

RT 586

Control of water quality



Description

- control of pH value, redox potential, oxygen concentration and electrical conductivity
- 4 control loops with industrial controllers

Adequate water quality is essential to many production processes. With RT 586 key water parameters can be monitored and controlled.

Water flows into a transparent tank which contains a stirrer. A sensor allows for measurement of the conductivity of the water. It is displayed on a meter and transmitted as an electrical signal to a controller. The desired conductivity is preset as the reference variable on the controller. The controller influences the conductivity of the water by adding diluted caustic soda with a metering pump.

The addition of caustic soda causes the pH value of the water to rise. It flows into a second transparent tank. A sensor provides for the measurement of the pH value. The desired pH value is preset as the reference variable on the controller. The water is neutralized by adding diluted sulphuric acid with a metering pump.

Another sensor in this tank is used to measure the oxygen concentration of the water. It is displayed on a meter and transmitted as an electrical signal to the controller. The controller influences the injection of compressed air, and thus the oxygen concentration of the water, by way of a control valve. The water flows into a collecting tank.

The redox potential is controlled in a separate section of the collecting tank. In this section the redox potential is measured using a sensor. The controller influences the redox potential of the water by the addition of iodine solution with a metering pump.

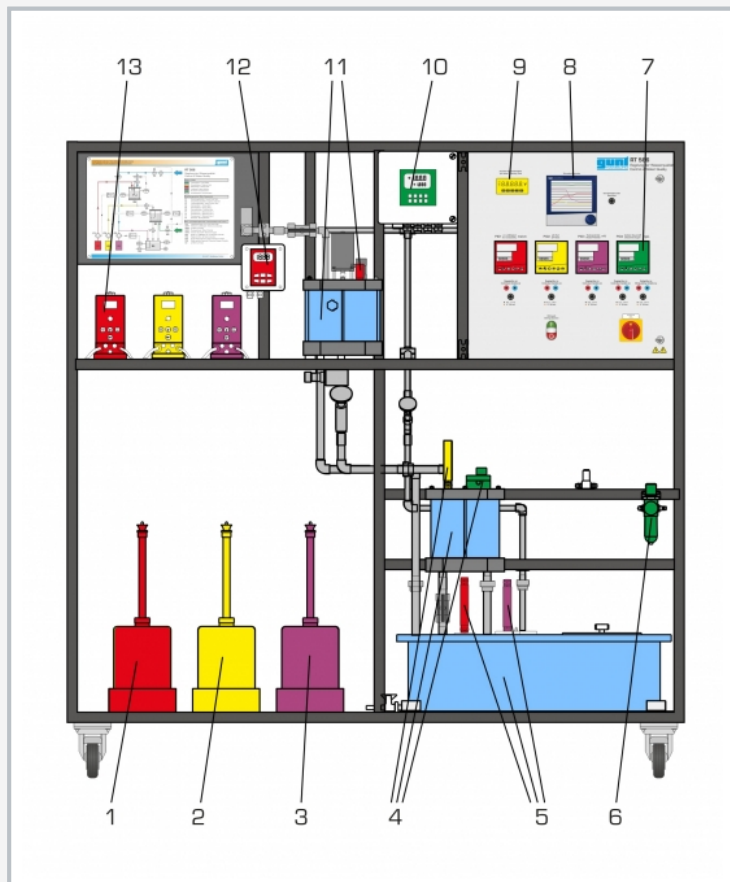
As a further check of performance, a sensor is employed to measure the pH value of the water in the collecting tank. It is displayed digitally on the switch cabinet. A six-channel line recorder is provided to record the control processes.

Learning objectives/experiments

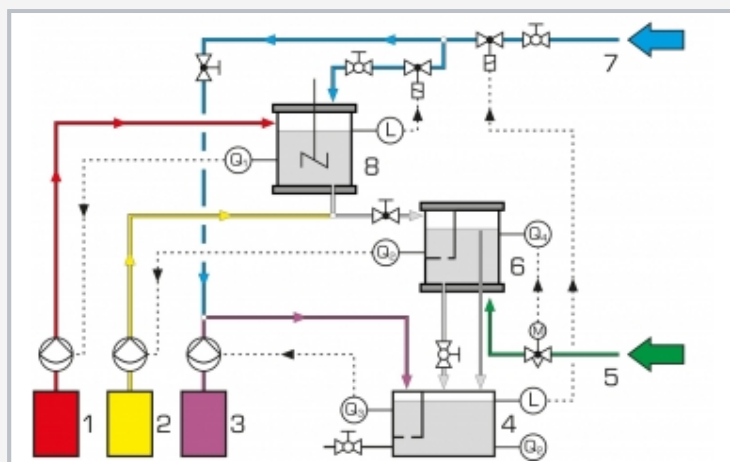
- comparison of various controller types
 - ▶ P, PD, PI and PID controllers
 - ▶ two-point controller
- influence of caustic soda on electrical conductivity and pH value
- influence of sulphuric acid on pH value
- influence of air injection on oxygen concentration
- influence of iodine on redox potential

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1 caustic soda, 2 sulphuric acid, 3 iodine solution, 4 tank with sensors for pH value and oxygen concentration, 5 collecting tank with sensors for redox potential and pH value, 6 compressed air maintenance unit, 7 controller, 8 line recorder, 9 collecting tank pH value display, 10 oxygen meter, 11 tank with stirrer and conductivity sensor, 12 conductivity meter, 13 metering pump



1 caustic soda, 2 sulphuric acid, 3 iodine solution, 4 collecting tank for control of redox potential, 5 compressed air, 6 tank for control of pH value and oxygen concentration, 7 water inlet, 8 tank for control of conductivity, Q_1 conductivity, Q_2 pH value, Q_3 redox potential, Q_4 oxygen concentration

Specification

- [1] control of water parameters; pH value, redox potential, oxygen concentration and electrical conductivity
- [2] control of conductivity in transparent tank with stirrer
- [3] control of pH value and oxygen concentration in transparent tank
- [4] control of redox potential in collecting tank
- [5] change in conductivity, pH value and redox potential by addition of caustic soda, sulphuric acid and iodine solution
- [6] 3 industrial metering pumps
- [7] change in oxygen concentration by injection of compressed air
- [8] 4 parameterisable industrial controllers
- [9] 6-channel line recorder
- [10] 3 plastic tanks for caustic soda, sulphuric acid and iodine solution
- [11] recording of pH value in collecting tank

Technical data

Tanks

- transparent tanks: 2x 5L
- collecting tank: 80L
- plastic tanks: 3x each

Metering pumps

- max. flow rate: each 2,1L/h
- max. head: each 160m

4 controllers parameterisable as

- P, PI or PID controller
- 2-point controller

Measuring ranges

- conductivity: 0...100mS/cm
- pH value: 1...12
- oxygen concentration: 0...60mg/L
- redox potential: 0...1000mV

230V, 50Hz, 1 phase
LxWxH: 1800x700x1830mm
Weight: approx. 182kg

Required for operation

Compressed air: 3...8bar
water connection
drainage
iodine solution
caustic soda
sulphuric acid

Scope of delivery

- 1 trainer
- 1 hose
- 1 set of instructional material