

# RT 350

## Operation of industrial controllers



### Description

- familiarisation with an industrial controller
- digital controller with freely selectable parameters
- simulation of controlled systems
- configuration software

This experimental unit familiarises students with the operation and function of a state-of-the-art industrial controller.

The controller has freely accessible inputs and outputs. Defined input levels and step signals can be produced with a signal generator. A digital voltmeter is used to measure the input and output signals. A simple first order lag is simulated to allow the response and stability of a closed control loop to be investigated.

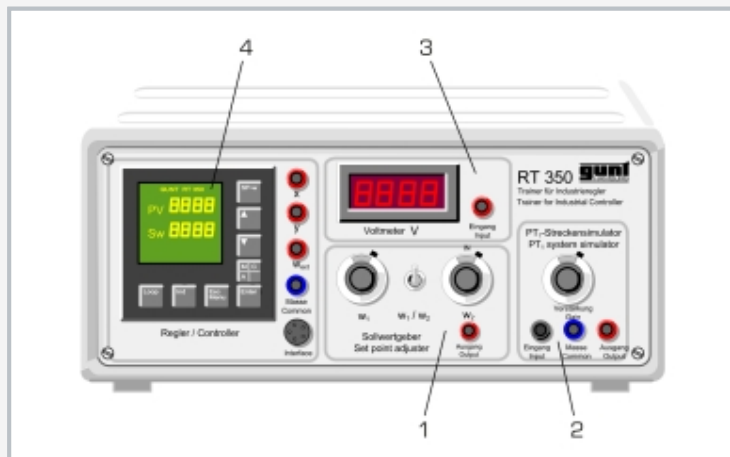
All signals are accessible via lab jacks so a standard x/y plotter or line recorder can be used. It is also possible to control external controlled system models with this controller. As well as manual configuration and parameter setting with keys, the controller can be configured (configuration software supplied) from a PC via USB.

### Learning objectives/experiments

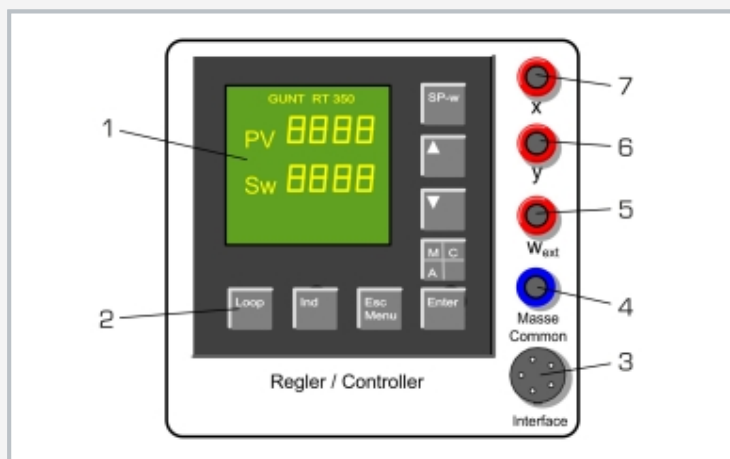
- basic concept of an industrial controller
  - ▶ operator control levels
  - ▶ parameter level
  - ▶ configuration level
- learning about basic terminology and methods of process control
  - ▶ static and dynamic transfer function
  - ▶ step response
  - ▶ reference variable step
  - ▶ closed control loop
- setting controller parameters
  - ▶ setting input and output channels
  - ▶ scaling displays
  - ▶ using PC-based configuration tools

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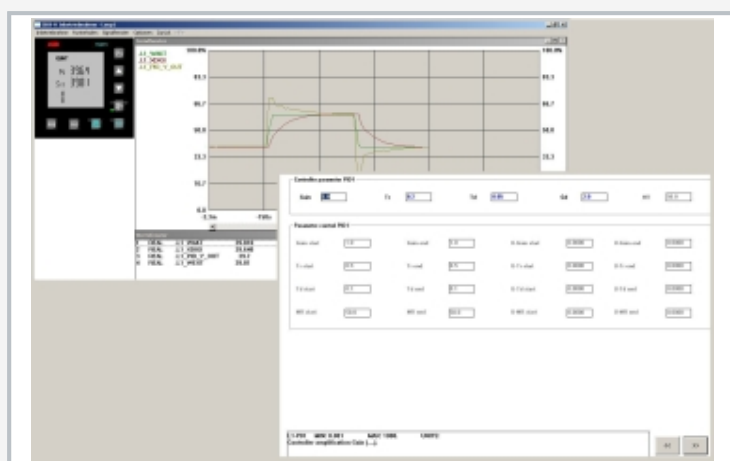
## Operation of industrial controllers



1 signal generator with switch between two pre-defined levels, 2 first order lag controlled system simulator with adjustable gain, 3 digital voltmeter, 4 controller



Controller: 1 LC display, 2 operating buttons, 3 configuration interface, 4 earth connection, 5 reference variable input, 6 manipulating variable output, 7 controlled variable input



Configuration software with time log window and parameter selection

### Specification

- [1] experimental unit for industrial controllers
- [2] digital controller, configurable
- [3] signal generator with potentiometer
- [4] digital voltmeter
- [5] first order lag controlled system simulator
- [6] all variables accessible as analogue signals at lab jacks
- [7] configuration software; software via USB under Windows 10

### Technical data

#### Controller

- configurable as P, PI or PID controller
- proportional gain  $X_p$ : 0...999,9%
- integral action time  $T_i$ : 0...3600s
- derivative time  $T_D$ : 0...1200s
- 2 inputs, 1 output

#### Voltmeter

- measuring range: 0...20V
- resolution: 10mV

#### Reference variables generator

- 2 voltages selectable
- output voltage: 0...10V

#### Controlled system simulator

- controlled system type: first order lag
- time constant: 20s
- controlled system gain: 1...10
- process variables as analogue signals: 0...10V

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

- 230V, 50Hz, 1 phase
- 230V, 60Hz, 1 phase
- 120V, 60Hz, 1 phase
- UL/CSA optional
- LxWxH: 370x330x150mm
- Weight: approx. 5kg

### Required for operation

PC with Windows recommended

### Scope of delivery

- 1 experimental unit
- 1 configuration software + USB cable
- 1 set of laboratory cables
- 1 set of instructional material

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Optional accessories

020.30009      WP 300.09      Laboratory trolley