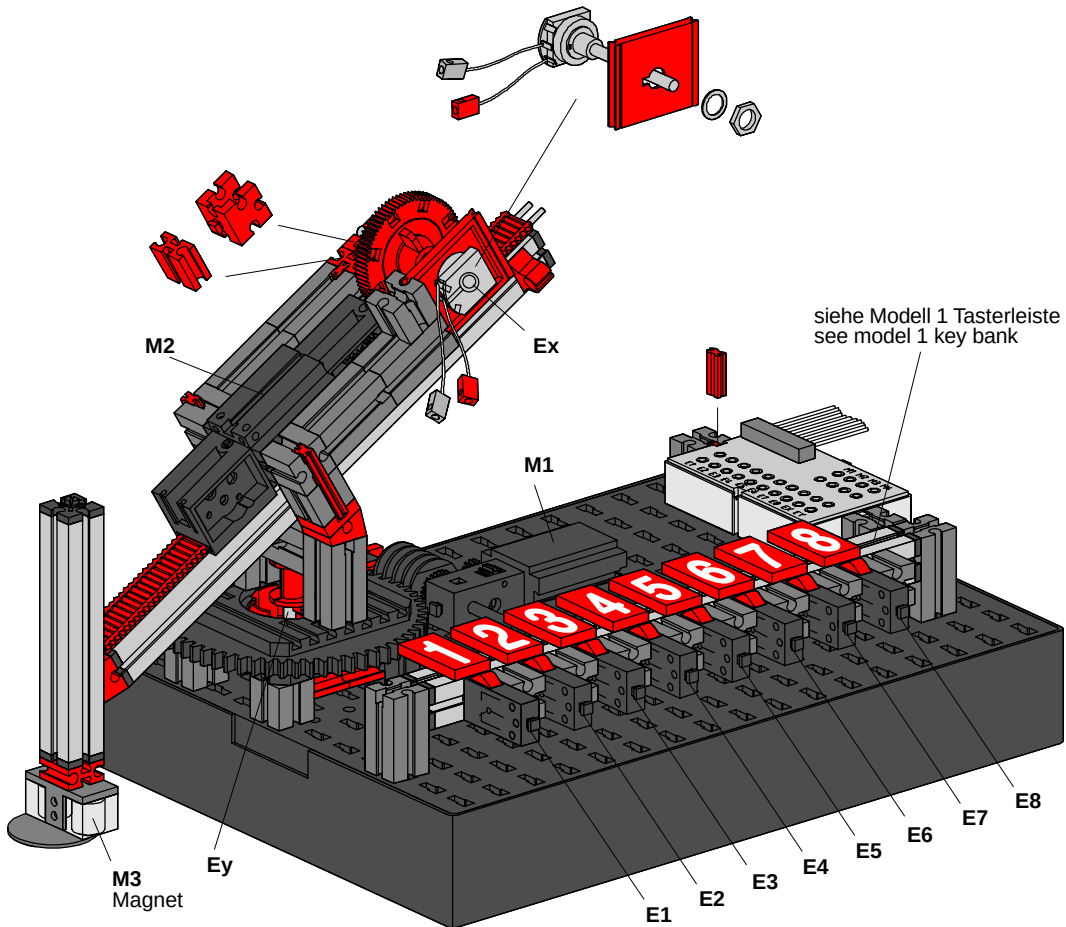
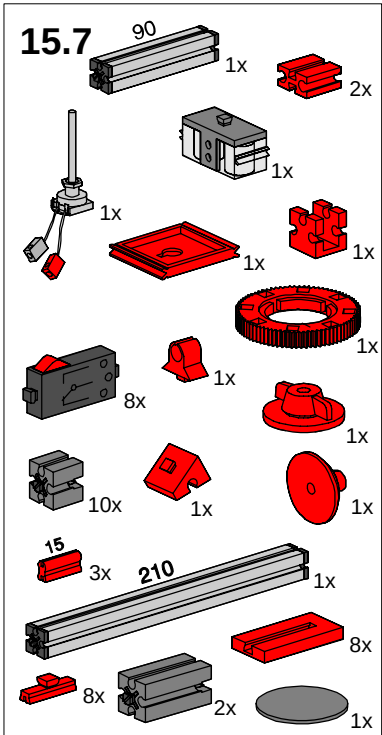
Parts list for step 15.5:

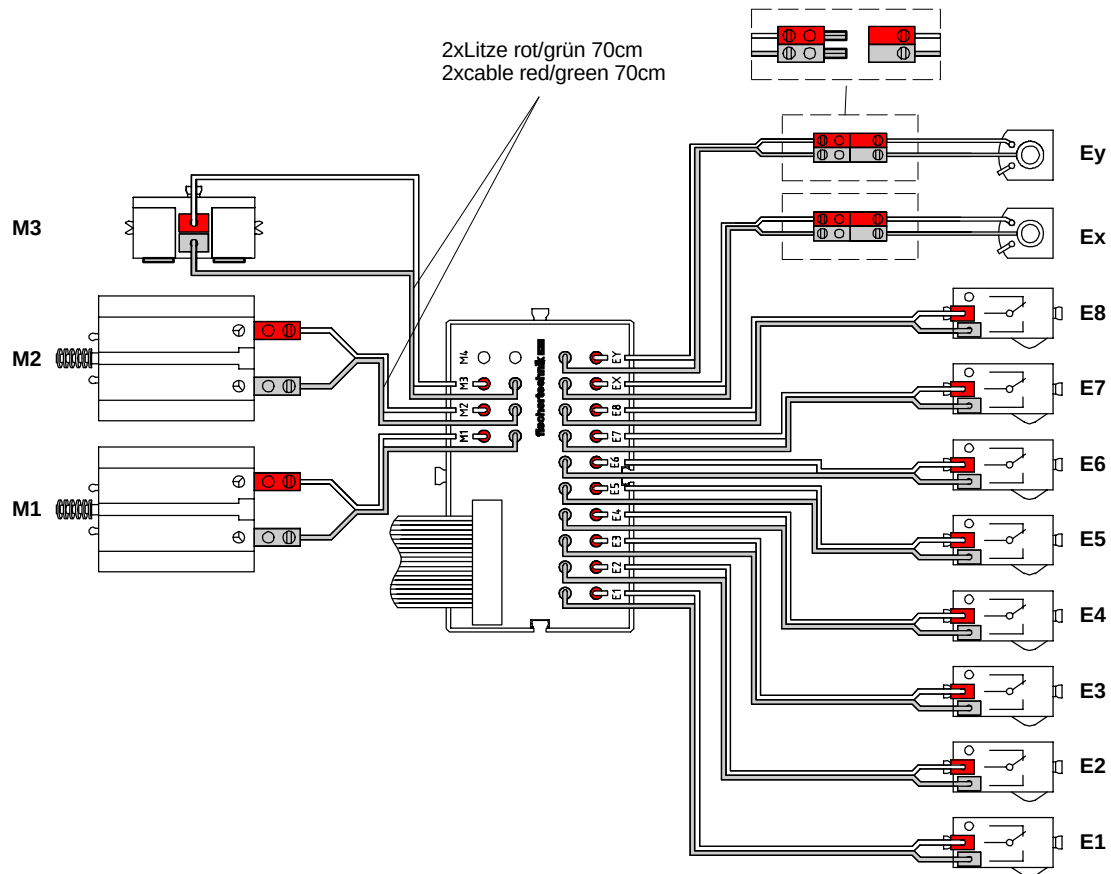
- Grey L-shaped beam: 4x
- Grey 2x4 Technic beam: 1x
- Grey 2x2 Technic connector: 2x
- Grey 2x2 Technic pin: 2x
- Grey 2x2 Technic axle with bush: 1x
- Red 2x2 Technic connector: 2x
- Red 2x2 Technic pin: 2x
- Red 2x2 Technic axle with bush: 2x
- Red 2x2 Technic axle with bush (labeled 30): 2x
- Red 2x2 Technic axle with bush: 1x



