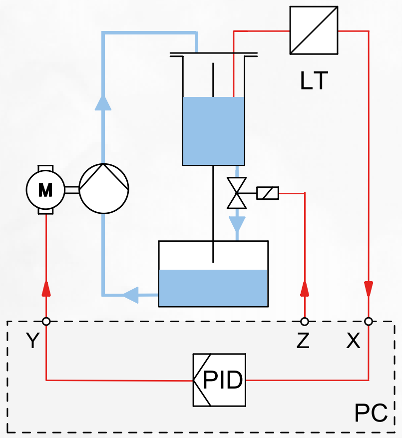
RT 010 – RT 060 FUNDAMENTALS OF PROCESS CONTROL ENGINEERING

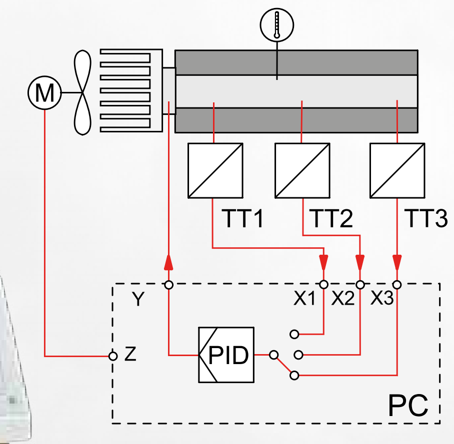


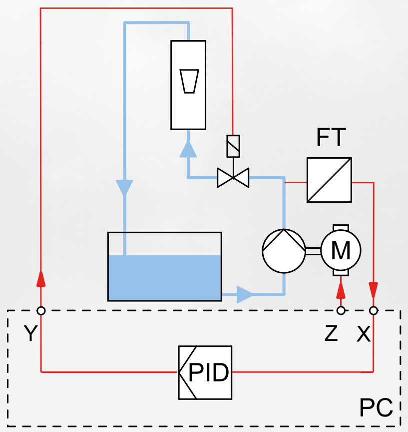
RT 010 Level Control

- level recording by pressure sensor
- level control by speed of pump
- electromagnetic valve to generate disturbance variables

RT 040 Temperature Control

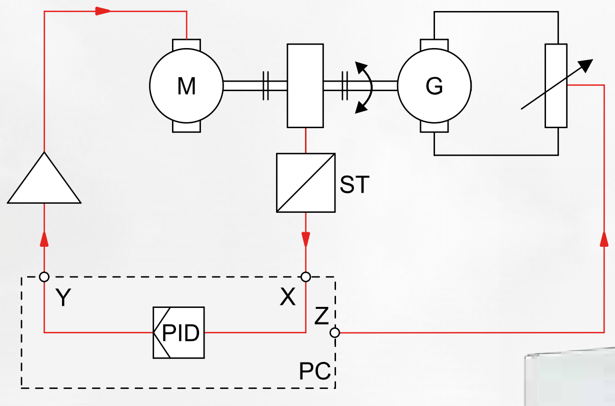
- temperature sensors at three positions
- heating and cooling of a metal bar by Peltier element
- switchable fan to generate disturbance variables





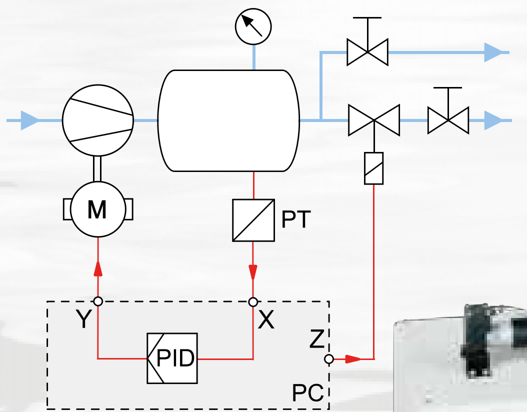
RT 020 Flow Control

- turbine wheel flow sensor
- electromagnetic proportional valve as actuator
- variable pump speed to generate disturbance variables



RT 050 Speed Control

- inductive speed sensor
- speed control by DC motor
- adjustable load to generate disturbance variables

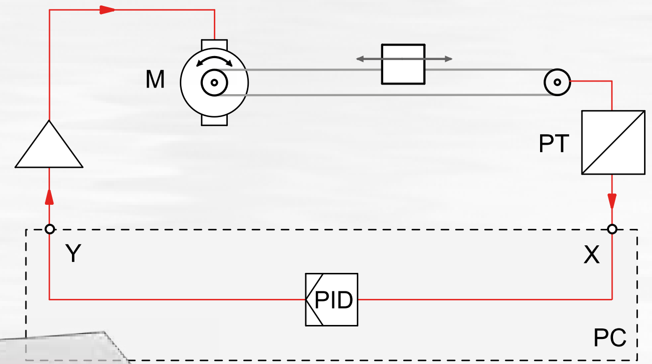


RT 030 Pressure Control

- electronic pressure sensor
- speed controlled diaphragm pump as actuator
- solenoid valve to generate disturbance variables

RT 060 Position Control

- rotary encoder as displacement sensor
- position control of a carriage by gear motor
- two microswitches to shut down at end positions



RT 010 Training System: Level Control, HSI

Technical Description

This compact experimental unit offers every opportunity to learn the fundamentals of control engineering through experimentation on a level control system.

The experimental set-up is mounted in a housing which also accommodates all the electronics. The transparent level-controlled tank is fed from the storage tank with the aid of a speed-controlled pump. The liquid level is measured using a pressure sensor. The sensor output signal is sent to the software controller. The controller's output signal influences the speed of the pump motor and therefore delivery flow rate. To investigate the influence of disturbance variables, an electromagnetic proportional valve in the tank outlet can be activated by the software.

The powerful state-of-the-art software is an integral part of the training system, embodying the principle of hardware/software integration (HSI). It enables the experiments to be conducted and evaluated in a user-friendly manner. The software has network capability. The link between the experimental unit and the PC is made via a USB port.

The well-structured instructional material sets out the fundamentals and provides a step-by-step guide through the experiments.

