

# RT 578

## Control of four variables from process engineering



### Description

- **practical control of level, flow rate, pressure and temperature**
- **cascade control**
- **process control software**

The RT 578 facilitates practical learning in the control of four controlled variables which are commonplace in process engineering.

A circuit with a graduated transparent tank is provided for the control of flow rate, level and pressure. Two actuator possibilities are included for use, namely, a variable-speed pump and a pneumatic control valve. A disturbance variable can be generated by a valve in the tank outlet for level and pressure control. A valve at the tank head also permits investigation of level control with and without counter pressure.

A heating circuit with a heater, heat exchanger and pump is provided for temperature control. The temperature can be controlled using the heater as the actuator, or by way of the flow of cooling water through the heat exchanger.

Two forms of cascade control are possible. The level in the tank can be controlled by way of the flow rate. The temperature in the heating circuit can be controlled by way of the flow rate through the heat exchanger. For these two cascade controls, either the pump or the control valve can be used as the actuator.

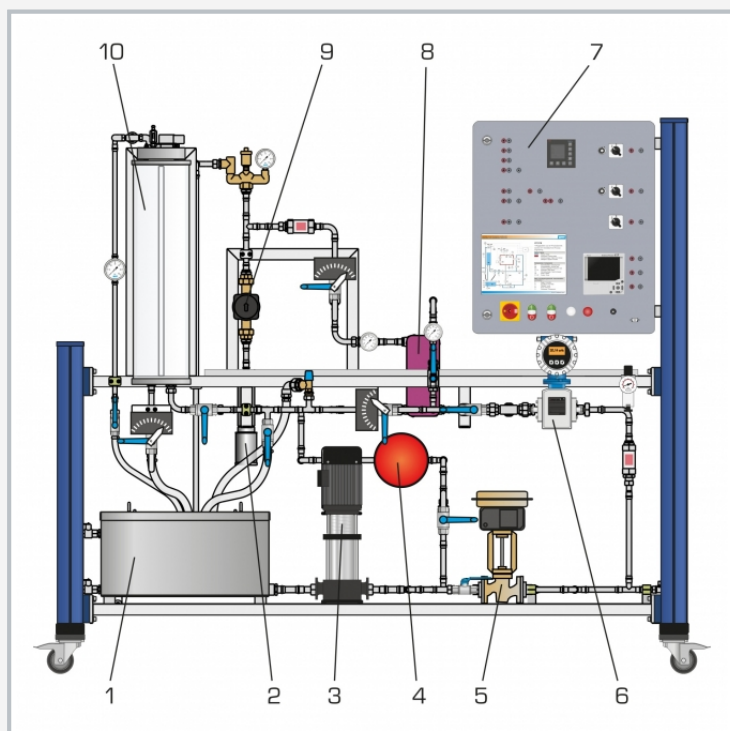
Sensors provide for measurement of the controlled variables. The variables can also be read-off directly from analogue meters. A line recorder is provided to record the control processes. The industrial controller has four selectable control loops. It has a Profibus DP interface. This enables the trainer to be controlled by way of a process control software. The software also permits recording of the process variables and parameterisation of the controller on the PC.

### Learning objectives/experiments

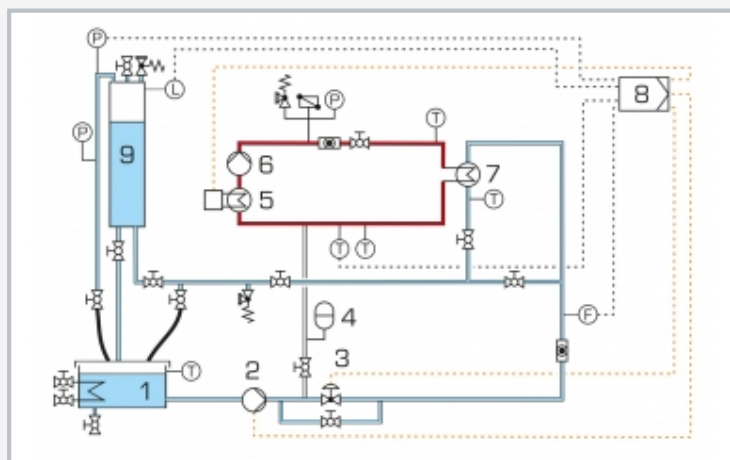
- familiarisation with industrial control loop components
- setup, parameterisation and configuration on the controller
- optimisation of controller settings
- flow rate control
- level control in closed tank with or without counter pressure
- pressure control
- temperature control
- cascade control, level – flow rate
- cascade control, temperature – flow rate
- two-point control, temperature
- plotting step responses

# RT 578

## Control of four variables from process engineering



1 collecting tank, 2 heater, 3 pump, 4 expansion vessel, 5 control valve, 6 flow rate sensor, 7 switch cabinet, 8 heat exchanger, 9 heating circuit pump, 10 graduated tank



1 collecting tank, 2 pump, 3 control valve, 4 expansion vessel, 5 heater, 6 heating circuit pump, 7 heat exchanger, 8 controller, 9 graduated tank;  
F flow rate, P pressure, L level, T temperature

### Specification

- [1] control of level, flow rate, pressure, temperature and cascade control
- [2] circuit with collecting tank, graduated tank, pneumatic control valve and multistage variable-speed centrifugal pump
- [3] heating circuit with heater, pump, expansion vessel and heat exchanger
- [4] heater, pneumatic control valve and multistage variable-speed centrifugal pump as actuators
- [5] sensors for measurement of the controlled variables; level, flow rate, pressure and temperature
- [6] 1 flow meter, 2 manometers and 4 thermometers for direct display
- [7] parameterisable controller with 4 selectable control loops
- [8] three-channel line recorder
- [9] GUNT process control software via PCle under Windows 7, 8.1, 10

### Technical data

#### Tanks

- graduated tank: approx. 6L

- collecting tank: approx. 90L

#### Multistage centrifugal pump

- max. flow rate: approx. 75L/min

- max. head: approx. 59m

#### Heating circuit pump

- max. flow rate: approx. 50L/min

- max. head: approx. 3,5m

Heater power output: approx. 2kW

Controller parameterisable as

- P, PI or PID controller

- switching controller

#### Measuring ranges

- level: 0...700mm

- flow rate: 0...4000L/h

- pressure: 1x 0...6bar, 1x 0...10bar

- temperature: 1x 0...60°C, 3x 0...120°C

230V, 50Hz, 1 phase

230V, 60Hz, 1 phase; 230V, 60Hz, 3 phases

UL/CSA optional

LxWxH: 2260x800x1990mm

Weight: approx. 250kg

### Required for operation

compressed air: 3...8bar; 25...50L/min

PC with Windows recommended

### Scope of delivery

- 1 trainer
- 1 set of cables
- 1 set of hoses
- 1 Profibus card
- 1 GUNT process control software CD
- 1 set of instructional material