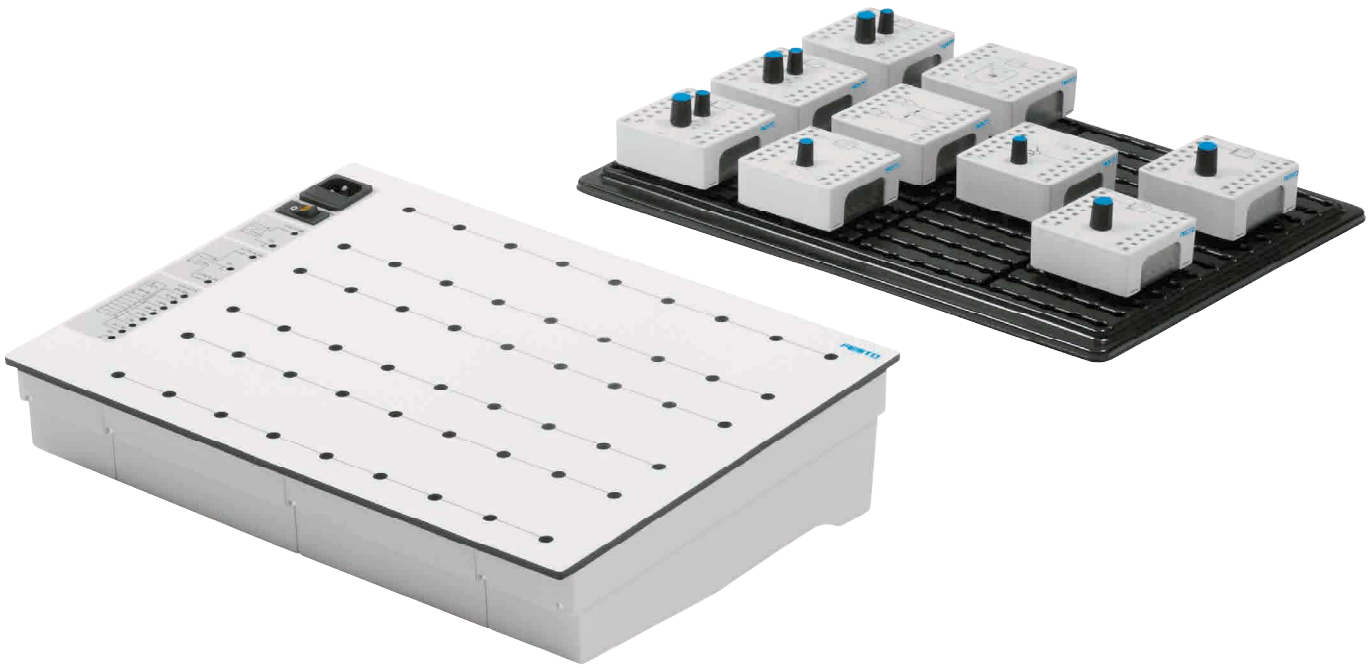
Basic Principles of Control Technology

TP 1013



Control technology explained simply and comprehensibly

The training package Basic Principles of Control Technology provides a fast and easy-to-understand introduction to the topic of controllers and controlled systems.

The basic terminology of control technology, the behavior of various controllers and the structured analysis of requirements for controlled systems are particularly important here.

Ways and means of analyzing and solving control problems are shown and looked at in depth through experiments during the projects.

The equipment set permits fast and flexible construction of different controllers and thus allows simple inspections of behavior based on the interaction with controlled systems of different types.

All parts of the equipment set are completely equipped with safety plug connections. The Combiboard Digital and Control Technology EduTrainer contained in the equipment set provides the required supply voltages for all tests and also contains a square-wave generator with 7 different output frequencies. This Combiboard EduTrainer is also used in the training package Basic Principles of Digital Technology.

Components included
- 1x 2 differential inputs with subtracter
- 1x P element
- 1x I element
- 1x D element
- 1x summer with adjustable offset
- 1x limiter with level adaptation of the output signals
- 1x comparator with hysteresis and switching output
- 2x controlled system

Training content
- Structure of a control circuit
- Step response, dynamic behavior
- Standardizing physical variables
- Bode diagram
- Modeling a controlled system
- Positive and negative feedback
- Two and three-point controller
- P, I and PID controllers
- Stable and unstable behavior
- Controller gain
- Delay behavior according to Ziegler and Nichols

Complete equipment set TP 1013	**8023964**

The most important components at a glance:

1	1x Combiboard Digital and control technology EduTrainer	8023962
2	1x Set of components for control technology	8023963

Necessary accessories, also order:

IEC power cable (→ page 28)
2 mm Safety laboratory cables (→ page 91)
Digital storage oscilloscope (→ page 33)

Possibilities of expansion:

Set of Components for Digital Technology (→ page 19)		574193
3	Application Module Level Control	8133444
4	Application Module Speed Control	8152965
5	Application Module Linear Position Control	8133202
6	Application Module Light and Temperature Control	8155732

Optional application modules enable learners to explore typical industrial applications within a closed-loop system:

3 **Application Module Level Control**
With a control signal of ±10 volts, the application module behaves like a typical level curve and returns a control voltage. The level is displayed by means of a row of LEDs.

Order no.	8133444

4 **Application Module Speed Control**
The module consists of 2 units. On the first unit, there is a DC electric motor. The motor is coupled to a tachometer, which outputs the rotational speed as a voltage signal. The voltage signal is used for feedback in a closed control loop. On the second unit a generator serves as a load. A lamp activated via a switch loads the generator, changing its behavior.

Order no.	8152965

5 **Application Module Linear Position Control**
The module controls a positioning unit depending on the control signals from the components of the equipment set TP 1013. The module returns a voltage value as a control variable. The closed control loop behaves like a typical industrial application.

Order no.	8133202

6 **Application Module Light and Temperature Control**
A halogen lamp generates light and heat in a tunnel. Two sensors detect the light intensity and the temperature. A fan and a flap allow the air flow in the tunnel to change and thus also the temperature behavior of the application module.

Order no.	8155732

1



2



3



4



5



6



Recommended Learning Material

Workbooks (→ page 162)



Campus license:

de	8023436
en	8023437
es	8023438
fr	8023439

Note: The campus license includes the PDF version of sample solutions, educational instructions, and worksheets for learners.

Courses on Festo LX

- → Basic Principles of Closed-Loop Control Technology
- → Level Control System
- → Speed Control System
- → Llght and Temperature Control System