Learning Objectives / Experiments

- fundamentals of control engineering based on the example of a level control system with integral control action
- open loop control response
- investigation of a controlled system without feedback
- effects of different controller parameters and methods on the response of the closed loop system
- recording of step responses
  - * reference variable
  - * disturbance variable
- controller optimisation
- software-based controlled system simulation
  - * comparison of different controlled system parameters

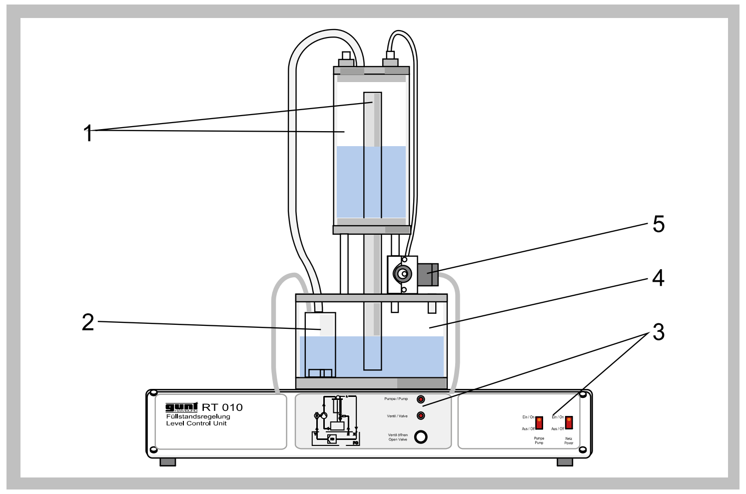
*** Experimental unit with clear level control system**

*** Extensive range of experiments on fundamentals of control engineering**

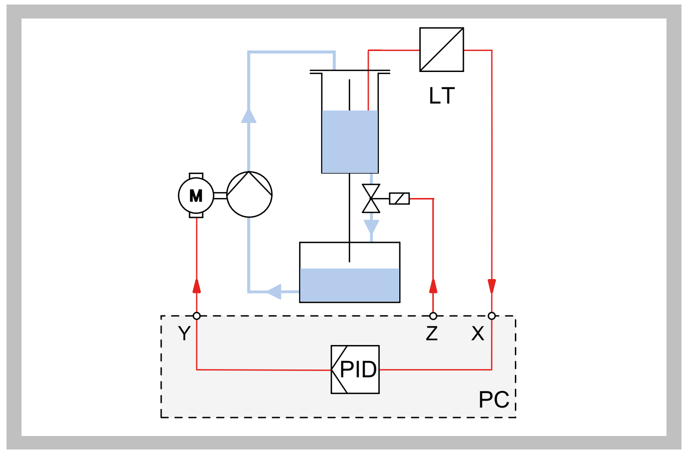
*** State-of-the-art software for all experimental units of the RT 010 - RT 060 series, with extensive controller and recorder functions**

*** Software-based simulation of the controlled system**

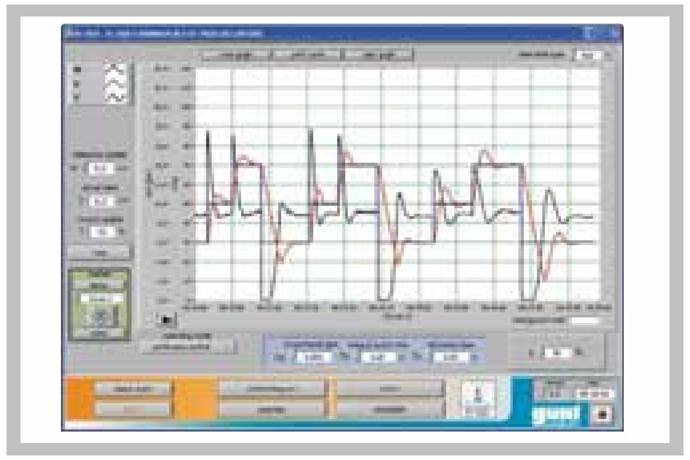
RT 010 Training System: Level Control, HSI



1 level-controlled tank with overflow, 2 pump, 3 displays and controls, 4 storage tank, 5 proportional valve



Process schematic



Software screenshot: PI control of level control system: step response to change in reference variable with different values for K_p and T_n

Specification

[1] experimental unit for control engineering experiments
[2] level control process with transparent tank
[3] speed-controlled pump
[4] level measurement by pressure sensor
[5] disturbance variables generated by electromagnetic proportional valve in tank outlet
[6] tank with overflow and graduated scale
[7] software-based controlled system simulation
[8] process schematic on front panel
[9] networkable GUNT software via USB under Windows Vista or Windows 7

Technical Data

Level-controlled tank
- capacity: 1200mL

Storage tank
- capacity: 3700mL

Pump
- power consumption: 18W
- max. flow rate: 8L/min
- max. head: 6m

Proportional valve: Kvs: 0,7m³/h
Pressure sensor: 0...30mbar (0...300mm)
Software controller configurable as P, PI, PID and switching controller
Software
- process schematic with controller type selection (manual, continuous controller, two- or three-point controller, programmer)
- time functions
- simulation function
- disturbance variable input

Dimensions and Weight

LxWxH: 600x450x800mm
Weight: approx. 22kg

Required for Operation

230V, 50/60Hz, 1 phase or 120V, 60Hz/CSA, 1 phase

Scope of Delivery

1 experimental unit
1 GUNT software CD + USB cable
1 hose
1 handbook: fundamentals of control engineering (RT 010 - RT 060)
1 manual for RT 010

Order Details

080.01000 RT 010 Training System: Level Control, HSI

G.U.N.T Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Phone +49 (40) 67 08 54-0, Fax +49 (40) 67 08 54-42, E-mail sales@gunt.de, Web http://www.gunt.de
We reserve the right to modify our products without any notifications.

RT 020 Training System: Flow Control, HSI

* **Experimental unit with clear flow control system**
* **Extensive range of experiments on fundamentals of control engineering**
* **State-of-the-art software for all experimental units of the RT 010 - RT 060 series, with extensive controller and recorder functions**
* **Software-based simulation of the controlled system**

Technical Description

This compact experimental unit offers every opportunity to learn the fundamentals of control engineering through experimentation on a flow control system. The experimental set-up is mounted in a housing which accommodates all the electronics.

