

# RT 532

## Pressure 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
- control response to
  - ▶ 1<sup>st</sup> order controlled system
  - ▶ 2<sup>nd</sup> order controlled system
- 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 522, RT 542, RT 552): familiarisation with and use of process control software (SCADA)

### Description

- **experimental introduction to control engineering using an example of pressure 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**

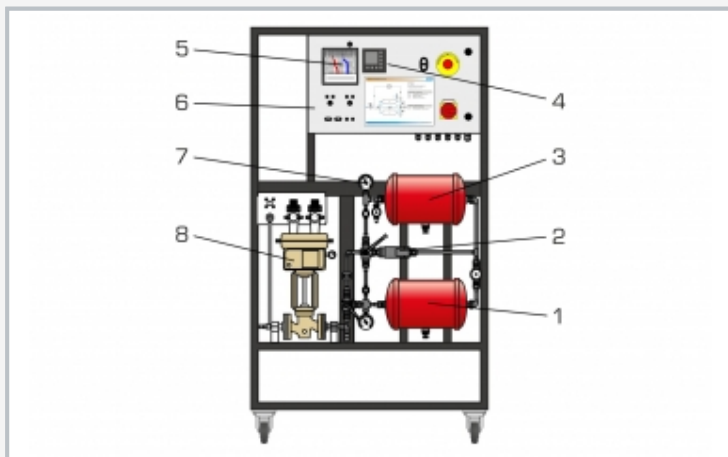
This trainer provides a comprehensive experimental introduction to the fundamentals of control engineering using an example of pressure control.

The air pressure control system is a 2<sup>nd</sup> order system. It comprises two in-line pressure tanks interconnected by a flow control valve. An additional valve on the second tank makes air tapping possible and so can be used to simulate a disturbance variable. A pressure sensor measures the pressure in the second vessel. The controller used is a state-of-the-art digital industrial controller. The actuator in the loop is a pneumatically operated control valve with a standardised current signal input. 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.

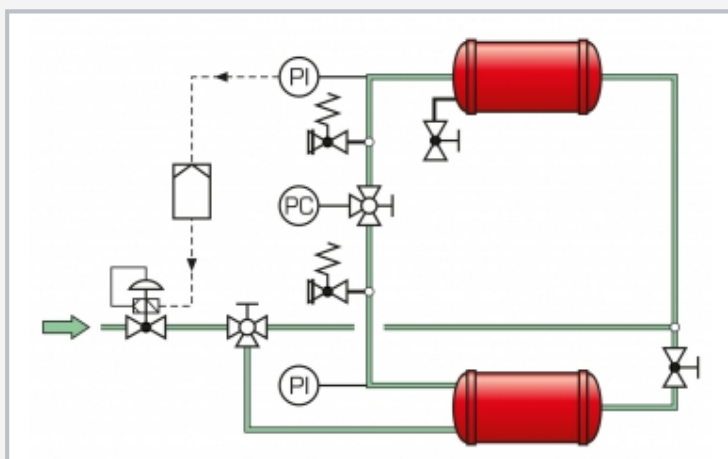
A process control software (RT 650.50) is optionally available. The software permits the construction of a complete networked system comprising multiple trainers from the RT 512 – RT 552 series. The key process variables can also be represented, and control functions executed.

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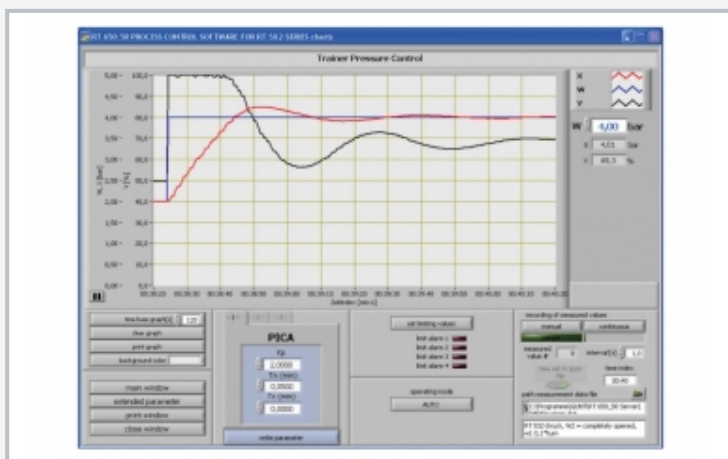
## Pressure control trainer



1 pressure tank, 2 pressure sensor, 3 pressure tank, 4 digital controller, 5 line recorder, 6 switch cabinet, 7 manometer, 8 pneumatically operated control valve



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] pressure control process, equipped with standard industrial components
- [3] pressure measurement by pressure sensor
- [4] generation of disturbance variables by drain valve
- [5] 2 pressure tanks with pressure relief valve and manometer for direct observation of the tank pressure
- [6] valves permit investigation of a 1<sup>st</sup> order controlled system (1 tank) or 2<sup>nd</sup> order controlled system (2 in-line tanks)
- [7] pneumatically operated control valve with electro-pneumatic positioner
- [8] digital controller, parameterisable as a P, PI or PID controller
- [9] 2-channel line recorder
- [10] process variables X and Y accessible as analogue signals via lab jacks

### Technical data

- 2 pressure tanks
  - capacity: each 10L
  - max. pressure: 10bar
  - operating pressure: 6bar
- Pressure sensor: 0...6bar
- Pneumatically operated control valve
  - connecting flanges: DN15
  - Kvs: 0,1m<sup>3</sup>/h
  - reference variable: 4...20mA
  - 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. 110kg

### Required for operation

- compressed air: 3...8bar

### 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