

RT 010

Training system: level control, HSI



Learning objectives/experiments

- fundamentals of control engineering based on the example of a level control system with integral control action
- open loop control response
- investigation of a controlled system without feedback
- 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

Description

- experimental unit with clear level 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

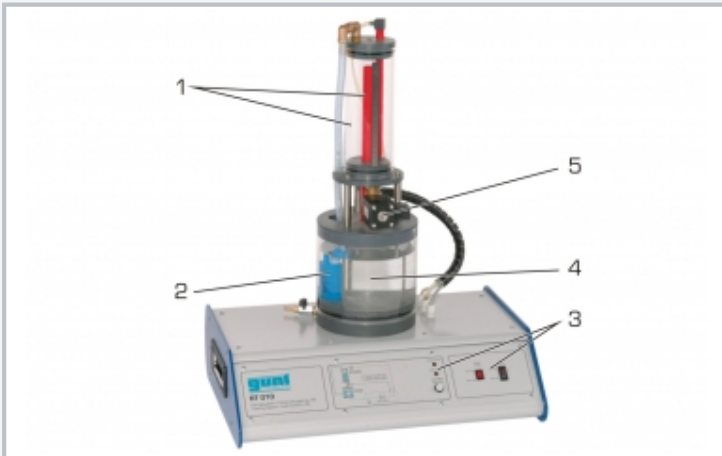
This compact experimental unit offers every opportunity to learn the fundamentals of control engineering through experimentation on a level control system.

The experimental setup is mounted in a housing which also accommodates all the electronics. The transparent level-controlled tank is fed from the storage tank with the aid of a speed-controlled pump. The liquid level is measured using a pressure sensor. The sensor output signal is sent to the software controller. The controller's output signal influences the speed of the pump motor and therefore delivery flow rate. To investigate the influence of disturbance variables, an electromagnetic proportional valve in the tank outlet can be activated by the software.

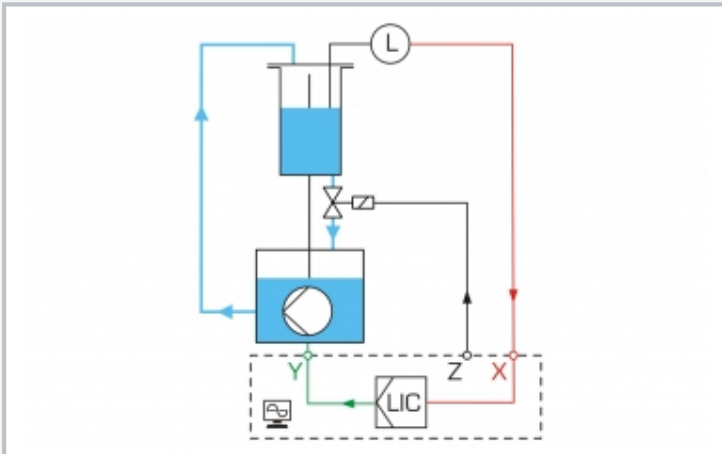
The powerful state-of-the-art software is an integral part of the training system, embodying the principle of hardware/software integration (HSI). It enables the experiments to be conducted and evaluated in a user-friendly manner. The software has network capability. The link between the experimental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

RT 010

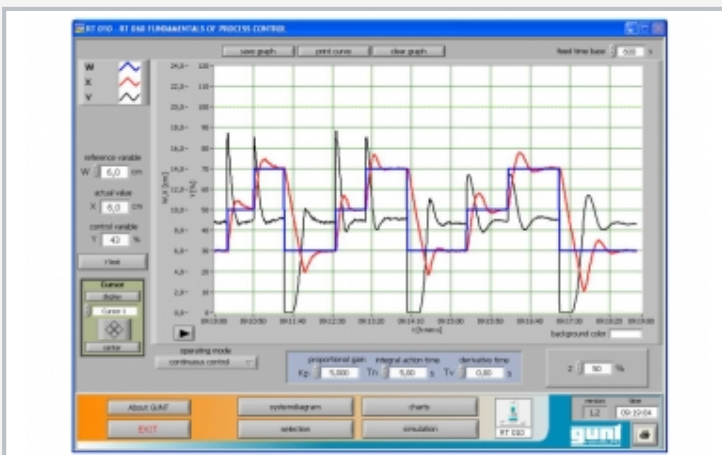
Training system: level control, HSI



1 level-controlled tank with overflow, 2 pump, 3 displays and controls, 4 storage tank, 5 proportional valve



Process schematic



Software screenshot: PI control of level control system: step response to change in reference variable with different values for K_p and T_n

Specification

- [1] experimental unit for control engineering experiments
- [2] level control process with transparent tank
- [3] speed-controlled pump
- [4] level measurement by pressure sensor
- [5] disturbance variables generated by electromagnetic proportional valve in tank outlet
- [6] tank with overflow and graduated scale
- [7] software-based controlled system simulation
- [8] process schematic on front panel
- [9] networkable GUNT software
- [10] GUNT software with control functions and data acquisition via USB under Windows 7, 8.1, 10

Technical data

Level-controlled tank

- capacity: 1200mL

Storage tank

- capacity: 3700mL

Pump

- power consumption: 18W
- max. flow rate: 8L/min
- max. head: 6m

Proportional valve: Kvs: 0,7m³/h

Pressure sensor: 0...30mbar (0...300mm)

Software controller configurable as P, PI, PID and switching controller

Software

- process schematic with controller type selection (manual, continuous controller, two- or three-point 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: 600x450x800mm

Weight: approx. 22kg

Scope of delivery

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

RT 010

Training system: level control, HSI

Optional accessories

020.30009

WP 300.09

Laboratory trolley