A piping system with two flowmeters is supplied with flow by a speed-controlled pump from the transparent storage tank. The rotameter offers the advantage that the flow rate can be observed directly at any time. The flow rate is measured by a turbine wheel flow sensor. The sensor output signal is sent to the software controller. The output signal from the controller influences the setting of an electromagnetic proportional valve. To investigate the influence of disturbance variables, the pump speed can be altered by way of the software.

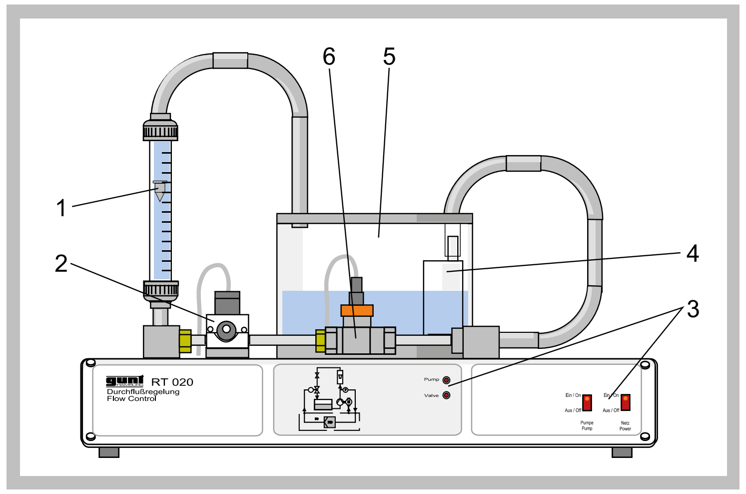
The powerful state-of-the-art software is an integral part of the training system, embodying the principle of hardware/software integration (HSI). It enables the experiments to be conducted and evaluated in a user-friendly manner. The software has network capability. The link between the experimental unit and the PC is made via a USB port.

The well-structured instructional material sets out the fundamentals and provides a step-by-step guide through the experiments.

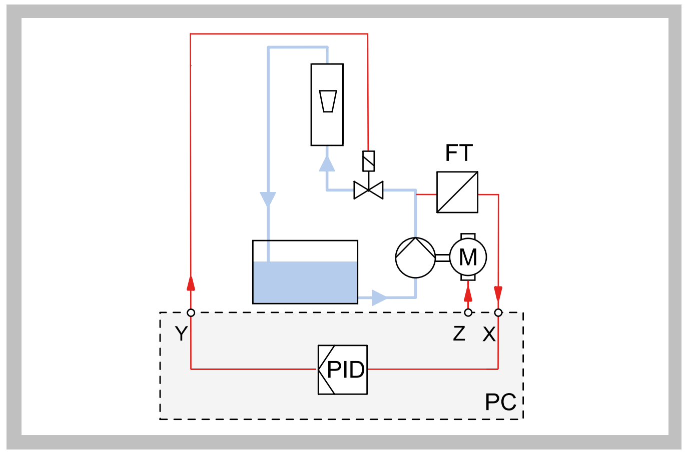
Learning Objectives / Experiments

- fundamentals of control engineering based on the example of a rapid flow control system
- open loop control response
- effects of different controller parameters and methods on the response of the closed loop system
- recording of step responses
  * reference variable
  * disturbance variable
- controller optimisation
- software-based controlled system simulation
  * comparison of different controlled system parameters

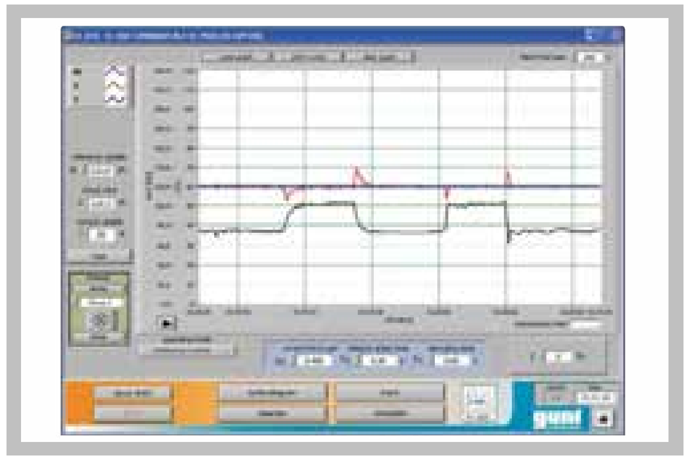
RT 020 Training System: Flow Control, HSI



1 rotameter, 2 proportional valve, 3 displays and controls, 4 pump, 5 storage tank, 6 flow sensor



Process schematic



Software screenshot: flow control, controller with PI response with different values for K_p and T_n, introduction of a disturbance variable

Specification

[1] experimental unit for control engineering experiments
[2] flow control system with variable-area flowmeter
[3] electromagnetic proportional valve as actuator
[4] turbine wheel flow sensor
[5] generation of disturbance variables by altering pump speed
[6] software-based controlled system simulation
[7] process schematic on front panel
[8] networkable GUNT software via USB under Windows Vista or Windows 7

Technical Data

Storage tank
- capacity: approx. 3000mL

Pump
- power consumption: 18W
- max. flow rate: 8L/min
- max. head: 6m

Rotameter: 20...250L/h
Proportional valve: Kvs: 0,7m³/h
Flow sensor: 0,5...3L/min
Software controller configurable as P, PI, PID and switching controller

Software
- process schematic with controller type selection (manual, continuous controller, two- or three-point controller, programmer)
- time functions
- simulation function
- disturbance variable input

Dimensions and Weight

LxWxH: 600x450x600mm
Weight: approx. 21kg

Required for Operation

230V, 50/60Hz, 1 phase or 120V, 60Hz/CSA, 1 phase

Scope of Delivery

1 experimental unit
1 hose
1 GUNT software CD + USB cable
1 handbook: fundamentals of control engineering (RT 010 - RT 060)
1 manual for RT 020

Order Details

080.02000 RT 020 Training System: Flow Control, HSI

RT 030 Training System: Pressure Control, HSI

*** Experimental unit with diaphragm gas pump and pressure tank**

*** Extensive range of experiments on fundamentals of control engineering**

*** State-of-the-art software for all experimental units of the RT 010 - RT 060 series, with extensive controller and recorder functions**

*** Software-based simulation of the controlled system**

Technical Description

This compact experimental unit offers every opportunity to learn the fundamentals of control engineering through experimentation on a pressure control system.

