

RT 522

Flow control trainer



Learning objectives/experiments

- fundamentals of control engineering
- real industrial control engineering components: controllers, transducers, actuators
- operation and parameterisation of the local industrial controller
 - ▶ manually (by keyboard)
 - ▶ using the RT 650.50 process control software
- investigation of disturbance and control response
- controller optimisation
- investigation of the properties of the open and closed control loops
- processing of process variables using external equipment, e.g. oscilloscope or plotter

- together with accessory RT 650.50 and other trainers (RT 512, RT 532 – RT 552): familiarisation with and use of process control software (SCADA)

Description

- **experimental introduction to control engineering using an example of flow control**
- **construction of the system with components commonly used in industry**
- **digital controller with freely selectable parameters: P, I, D and all combinations**
- **integrated 2-channel line recorder**
- **optional process control software RT 650.50 available**
- **construction of a complete networked system via Profibus interface possible**

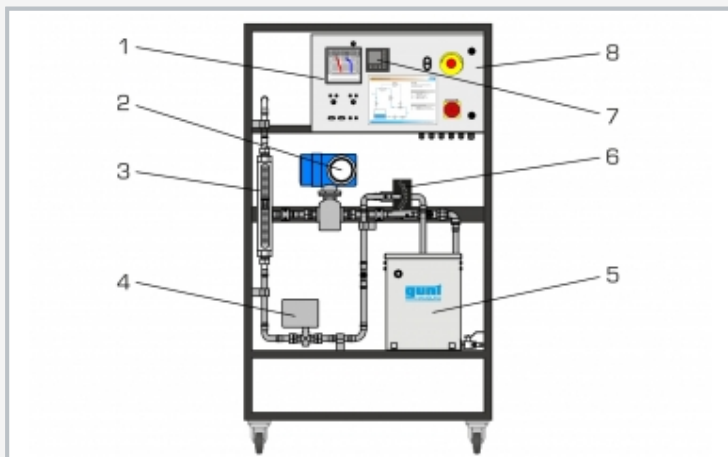
This trainer provides a comprehensive experimental introduction to the fundamentals of control engineering using an example of flow control.

A pump delivers water from a storage tank through a piping system. The flow rate is measured by an electromagnetic sensor, which permits further processing of the measured value by outputting a standardised current signal. A rotameter indicates the flow rate. The controller used is a state-of-the-art digital industrial controller. The actuator in the control loop is a control valve with electric motor operation. A ball valve in the outlet line enables defined disturbance variables to be generated. The controlled variable X and the manipulating variable Y are plotted directly on an integrated 2-channel line recorder. Alternatively, the variables can be tapped as analogue signals at lab jacks on the switch cabinet. This enables external recording equipment, such as an oscilloscope or a flatbed plotter, to be connected.

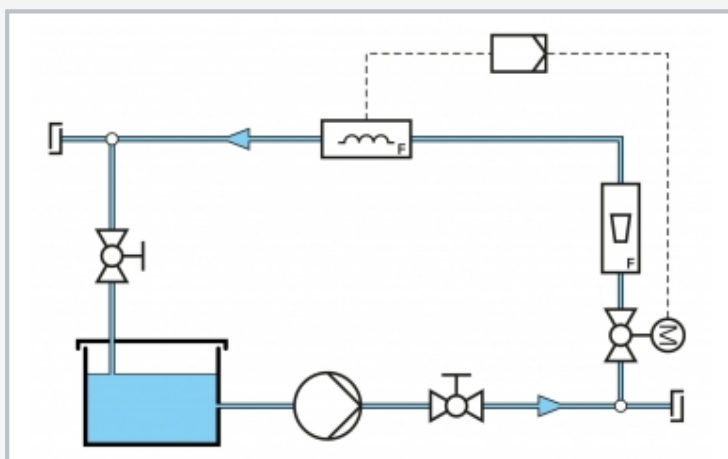
A process control software (RT 650.50) is optionally available. The software permits the construction of a complete networked system comprising multiple trainers from the RT 512 – RT 552 series. The key process variables can also be represented, and control functions executed.

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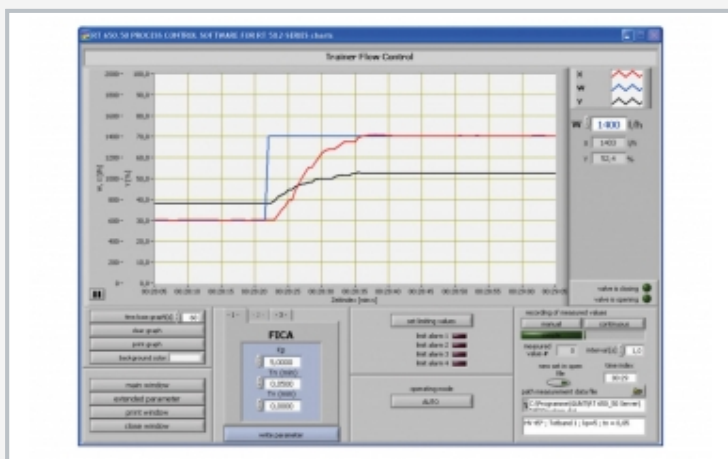
Flow control trainer



1 line recorder, 2 electromagnetic flow rate sensor, 3 rotameter, 4 control valve, 5 storage tank with pump, 6 ball valve with scale, 7 controller, 8 switch cabinet



Process schematic



Screenshot of optional process control software RT 650.50: step response to change in reference variable, PI controller

Specification

- [1] trainer for control engineering experiments
- [2] flow control process, equipped with standard industrial components
- [3] flow rate measurement by electromagnetic sensor
- [4] rotameter for direct observation of the flow rate
- [5] generation of disturbance variables by ball valve with scale in outlet line
- [6] control valve with electric motor
- [7] digital controller, parameterisable as a P, PI or PID controller
- [8] 2-channel line recorder
- [9] process variables X and Y accessible as analogue signals via lab jacks

Technical data

Storage tank: 30L

Centrifugal pump

- power consumption: 250W
- max. flow rate: 150L/min
- max. head: 7m
- speed: 2800min⁻¹

Rotameter: 0...1960L/h

Electromagnetic flow rate sensor: 0...6000L/h

Control valve with electric motor

- Kvs: 5,7m³/h
- stroke: 5mm
- characteristic curve equal-percentage
- valve-opening position sensor: 0...1000Ω

Line recorder

- 2x 4...20mA
- feed rate 0...7200mm/h, stepped

Controller

- process variables X, Y as analogue signals: 4...20mA

230V, 50Hz, 1 phase

230V, 60Hz, 1 phase

120V, 60Hz, 1 phase

UL/CSA optional

LxWxH: 1000x700x1750mm

Weight: approx. 110kg

Scope of delivery

- 1 trainer
- 1 set of cables
- 1 hose
- 1 set of instructional material

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Optional accessories

080.65050 RT 650.50 Process Control Software for RT 512 - RT 552 Series