RT 050
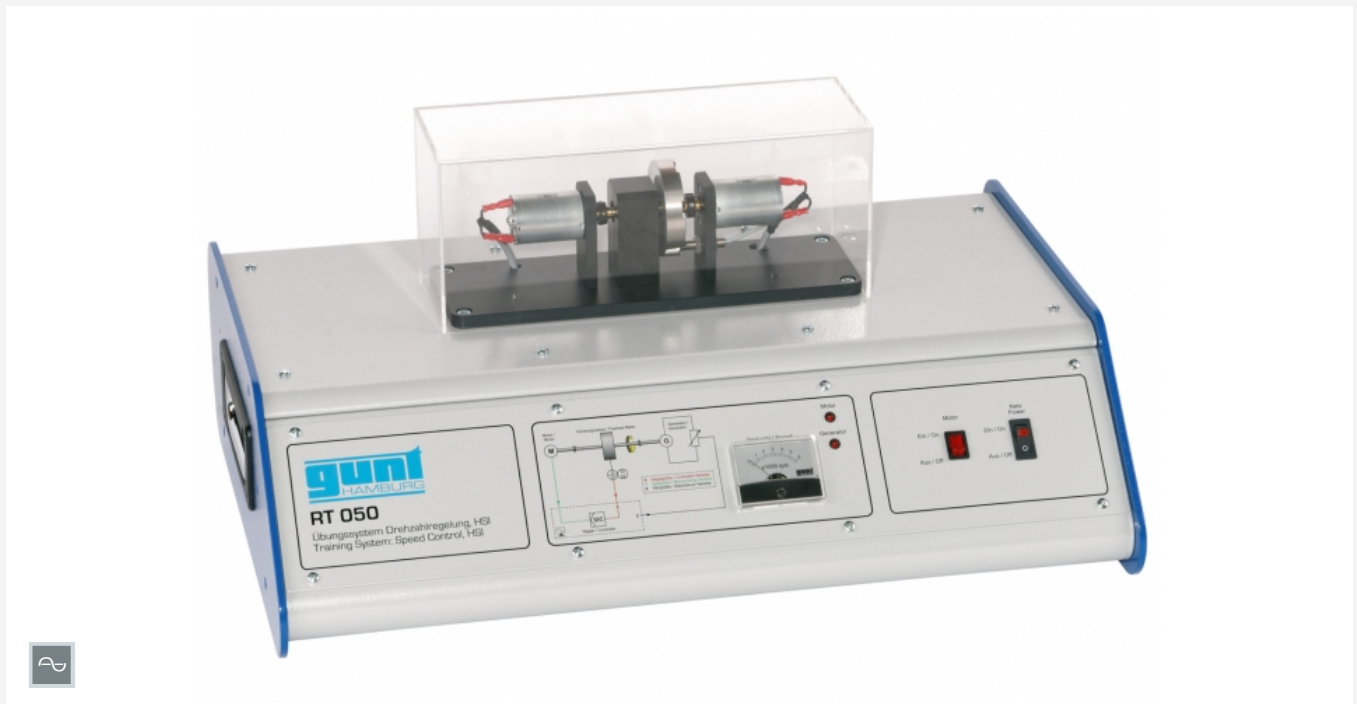## Training system: speed control, HSI

Description

- **experimental unit with speed control system**
- **extensive range of experiments on fundamentals of control engineering**
- **state-of-the-art software for all experimental units of the RT 010 – RT 060 series, with extensive controller and recorder functions**
- **software-based simulation of the controlled system**

This compact experimental unit offers every opportunity to learn the fundamentals of control engineering through experimentation on a speed control system.

The experimental setup is mounted on a housing which accommodates all the electronics. A transparent protective cover permits safe observation of the experiments. A DC motor drives a shaft with a mass flywheel. The dial gauge allows the speed to be read off directly at any time. The speed is measured inductively using a speed sensor. The output signal from the sensor is sent to the software controller. The output signal from the controller influences the motor current. A generator acting as a mechanical resistance to shaft rotation can be activated by the software to study the influence of disturbance variables.

The powerful state-of-the-art software is an integral part of the training system, embodying the principle of hardware/software integration (HSI). It enables the experiments to be conducted and evaluated in a user-friendly manner. The software has network capability. The link between the experimental unit and the PC is made via a USB port.

