

RT 030

Training system: pressure control, HSI



Description

- experimental unit with diaphragm gas pump and pressure tank
- 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 pressure control system.

The experimental setup is mounted on a housing which accommodates all the electronics. The pressure tank is charged with compressed air by a diaphragm gas pump. The advantage of the dial-gauge manometer is that the pressure in the tank can be observed directly

at any time. The pressure is measured using a pressure sensor. The sensor output signal is sent to the software controller. The output signal from the controller influences the speed of the diaphragm gas pump and hence the flow rate. An air consumer is simulated by way of a flow control valve. A solenoid valve through which air can escape can be activated by the software to investigate the influence of disturbance variables.

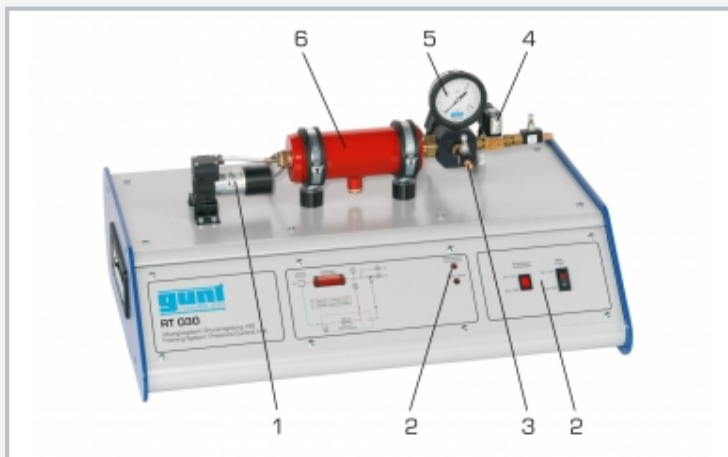
The powerful state-of-the-art software is an integral part of the training system, embodying the principle of hardware/software integration (HSI). It enables the experiments to be conducted and evaluated in a user-friendly manner. The software has network capability. The link between the experimental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

Learning objectives/experiments

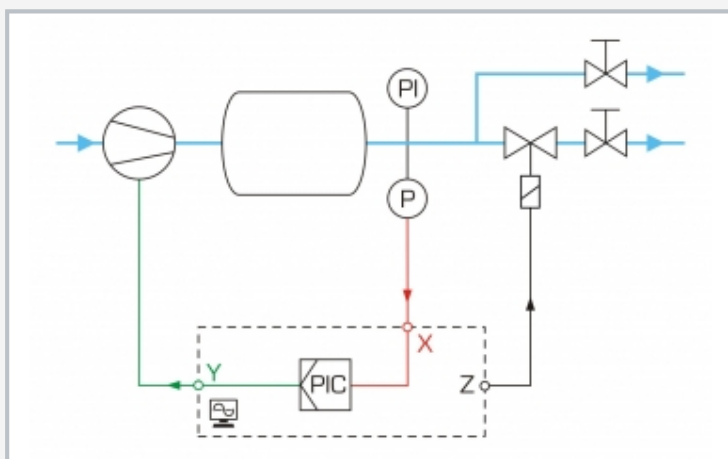
- fundamentals of control engineering based on the example of a pressure control system with PT_1 behaviour
- open loop control response
- effects of different controller parameters and methods on the response of the closed loop system
- recording of step responses
 - ▶ reference variable
 - ▶ disturbance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

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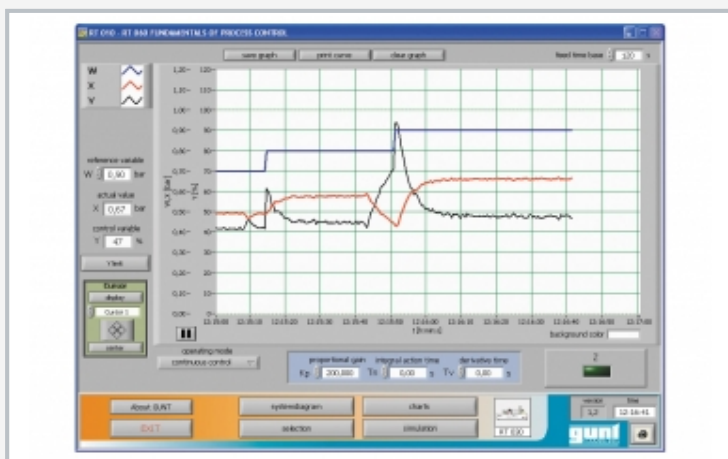
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1 diaphragm gas pump, 2 displays and controls, 3 drain valve, 4 solenoid valve to generate disturbance variables, 5 manometer, 6 pressure tank



Process schematic



Software screenshot: continuous P control: a step of the reference variable results in a permanent control deviation

Specification

- [1] experimental unit for control engineering experiments
- [2] pressure control in a tank
- [3] speed controlled diaphragm gas pump
- [4] electronic pressure sensor
- [5] solenoid valve to generate disturbance variables
- [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

Diaphragm gas pump

- max. flow rate: 3L/min
- max. positive pressure: 1bar
- max. negative pressure: 250mbar abs.

Pressure tank

- capacity: 400mL
 - operating pressure: 1bar
 - max. pressure: 10bar
- Pressure control range: 0...1bar
 Solenoid valve: Kvs: 0,11 m³/h
 Pressure transducer: 0...1bar

Manometer: 0...1bar

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: 600x450x340mm

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 030

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Optional accessories

020.30009

WP 300.09

Laboratory trolley