

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.

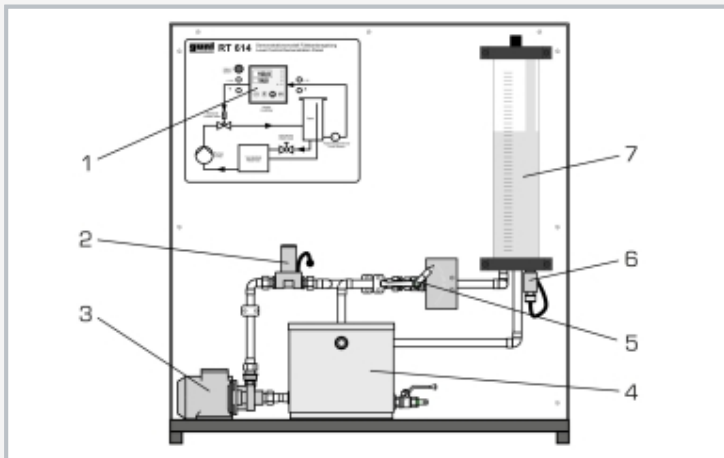
All components are clearly laid out on a vertical panel. The large-format process schematic provides an aid to understanding.

A pump delivers water from a storage tank into the transparent level-controlled tank. The level is measured by a pressure sensor 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 an electromagnetic proportional valve. 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.

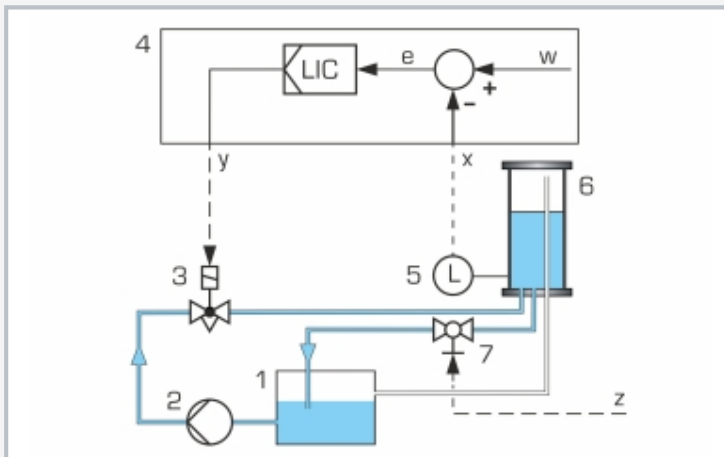
An instrumentation and control software (RT 650.40) with interface module (USB) is available as an accessory. This enables the key process variables to be represented, and control functions executed.

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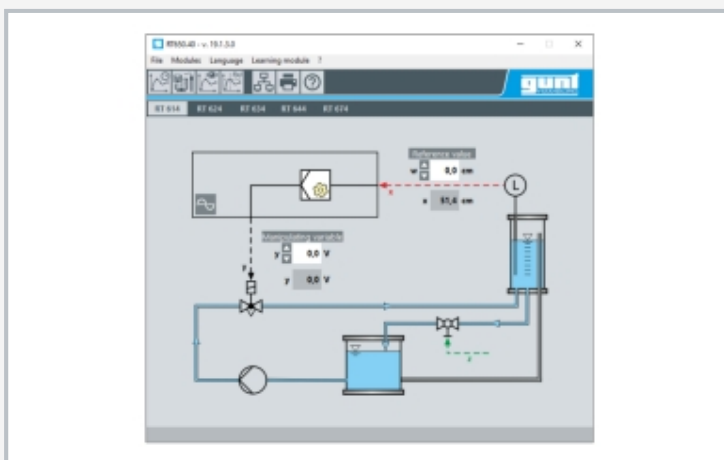
Level control demonstration unit



1 controller, 2 control valve, 3 pump, 4 storage tank, 5 ball valve with scale, 6 pressure sensor for level measurement, 7 level-controlled 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: level-controlled 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] experimental unit for control engineering experiments
- [2] level control with transparent tank
- [3] level measurement by pressure sensor
- [4] generation of disturbance variables by ball valve with scale in outlet
- [5] level-controlled tank with overflow and graduated scale
- [6] control valve: electromagnetic proportional valve
- [7] multi-functional digital industrial controller
- [8] large process schematic on front panel
- [9] process variables X and Y accessible as analogue signals via lab jacks

Technical data

Storage tank

- stainless steel
- capacity: 15L

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

080.65040
020.30009

RT 650.40
WP 300.09

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