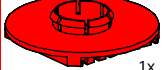
15.6

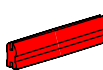
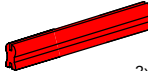


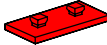




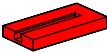
Stückliste Parts list	Best.-Nr. Order No.	Bezeichnung Specification
 13x	60179 (31003)	Baustein 30 Building block 30
 1x	60187 (31004)	Baustein 30 mit Bohrung Building block 30 with bore
 1x	65570 (35001)	Stein 30 ohne Zapfen Buildin block without peg
 13x	60195 (31005)	Baustein 15 Building block 15
 6x	60209 (31006)	Baustein 15 mit 2 Zapfen Double ended block
 1x	67378 (32322)	Baustein 15 mit Ansenkung Buildin block 15 with counterbase
 3x	60845 (31011)	Winkelstein 30° Angle block 30°
 9x	63585 (37237)	Baustein 5 Building block 5
 2x	68145 (37238)	Baustein 5 mit 2 Zapfen Building block 5 with 2 pins

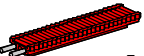
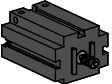
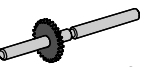
Stückliste Parts list	Best.-Nr. Order No.	Bezeichnung Specification
 6x	61876 (37468)	Baustein 7,5 Building block 7,5
 6x	64247 (38423)	Winkelstein 10x15x15 Angle block 10x15x15
 1x	64751 (38309)	Stein 15/60° Block 15/60°
 2x	64484 (31058)	Nabenmutter Hub nut
 1x	64492 (35031)	Flachnabenzange Flat hub chuck
 2x	67726 (32928)	Freilaufnabenzange Freewheel hub chuck
 2x	64697 (35113)	Spannzange Collet chuck
 1x	65006 (31390)	Drehkranz—Oberteil Turntable top
 1x	65103 (31391)	Drehkranz—Unterteil Turntable base

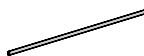
Stückliste Parts list	Best.-Nr. Order No.	Bezeichnung Specification
 4x	60250 (31023)	Klemmbuchse 10 Clip 10
 5x	60969 (31060)	Verbindungsstück 15 Link 15
 4x	60977 (31061)	Verbindungsstück 30 Link 30
 2x	61094 (31330)	Verbindungsstück 45 Link 45
 15x	64743 (31982)	Federnocken Spring cam
 1x	67157 (31124)	Aufnahmeachse Holding axle
 2x	63208 (31016)	Seiltrommel Winch drum
 1x	66487 (32085)	Rollenbock Roller block
 2x	61892 (37636)	Rollenlager Roller bearing

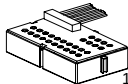
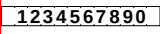
Stückliste Parts list	Best.-Nr. Order No.	Bezeichnung Specification
 2x	64832 (38241)	Bauplatte 15x30 Mounting plate 15x30
 4x	64182 (38242)	Bauplatte 15x45 Mounting plate 15x45
 5x	64840 (38244)	Bauplatte 15x75 Mounting plate 15x75
 1x	64174 (38245)	Bauplatte 15x90 Mounting plate 15x90
 2x	64824 (38246)	Bauplatte 15x15 Mounting plate 15x15
 2x	64816 (38259)	Bauplatte 30x30 Mounting plate 30x30
 2x	66428 (38249)	Bauplatte 30x60 Mounting plate 30x60
 3x	64158 (38251)	Bauplatte 30x90 Mounting plate 30x90
 1x	67149 (38464)	Bauplatte 15x60 Mounting plate 15x60

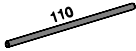
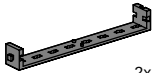
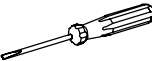
Stückliste Parts list	Best.-Nr. Order No.	Bezeichnung Specification
 2x	64859 (31253)	Flachbuchse grün Flat bustring green
 2x	64867 (31254)	Flachbuchse rot Flat bustring red
 28x	60543 (31336)	Flachstecker grün Flat plug green
 28x	60551 (31337)	Flachstecker rot Flat plug red
 1x	68080 (35079)	Rastleuchtkappe rot Light cap red
 1x	68099 (35085)	Ratleuchtkappe gelb Light cap yellow
 1x	68102 (35084)	Rastleuchtkappe grün Light cap green
 2x	61078 (31321)	Leuchtkappe für Linsenlampe Louninous cap for lenstype lamp
 2x	61809 (36532)	Störlichtkappe Ø6 Masking light cap Ø6