The experimental set-up is mounted on a housing which accommodates all the electronics. The pressure tank is charged with compressed air by a diaphragm gas pump. The advantage of the dial-gauge manometer is that the pressure in the tank can be observed directly at any time. The pressure is measured using a pressure sensor. The sensor output signal is sent to the software controller. The output signal from the controller influences the speed of the diaphragm gas pump and hence the flow rate. An air consumer is simulated by way of a flow control valve. A solenoid valve through which air can escape can be activated by the software to investigate the influence of disturbance variables.

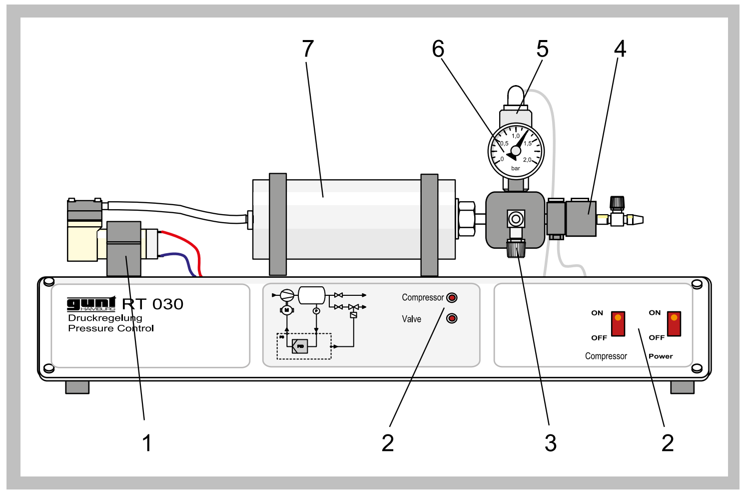
The powerful state-of-the-art software is an integral part of the training system, embodying the principle of hardware/software integration (HSI). It enables the experiments to be conducted and evaluated in a user-friendly manner. The software has network capability. The link between the experimental unit and the PC is made via a USB port.

The well-structured instructional material sets out the fundamentals and provides a step-by-step guide through the experiments.

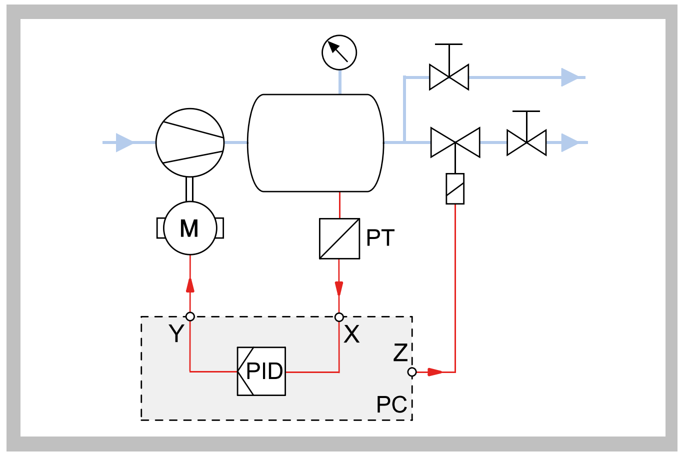
Learning Objectives / Experiments

- fundamentals of control engineering based on the example of a pressure control system with PT_1 behaviour
- open loop control response
- effects of different controller parameters and methods on the response of the closed loop system
- recording of step responses
  * reference variable
  * disturbance variable
- controller optimisation
- software-based controlled system simulation
  * comparison of different controlled system parameters

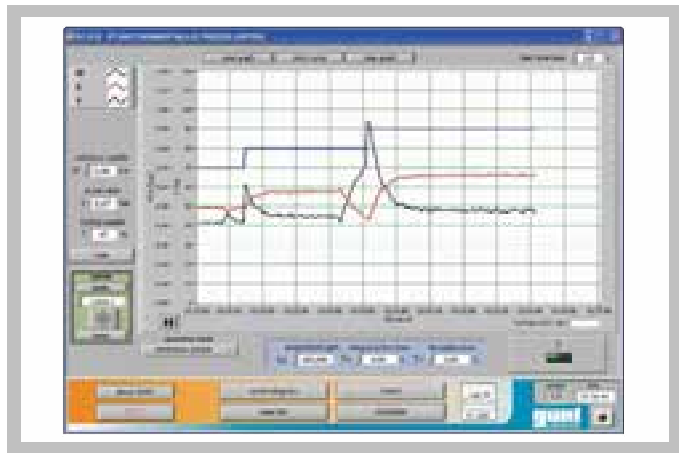
RT 030 Training System: Pressure Control, HSI



1 diaphragm gas pump, 2 displays and controls, 3 drain valve, 4 solenoid valve to generate disturbance variables, 5 pressure sensor, 6 manometer, 7 pressure tank



Process schematic



Software screenshot: continuous P control: a step of the reference variable results in a permanent control deviation

Specification

[1] experimental unit for control engineering experiments
[2] pressure control in a tank
[3] speed controlled diaphragm gas pump
[4] electronic pressure sensor
[5] solenoid valve to generate disturbance variables
[6] software-based controlled system simulation
[7] process schematic on front panel
[8] networkable GUNT software via USB under Windows Vista or Windows 7

Technical Data

Diaphragm gas pump
- max. flow rate: 3L/min
- max. positive pressure: 1bar
- max. negative pressure: 250mbar abs.

