

RT 614

Level control demonstration unit



Learning objectives/experiments

- fundamentals of control engineering
- latest industrial control engineering components: controllers, transducers, actuators
- operation and parameter setting of a multifunctional state-of-the-art digital controller: e.g. parameter setting as P, PI and PID controller
- investigation of disturbance and control response
- influence of different controller parameters on stability and control quality
- investigation of the properties of the open and closed control loops
- processing of process variables using external equipment, e.g. plotter or oscilloscope
- together with accessory RT 650.40: familiarisation with and use of I&C software

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**
- **Optional I&C software RT 650.40 via USB**

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

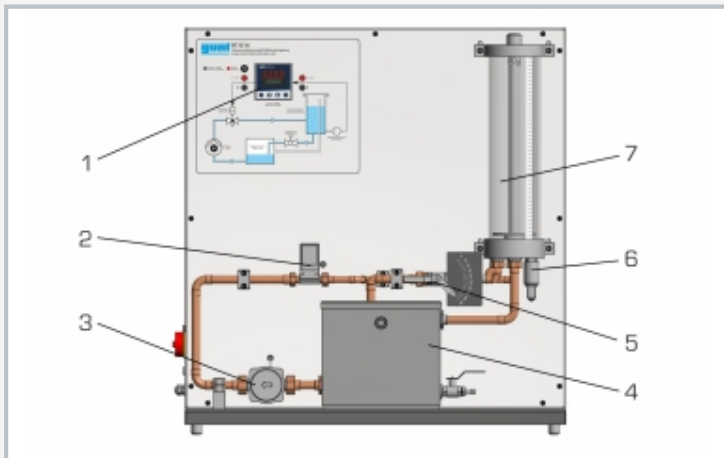
All components are clearly laid out on a vertical panel. The large-format process schematic provides an aid to understanding.

The controlled system represents a transparent tank. This is fed with water from a storage tank via a pump. The measuring element is a pressure sensor installed at the base of the transparent tank, which detects the level as the controlled variable. The controller used is a state-of-the-art digital industrial controller. An electropneumatic proportional valve is installed in the feed line to the tank as an actuator in the control loop. A ball valve in the outlet enables defined disturbance variables to be generated. The controlled variable X and the manipulating variable Y can be tapped as analogue signals at lab jacks. This enables external recording equipment, such as a plotter or an oscilloscope, to be connected.

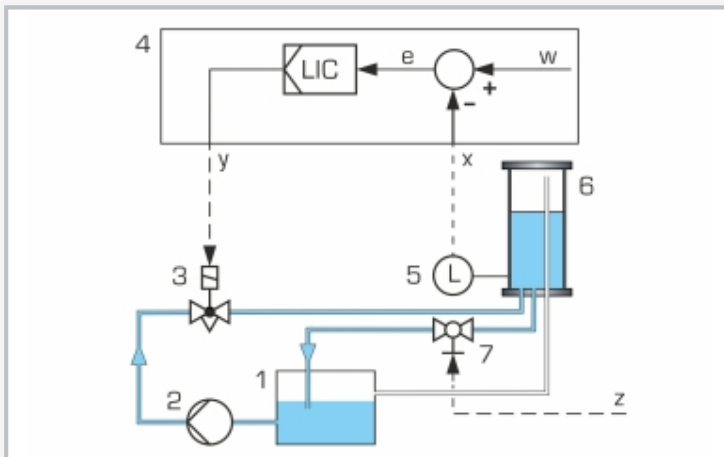
An instrumentation and control software (RT 650.40) with interface module (USB) is available as an accessory. This enables the key process variables to be represented, and control functions executed.

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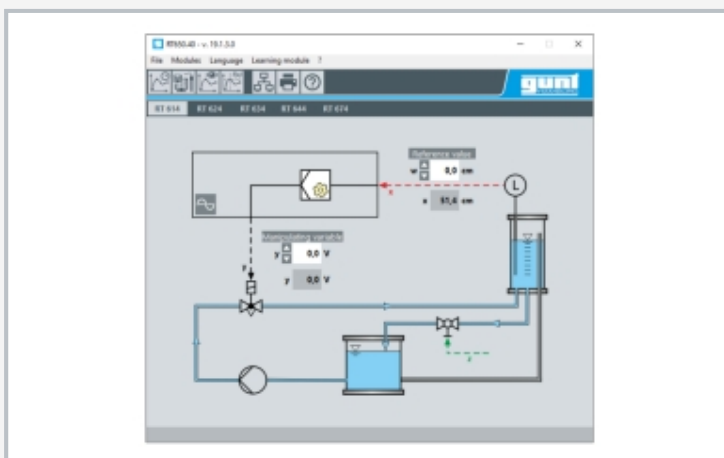
Level control demonstration unit



1 controller, 2 control valve, 3 pump, 4 storage tank, 5 ball valve with scale, 6 pressure sensor for level measurement, 7 transparent tank



1 storage tank, 2 pump, 3 actuator: control valve, 4 digital industrial controller, 5 measuring element: pressure sensor for level measurement, 6 controlled system: transparent tank, 7 generate disturbance variables via ball valve;
 x controlled variable: level, y manipulated variable: degree of opening of control valve that directly affects the water supply, z disturbance variable: adjustable drain from the tank, w reference variable: input values, e control deviation, L level



Screenshot of optional I&C software RT 650.40

Specification

- [1] level control with components commonly used in industry
- [2] controlled system: transparent tank with overflow and scale
- [3] measuring element: pressure sensor for level measurement
- [4] multi-functional digital industrial controller
- [5] generation of disturbance variables by ball valve with scale in outlet
- [6] actuator: electromagnetic proportional valve
- [7] process variables X and Y accessible as analogue signals via lab jacks
- [8] large process schematic on front panel

Technical data

Transparent tank: 7L

Storage tank: 15L, stainless steel

Pump, 3-stage

■ power consumption: 100W

■ max. flow rate: 70L/min

■ max. head: 5,6m

Pressure sensor for level measurement: 0...100mbar

Electromagnetic proportional valve: Kvs: 1,1m³/h

Controller: parameterisable as P, PI or PID controller

Process variables as analogue signals: 0...10V

Connection of external recording devices (e.g. oscilloscope, line recorder) via lab jacks

230V, 50Hz, 1 phase

230V, 60Hz, 1 phase

120V, 60Hz, 1 phase

UL/CSA optional

LxWxH: 1000x500x1070mm

Weight: approx. 73kg

Scope of delivery

- 1 experimental unit
- 1 set of laboratory cables
- 1 set of instructional material

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Optional accessories

RT 650.40	I&C software for RT 614 - RT 674 series
WP 300.09	Laboratory trolley