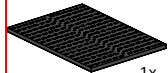
Stückliste Parts list	Best.-Nr. Order No.	Bezeichnung Specification
 1x	63275 (37604)	Störlichtkappe Ø8 Masking light cap Ø8
 3x	61922 (37869)	Kugelstecklampe Ball lamp
 2x	61930 (37875)	Linsenstecklampe Lens plug-in bulb
 4x	63534 (38217)	Leuchtstein mit Steckfassung Plug in light holder
 2x	68129 (36134)	Fototransistor in gelbem Sockel Fototransistor in yellow sockel
 1x	67394 (36387)	Heißeleiter Heat sensitive resistor
 1x	68463 (36573)	Rad 14 Wheel 14
 6x	65634 (32366)	Bauplatte 15x15 grau Mounting plate 15x15 grey
 8x	67130 (32330)	Bauplatte 15x30x3,75 m. Nut Building plate 15x30x3.75 w. slot

Stückliste Parts list	Best.-Nr. Order No.	Bezeichnung Specification
 2x	68412 (37272)	Hub-Getriebe Mini-motor rack
 1x	68404 (37271)	Hubgetriebegehäuse Rack without gear
 7x	64794 (37351)	Hub-Zahnstange 60 Rack and pinion 60
 1x	64808 (37457)	Hub-Zahnstange 30 Rack and pinion 30
 2x	68420 (32293)	S-Motor 6-9V=
 2x	68439 (31078)	U-Getriebe mini Mini mot gear box
 8x	68447 (37783)	Mini-Taster Mini-switch
 2x	67173 (31063)	U-Achse 60 mit Zahnrad Z28 Mini mot axle 60
 1x	68471 (32886)	Schneckenantrieb Worm drive

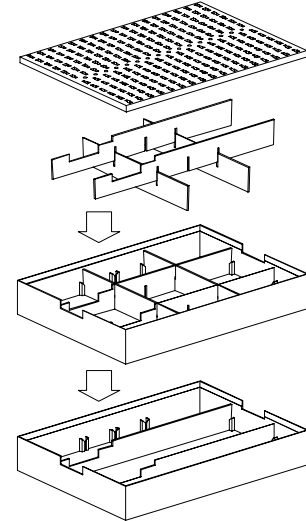
Stückliste Parts list	Best.-Nr. Order No.	Bezeichnung Specification
 2x	64700 (35112)	Ritzel Z10 Cog wheel Z10
 1x	60853 (31021)	Zahnrad Z 20 Gear wheel Z20
 2x	63186 (31019)	Drehscheibe 60 Large pulley 60
 2x	63224 (31022)	Zahnrad Z40/32 Gear wheel Z40/32
 1x	64760 (35404)	V-Achse 4x17 V-axle 4x17
 1x	68455 (38415)	K-Achse 50 Plastic axle 50
 1x	61388 (35696)	Achse 170 Axle 170
 1x	65359 (31221)	Alu-Profil 90 Aluminium strut 90
 2x	65375 (31226)	Alu-Profil 210 Aluminium strut 210

Stückliste Parts list	Best.-Nr. Order No.	Bezeichnung Specification
 1x	65081 (32117)	Drehschalter Ober- teil Upper part of rotary switch
 3x	68153 (35969)	Reed-Kontakthalter Holder for reed contact
 2x	65065 (32235)	Potentiometer Potentiometer
 2x	65073 (32116)	Flachstein 30 mit Bohrung Flat block 30 with bore
 2x	67165 (35678)	O-Ring 54x3 O-Ring 54x3
 1x	68498 (36778)	Flachbandkabel 50cm Rainbow cable 50cm
 1x	68617 (36391)	Verteilerbox mit Kabel Distributing box with cable
 1x	68684 (36216)	Zahlenaufkleber Sticker with numbers
	68625 (36779)	Litze 2-adrig, 5m rot/grün Twin lace 5m red/green