Pressure tank
- capacity: 400mL
- operating pressure: 1bar
- max. pressure: 10bar

Pressure control range: 0...1bar
Solenoid valve: Kvs: 0,11m³/h
Pressure transducer: 0...1bar
Manometer: 0...1bar
Software controller configurable as P, PI, PID and switching controller
Software
- process schematic with controller type selection (manual, continuous controller, two- or three-point controller, programmer)
- time functions
- simulation function
- disturbance variable input

Dimensions and Weight

LxWxH: 600x450x340mm
Weight: approx. 18kg

Required for Operation

230V, 50/60Hz, 1 phase or 120V, 60Hz/CSA, 1 phase

Scope of Delivery

1 experimental unit
1 GUNT software CD + USB cable
1 handbook: fundamentals of control engineering (RT 010 - RT 060)
1 manual for RT 030

Order Details

080.03000 RT 030 Training System: Pressure Control, HSI

RT 040 Training System: Temperature Control, HSI

*** Experimental unit with temperature control system**

*** Extensive range of experiments on fundamentals of control engineering**

*** Heating and cooling with Peltier element**

*** State-of-the-art software for all experimental units of the RT 010 - RT 060 series, with extensive controller and recorder functions**

*** Software-based simulation of the controlled system**

Technical Description

This compact experimental unit offers every opportunity to learn the fundamentals of control engineering through experimentation on a temperature control system.

The experimental set-up is mounted on a housing which accommodates all the electronics. A metal bar, which is thermally insulated with cladding, is heated or cooled at one end by a Peltier element. Three temperature transducers along the axis of the bar allow the variation in temperature along the length of the bar, and hence the associated thermal lags, to be obtained for differing operating conditions. A dial-gauge thermometer offers the advantage that the temperature can be read off directly at any time. The temperature is measured using a thermal resistor (PTC). The sensor output signal is sent to the software controller. The output signal from the controller influences the operating voltage of the Peltier element and hence the heating capacity. A fan that dissipates part of the heating power can be activated by the software to investigate the influence of disturbance variables.

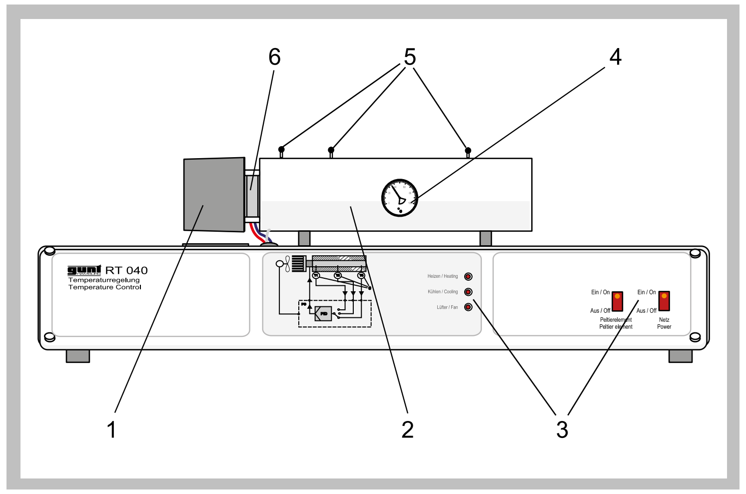
The powerful state-of-the-art software is an integral part of the training system, embodying the principle of hardware/software integration (HSI). It enables the experiments to be conducted and evaluated in a user-friendly manner. The software has network capability. The link between the experimental unit and the PC is made via a USB port.

The well-structured instructional material sets out the fundamentals and provides a step-by-step guide through the experiments.

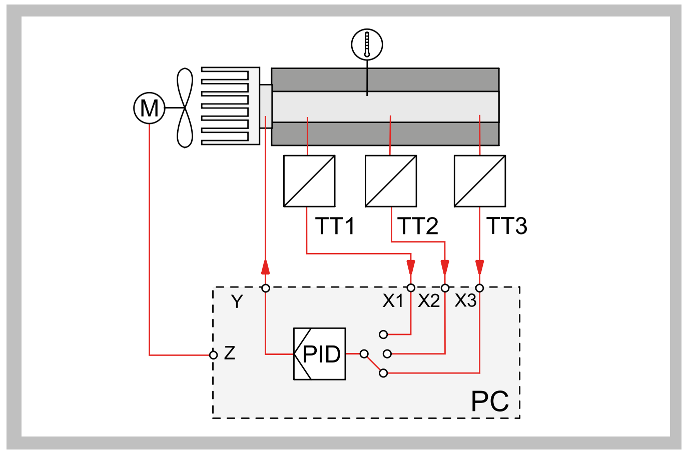
Learning Objectives / Experiments

- fundamentals of control engineering based on the example of a temperature control system. System dead time can be obtained from the response
- open loop control response.
- effects of different controller parameters and methods on the response of the closed loop system
  - recording of step responses
    * reference variable
    * disturbance variable
- controller optimisation
- software-based controlled system simulation
  * comparison of different controlled system parameters

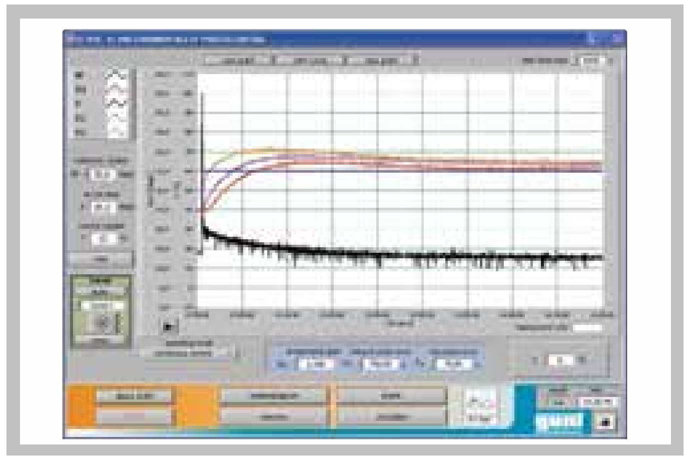
RT 040 Training System: Temperature Control, HSI



1 fan, 2 bar in cladding tube, 3 displays and controls, 4 thermometer, 5 temperature sensor, 6 heater/cooler



Process schematic



Software screenshot: step response to reference variable with PID controller with non-optimised values for K_p, T_n and T_v

Specification

[1] experimental unit for control engineering experiments
[2] temperature control of a heated metal bar
[3] heating and cooling by Peltier element
[4] temperature sensors at 3 different points along axis of bar to establish thermal lags
[5] software activated fan to generate disturbance variables
[6] software-based controlled system simulation
[7] process schematic on front panel
[8] networkable GUNT software via USB under Windows Vista or Windows 7

