

RT 624

Flow control demonstration unit



The illustration shows a similar 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 flow 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 flow control.

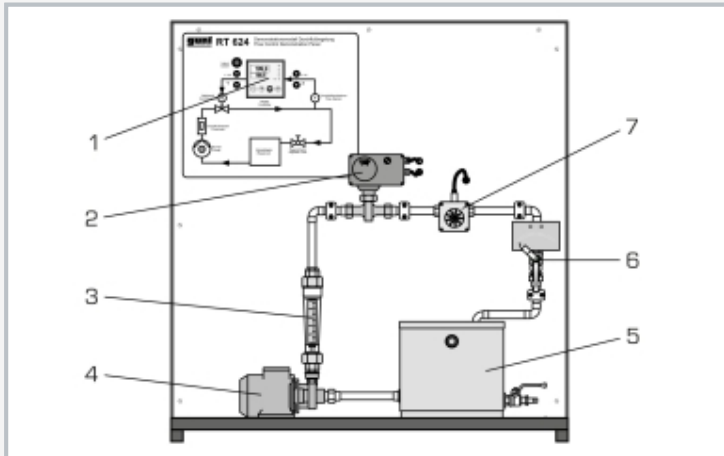
All components are clearly laid out on a vertical front panel. The large-format process schematic provides an aid to understanding. A pump delivers water from a storage tank into the pipe section.

The flow rate is measured by a paddle-wheel sensor. The transparent rotameter enables the control process to be observed very clearly. The controller used is a state-of-the-art digital industrial controller. The actuator in the control loop is an electric control valve. A ball valve in the pipe section 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.

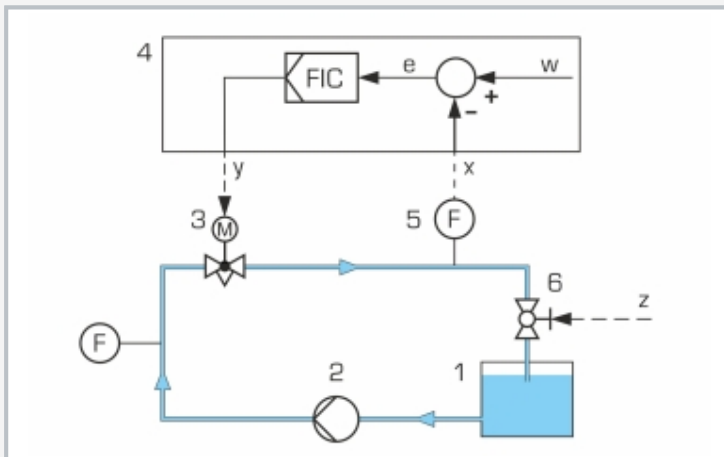
An instrumentation and control software (RT 650.40) with interface module (USB) is available as an accessory. This enables the key process variables to be represented, and control functions executed.

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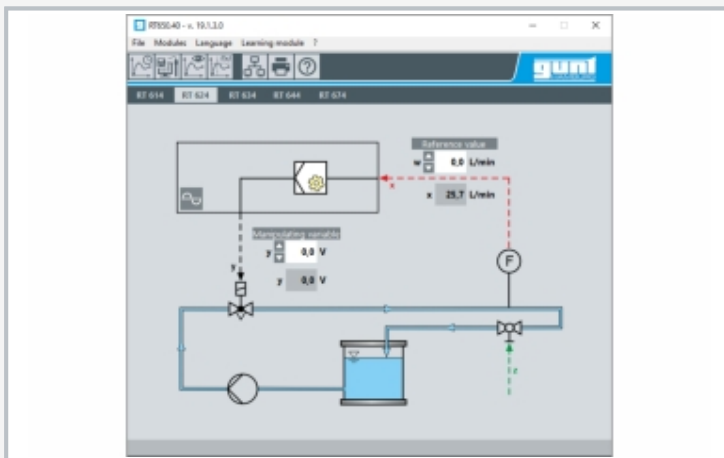
Flow control demonstration unit



1 controller, 2 control valve, 3 rotameter, 4 pump, 5 storage tank, 6 ball valve with scale, 7 paddle-wheel sensor



1 storage tank, 2 pump, 3 actuator: control valve, 4 digital industrial controller, 5 measuring element: flow rate sensor, 6 generate disturbance variables via ball valve; x controlled variable: flow rate, y manipulated variable: degree of opening of control valve that directly affects the water flow rate, z disturbance variable: degree of opening of ball valve, w reference variable: input values, e control deviation, F flow rate



Screenshot of optional I&C software RT 650.40

Specification

- [1] experimental unit for control engineering experiments
- [2] flow control in a pipe section
- [3] rotameter to visualise the flow rate
- [4] flow rate measurement by paddle-wheel sensor
- [5] generation of disturbance variables by ball valve with scale in pipe section outlet
- [6] control valve: electric control valve
- [7] digital industrial controller, parameterisable as a P, PI or PID 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: 90W
- max. flow rate: 83L/min
- max. head: 6m

Paddle-wheel sensor: 3...50L/min

Rotameter: 160...1600L/h

Electric control valve: $Kvs: 5,7m^3/h$

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. 72kg

Scope of delivery

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

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Optional accessories

| | | |
|-----------|-----------|---|
| 080.65040 | RT 650.40 | I&C software for RT 614 - RT 674 series |
| 020.30009 | WP 300.09 | Laboratory trolley |