

# RT 451 – RT 455 – Industry 4.0 compact – smart sensors

## Control engineering practice-oriented

The series **RT 451 – RT 455** is constructed entirely from industrial components in order to teach control engineering in a practical manner. The use of **smart sensors** lays the foundations for Industry 4.0 applications.

For operation and control, all the trainers include an integrated PLC and touch screen.

A separate trainer is available for all important controlled variables in process engineering. The control loops are clearly arranged. All associated components can be easily identified visually.

### GUNT software with network capability

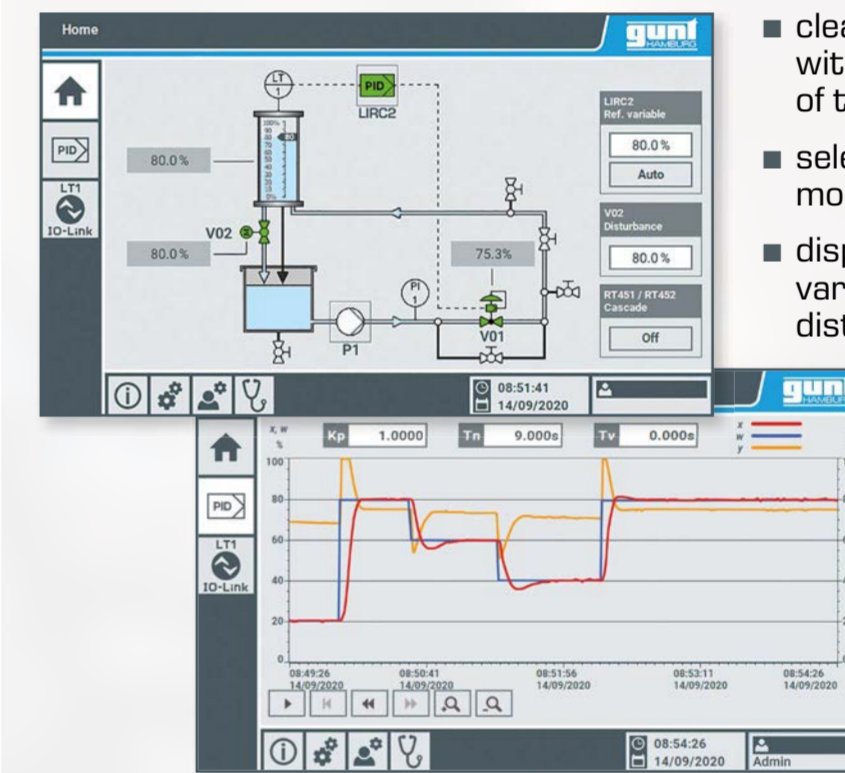
- HMI: alternative for using the touch screen
- save and evaluate measured values
- remote learning
  - ▶ LAN/WLAN connection of any number of workstations with GUNT software using only one licence
  - ▶ experiments executed in the lab can be observed and evaluated via the local network



### Learning objectives

- design and function of different controls
- investigate the properties of open and closed loops
- investigate disturbance and reference variable response
- familiarisation with industrial control engineering components
- learn about the features of **smart sensors**
  - ▶ extended data transmission e.g. configuration data, statistical data on system status, events
  - ▶ digital interfaces for the connection to the system

### Integrated PLC: Siemens S7-1200



- clearly arranged start screen with process schematic, display of the latest measured values
- select controller operating mode: manual or automatic
- display and setting of reference variable, manipulating variable, disturbance variable
- parameterise the controller
- display time functions

	RT 451 Level control	RT 452 Flow control	RT 453 Pressure control	RT 454 Temperature control	RT 455 pH value control
<b>Controlled system</b>	transparent, water-filled tank	pipe section with water flow	2 pressure vessels for 1 <sup>st</sup> and 2 <sup>nd</sup> order controlled system	pipe section and 2 process delay pipe sections with water flow	pipe section with water flow as a carrier medium
<b>Measuring element</b>	smart level sensor with integrated display	smart flow rate sensor with integrated display	2 smart pressure sensors with integrated display	3 smart temperature sensors	smart pH sensor with integrated Pt1000
<b>Principle of measurement</b>	guided microwave	electromagnetic	ceramic-capacitive	thermoresistance effect	electrochemical
<b>Actuator</b>	electropneumatic control valve	electropneumatic control valve	electropneumatic control valve	heater and /or cooling unit	metering pump for acid
<b>Controller</b>	digital control via integrated PLC Siemens S7-1200	digital control via integrated PLC Siemens S7-1200	digital control via integrated PLC Siemens S7-1200	digital control via integrated PLC Siemens S7-1200	digital control via integrated PLC Siemens S7-1200