Learning objectives/experiments

- fundamentals of control engineering based on the example of a speed control system with PT_1 behaviour
- open loop control response
- effects of different controller parameters and methods on the response of the closed loop system
- recording of step responses
  - ▶ reference variable
  - ▶ disturbance variable
- controller optimisation
- software-based controlled system simulation
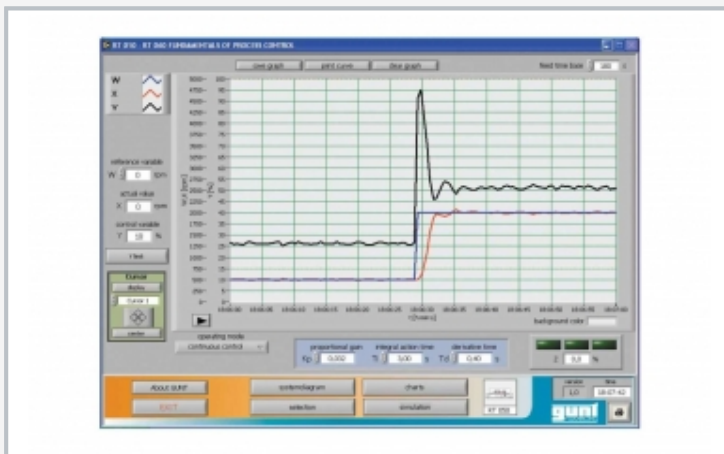 - ▶ comparison of different controlled system parameters

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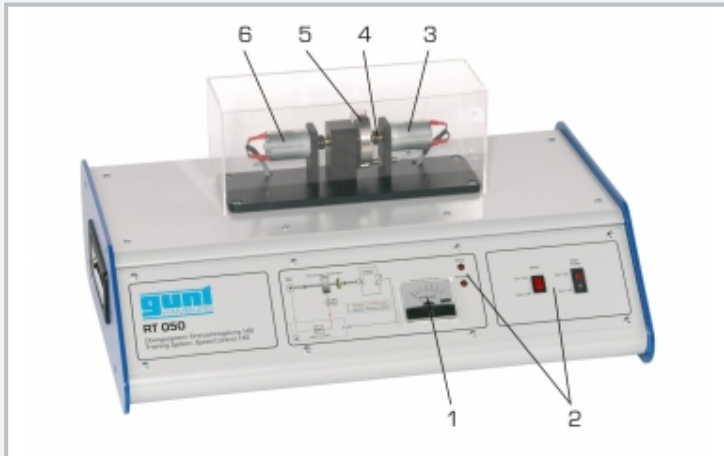
1 tachometer, 2 displays and controls, 3 generator, 4 speed sensor, 5 rotor, 6 motor
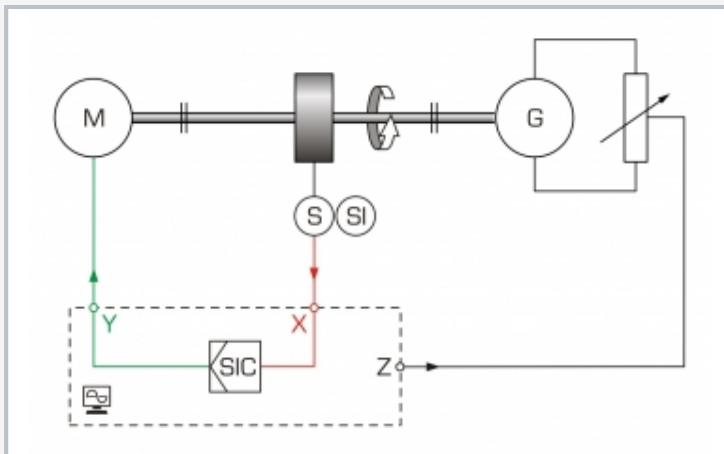
Process schematic

Software screenshot: step response to change in reference variable with PID controller (acceptable control quality)

Specification

[1] experimental unit for control engineering experiments
[2] speed control of a DC motor with shaft and flywheel
[3] transparent protective cover for motor/generator set
[4] inductive speed sensor
[5] generation of disturbance variables by adjustable generator load
[6] software-based controlled system simulation
[7] process schematic on front panel
[8] networkable GUNT software
[9] GUNT software with control functions and data acquisition via USB under Windows 7, 8.1, 10

Technical data

Motor
- max. speed: 4500min^{-1}
- max. motor power output: 10W
- max. torque: 1,7Ncm

Generator
- max. speed: 4500min^{-1}
- max. power output: 10W
- max. torque: 1,7Ncm

Tachometer (analogue): 0...6000min^{-1}

Software controller configurable as P, PI and PID controller

Software
- process schematic with controller type selection (manual, continuous controller, programmer)
- time functions
- simulation function
- disturbance variable input

230V, 50Hz, 1 phase
230V, 60Hz, 1 phase
120V, 60Hz, 1 phase
UL/CSA optional
LxWxH: 600x450x310mm
Weight: approx. 18kg

Scope of delivery

1 experimental unit
1 GUNT software CD + USB cable
1 handbook: fundamentals of control engineering (RT 010 – RT 060)
1 manual for RT 050

G.U.N.T. Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Telefon (040) 67 08 54-0, Fax (040) 67 08 54-42, Email sales@gunt.de, Web www.gunt.de
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Optional accessories

020.30009	WP 300.09	Laboratory trolley