Technical Data

Heated bar: DxL: 20x200mm, aluminium
Peltier element
- power consumption depending on temperature
  power at 300K: 38,2W
  power at 50°C: 44,3W
- operated by DC voltage

Fan
- power consumption: 2W
- max. flow rate: 40m³/h

Temperature sensor: 0...100°C
Thermometer: 0...100°C
Temperature control range: 0...100°C
Software controller configurable as P, PI, PID and switching controller
Software
- process schematic with controller type selection (manual, continuous controller, two- or three-point controller, programmer)
- time functions
- simulation function
- disturbance variable input

Dimensions and Weight

LxWxH: 600x450x260mm
Weight: approx. 16kg

Required for Operation

230V, 50/60Hz, 1 phase or 120V, 60Hz/CSA, 1 phase

Scope of Delivery

1 experimental unit
1 GUNT software CD + USB cable
1 handbook: Fundamentals of control engineering (RT 010 - RT 060)
1 manual for RT 040

Order Details

080.04000 RT 040 Training System: Temperature Control, HSI

RT 050 Training System: Speed Control, HSI

*** Experimental unit with speed control system**

*** Extensive range of experiments on fundamentals of control engineering**

*** State-of-the-art software for all experimental units of the RT 010 - RT 060 series, with extensive controller and recorder functions**

*** Software-based simulation of the controlled system**

Technical Description

This compact experimental unit offers every opportunity to learn the fundamentals of control engineering through experimentation on a speed control system.

The experimental set-up is mounted on a housing which accommodates all the electronics. A transparent protective cover permits safe observation of the experiments. A DC motor drives a shaft with a mass flywheel. The dial gauge allows the speed to be read off directly at any time. The speed is measured inductively using a speed sensor. The output signal from the sensor is sent to the software controller. The output signal from the controller influences the motor current. A generator acting as a mechanical resistance to shaft rotation can be activated by the software to study the influence of disturbance variables.

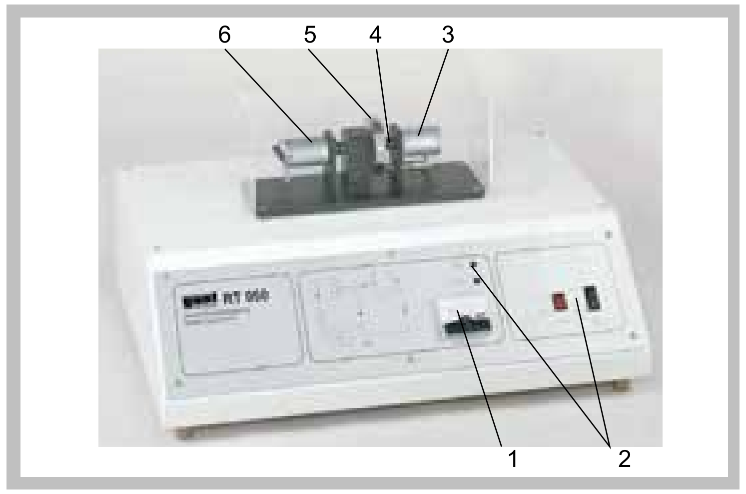
The powerful state-of-the-art software is an integral part of the training system, embodying the principle of hardware/software integration (HSI). It enables the experiments to be conducted and evaluated in a user-friendly manner. The software has network capability. The link between the experimental unit and the PC is made via a USB port.

The well-structured instructional material sets out the fundamentals and provides a step-by-step guide through the experiments.

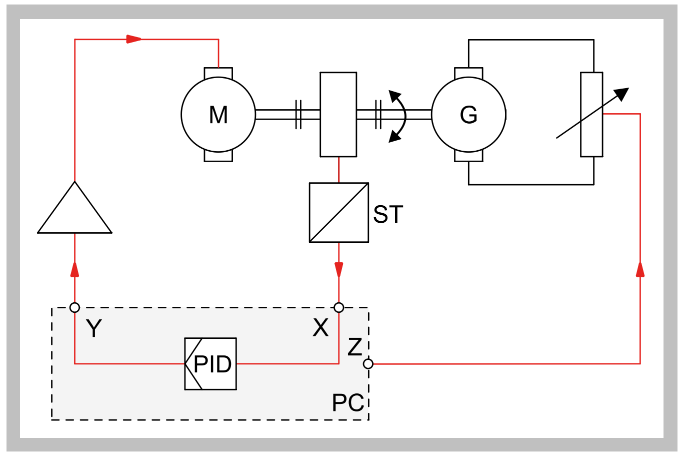
Learning Objectives / Experiments

- fundamentals of control engineering based on the example of a speed control system with PT_1 behaviour
- open loop control response
- effects of different controller parameters and methods on the response of the closed loop system
- recording of step responses
  - * reference variable
  - * disturbance variable
- controller optimisation
- software-based controlled system simulation
  - * comparison of different controlled system parameters

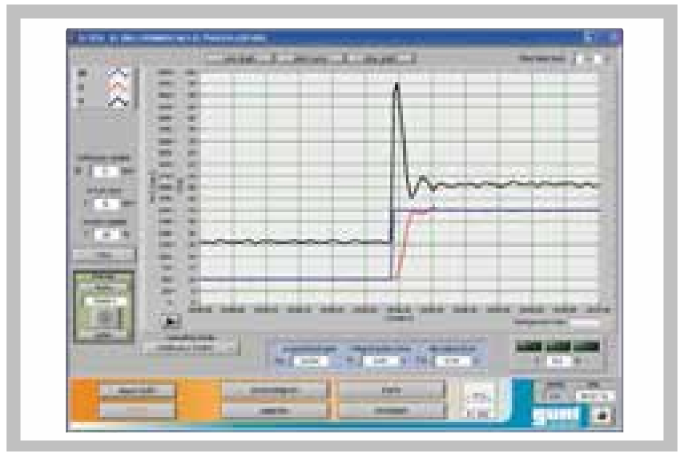
RT 050 Training System: Speed Control, HSI



1 tachometer, 2 displays and controls, 3 generator, 4 speed sensor, 5 rotor, 6 motor



Process schematic



Software screenshot: step response to change in reference variable with PID controller (acceptable control quality)