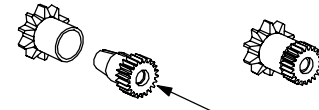
Stückliste Parts list	Best.-Nr. Order No.	Bezeichnung Specification
 1x	60861 (31031)	Achse 110 Axle 110
 1x	68668 (31424)	Gelenkwürfel-Klaue Hinged block claw
 1x	68676 (31425)	Gelenkwürfel-Zunge Hinged block tab
 2x	65758 (31597)	Abstandsring Spacer ring
 1x	65650 (31983)	Hülse 15 Sleeve 15
 1x	64212 (37679)	Klemmbuchse 5 Clip 5
 2x	65596 (32064)	Baustein 15 mit Bohrung Building block 15 with bore
 2x	61523 (36305)	Flachträger 120 Flat girder 120
 1x	64735 (36443)	Schraubendreher Screw driver

Stückliste Parts list	Best.-Nr. Order No.	Bezeichnung Specification
 1x	68633 (36558)	Luftschraube Propeller
 1x	68641 (37681)	Adapterspitze Pointed adapter
 1x	66550 (32363)	Elektromagnet Electromagnet
 1x	64930 (32123)	Scheibe Ø 25 Disc Ø 25
 1x	68064 (32985)	Experimentierplatte Base plate

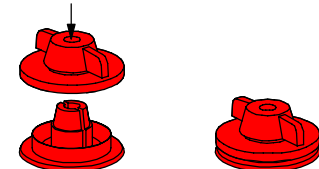
Aufbau der Sortierwanne Setup of storage device

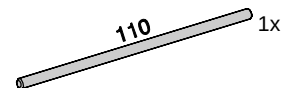
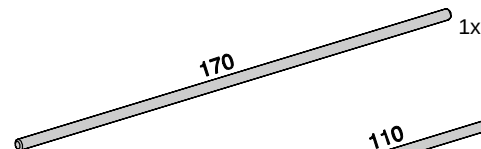
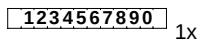
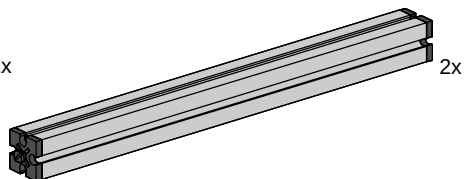
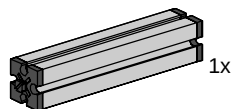
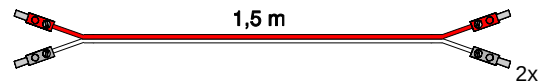
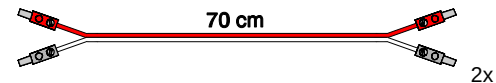
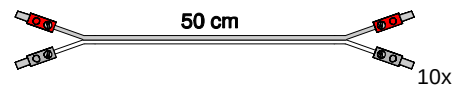
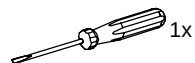
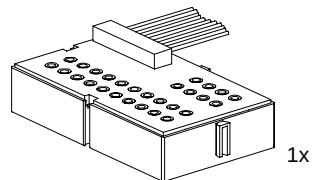
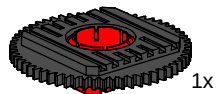
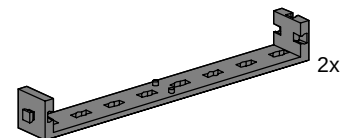
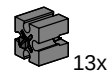
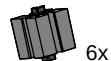
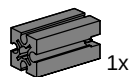
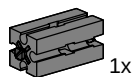
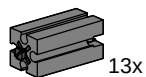


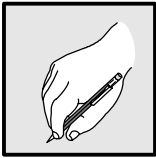
Ritzel und Spannzange Cog wheel and collet chuck



Nabenmutter und Nabenzange Hub nut and hub chuck







Notizen

Notes

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