RT 512
Level 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 522 – RT 552): familiarisation with and use of process control software (SCADA)

Description

- **experimental introduction to control engineering using an example of level 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 level control.

A pump delivers water from a storage tank to the transparent level-controlled tank. The liquid level is measured by a pressure transducer installed at the base of the level-controlled tank. The controller used is a state-of-the-art digital industrial controller. The actuator in the control loop is a pneumatically operated control valve with an electro-pneumatic positioner. 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.
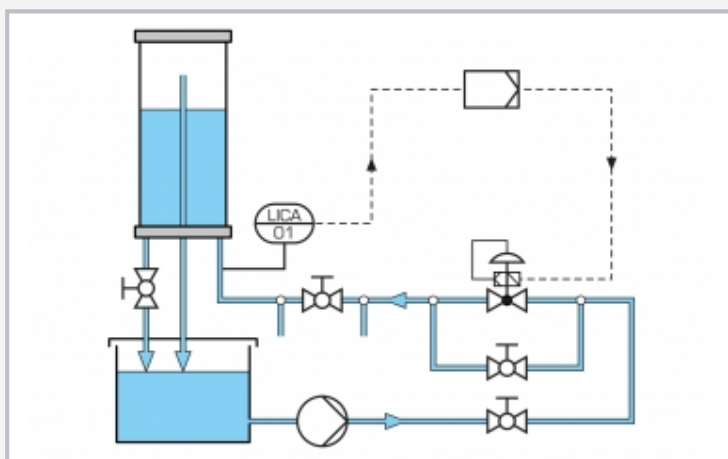
A process control software (RT 650.50) is optionally available. The software permits the construction of a complete networked system comprising multiple trainers from the RT 512 – RT 552 series. The key process variables can also be represented, and control functions executed.
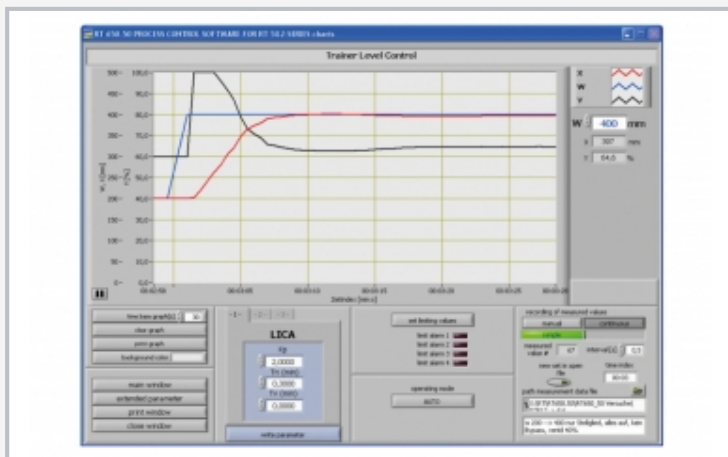
RT 512
Level control trainer
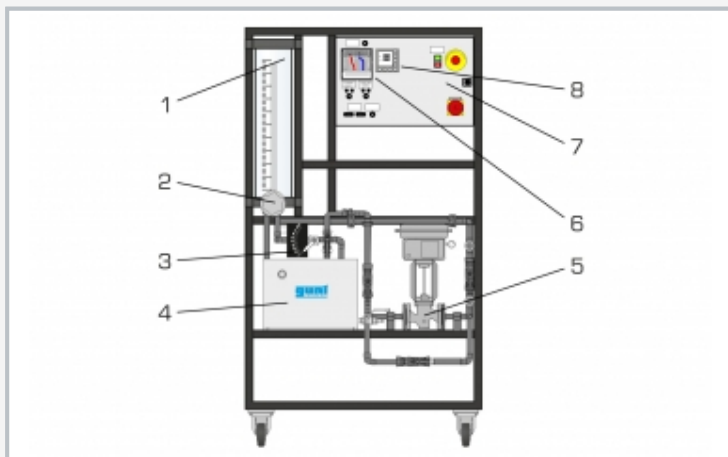
1 transparent level-controlled tank, 2 pressure sensor, 3 ball valve with scale, 4 storage tank with pump, 5 pneumatic control valve, 6 line recorder, 7 switch cabinet, 8 controller

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] level control process, equipped with standard industrial components
[3] level measurement by pressure sensor
[4] generation of disturbance variables by ball valve with scale in outlet
[5] transparent level-controlled tank with overflow and graduated scale
[6] pneumatically operated control valve with electro-pneumatic positioner
[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}

Level-controlled tank
■ max. 7L
■ level: 0...0,6m
Pressure sensor: 0...100mbar
Pneumatically operated control valve DN 20
■ Kvs: 4,0m^3/h
■ reference variable: 4...20mA
■ nominal stroke: 15mm
■ characteristic curve equal-percentage

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. 124kg

Required for operation

compressed air: 3...8bar

Scope of delivery

1 trainer
1 set of cables
1 set of hoses
1 set of instructional material

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

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

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