Specification

[1] experimental unit for control engineering experiments
[2] speed control of a DC motor with shaft and flywheel
[3] transparent protective cover for motor/generator set
[4] inductive speed sensor
[5] generation of disturbance variables by adjustable generator load
[6] software-based controlled system simulation
[7] process schematic on front panel
[8] networkable GUNT software via USB under Windows Vista or Windows 7

Technical Data

Motor
- max. speed: $4500 min^{-1}$
- max. motor power output: 10W
- max. torque: 1,7Ncm

Generator
- max. speed: $4500 min^{-1}$
- max. power output: 10W
- max. torque: 1,7Ncm

Tachometer (analogue): $0...6.000 min^{-1}$

Software controller configurable as P, PI and PID controller

Software
- process schematic with controller type selection (manual, continuous controller, programmer)
- time functions
- simulation function
- disturbance variable input

Dimensions and Weight

LxWxH: 600x450x310mm
Weight: approx. 18kg

Required for Operation

230V, 50/60Hz, 1 phase or 120V, 60Hz/CSA, 1 phase

Scope of Delivery

1 experimental unit
1 GUNT software CD + USB cable
1 handbook: fundamentals of control engineering (RT 010 - RT 060)
1 manual for RT 050

Order Details

080.05000 RT 050 Training System: Speed Control, HSI

RT 060 Training System: Position Control, HSI

*** Experimental unit with clear linear position control system**

*** Extensive range of experiments on fundamentals of control engineering**

*** State-of-the-art software for all experimental units of the RT 010 - RT 060 series, with extensive controller and recorder functions**

*** Software-based simulation of the controlled system**

Technical Description

This compact experimental unit offers every opportunity to learn the fundamentals of control engineering through experimentation on a linear position control system.

The experimental set-up is mounted on a housing which accommodates all the electronics. A transparent protective cover permits safe observation of the experiments. A carriage can be moved by a DC motor via a toothed belt. The linear positioning is measured by a rotary encoder and delivered as a voltage signal. The output signal from the sensor is sent to the software controller. The output signal from the controller influences the motor current. The motor is automatically shut down if the carriage reaches one of the two end positions.

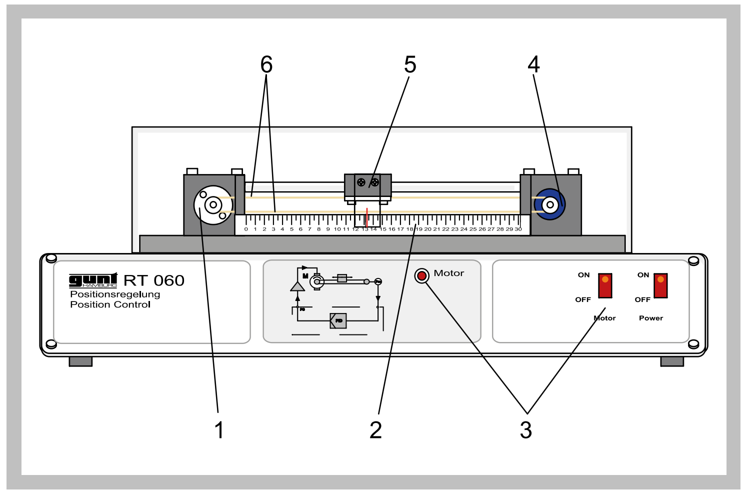
The powerful state-of-the-art software is an integral part of the training system, embodying the principle of hardware/software integration (HSI). It enables the experiments to be conducted and evaluated in a user-friendly manner. The software has network capability. The link between the experimental unit and the PC is made via a USB port.

The well-structured instructional material sets out the fundamentals and provides a step-by-step guide through the experiments.

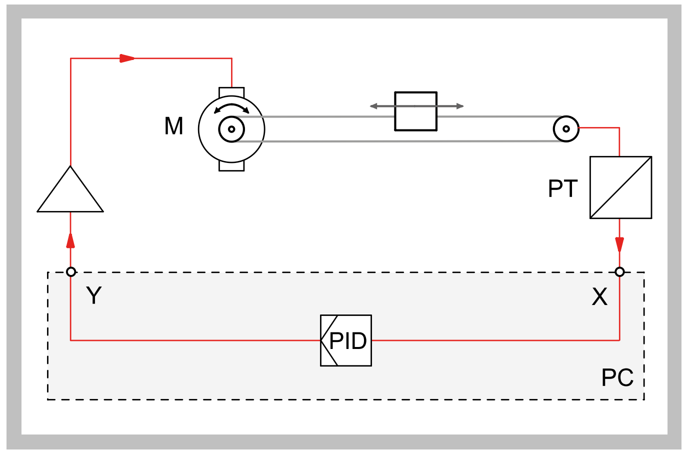
Learning Objectives / Experiments

- fundamentals of control engineering based on the example of a linear position control system with integral control action
- open loop control response
- effects of different controller parameters and methods on the response of the closed loop system
- recording of step responses
  * reference variable
- controller optimisation
- software-based controlled system simulation
  * comparison of different controlled system parameters

RT 060 Training System: Position Control, HSI



1 motor, 2 scale, 3 displays and controls, 4 rotary encoder, 5 carriage, 6 toothed belt



Process schematic

Software screenshot: step response to change in reference variable with P controller (permanent control deviation)

Specification

[1] experimental unit for control engineering experiments
[2] linear position control of carriage with linear drive and gear motor
[3] rotary encoder as displacement sensor
[4] transparent protective cover
[5] 2 microswitches to shut down at end positions
[6] software-based controlled system simulation
[7] process schematic on front panel
[8] networkable GUNT software via USB under Windows Vista or Windows 7

Technical Data

DC motor
- transmission ratio: i=50
- speed: 85min^{-1}
- torque: 200Nmm

Travel: max. 300mm
Max. traverse rate: 45mm/s
Scale: 0...300mm
Software controller configurable as P, PI, PID
Software
- process schematic with controller type selection (manual, continuous controller, programmer)
- time functions
- simulation function

Dimensions and Weight

LxWxH: 600x450x280mm
Weight: approx. 20kg

Required for Operation

230V, 50/60Hz, 1 phase or 120V, 60Hz/CSA, 1 phase

Scope of Delivery

1 experimental unit
1 GUNT software CD + USB cable
1 handbook: fundamentals of control engineering (RT 010 - RT 060)
1 manual for RT 060

Order Details

080.06000 RT 060 Training System: Position Control, HSI

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RT 800 PLC Application: Mixing Process

* Trainer for control of discontinuous mixing processes by PLC
* Use of standard industrial components
* Capacitive proximity switches as level sensors
* Built-in power supply unit to power all the components and the PLC

Technical Description

This trainer for PLC applications can be used to create complex PLC control functions from the field of process engineering, particularly for processes involving metering and mixing. The system consists of the base frame with a storage tank, a centrifugal pump and a demonstration panel on which all components are clearly laid out. A pump delivers water to three tanks, controlled via solenoid valves. The level of water in the three tanks is monitored by capacitive proximity switches with adjustable sensitivity. The fluid from the three tanks can be mixed together in the downstream mixing tank. The mixing tank is also equipped with three proximity switches. A stirring machine assists the mixing process. All the tanks are transparent, so the conveying and mixing processes are clearly observable.

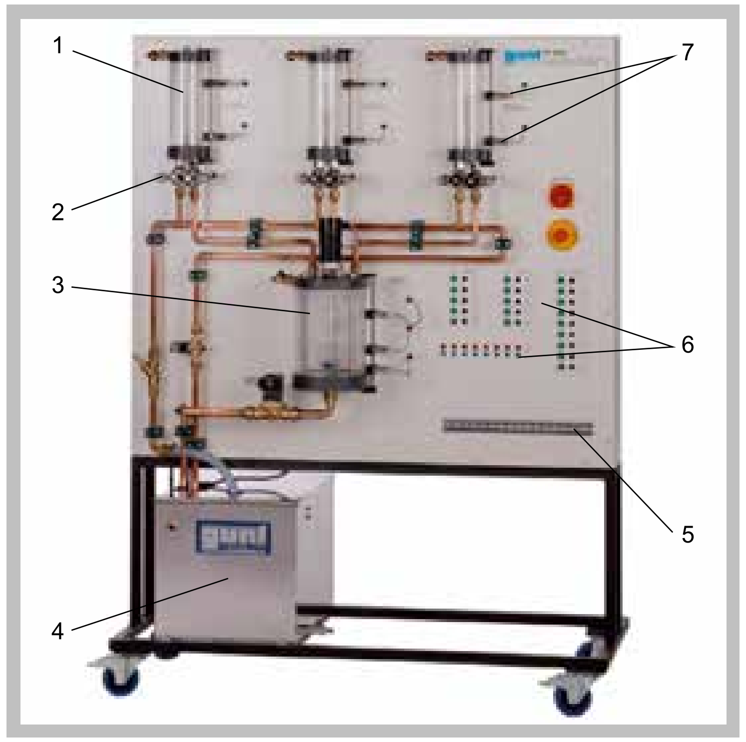
The trainer features a lab jack panel by which the signals from the capacitive proximity switches can be processed by PLC, and all the solenoid valves can be individually controlled. PLC systems from different manufacturers can be used. A rail on the model's front panel is provided so as to allow for connection of the PLC. Although a PLC is not included in the package, the operation of the system can be checked without one. We recommend the use of PLC module IA 130.

The well-structured instructional material sets out the fundamentals and provides a step-by-step guide through the experiments.

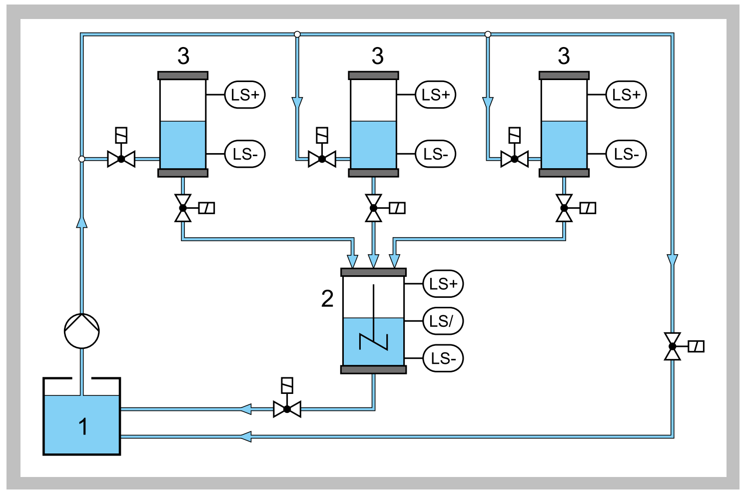
Learning Objectives / Experiments

- planning and implementation of a PLC controlled mixing process
- familiarisation with terms and symbols
- presentation of circuits
- functionality test of all sensors and actuators
- sensitivity adjustment of the capacitive proximity switches
- procedure for connecting up the PLC
- together with PLC module: performance of complex PLC control functions using a complex example from the field of process engineering
- discontinuous metering and mixing

RT 800 PLC Application: Mixing Process



1 measuring tank, 2 solenoid valve, 3 mixing tank with stirring machine, 4 storage tank, 5 rail for mounting of a PLC system, 6 lab jack panel for connection of a PLC, 7 level sensor



Process schematic: 1 storage tank, 2 mixing tank, 3 measuring tank;
LS level sensors (+: high, /: middle, -: low)

Specification

[1] clearly laid out trainer as basis for the use of a PLC in a process control application involving mixing processes
[2] transparent mixing tank with 3 capacitive proximity switches to monitor the level
[3] 3 transparent measuring tanks, each with 2 capacitive proximity switches
[4] metering from the 3 measuring tanks into the mixing tank via solenoid valves
[5] mixing assisted by stirring machine in mixing tank
[6] proximity switch signals processed by PLC via lab jack panel
[7] control of the 8 solenoid valves, the pump and the agitator also by PLC via lab jack panel
[8] capacitive proximity switches with adjustable sensitivity
[9] closed water circuit with centrifugal pump and stainless steel storage tank
[10] power supply to all components and to PLC by built-in power supply unit

Technical Data

Centrifugal pump (submersible pump)
- power consumption: 430W
- max. flow rate: 150L/min
- max. head: 7m

Tanks
- storage tank: 70L
- 3 measuring tanks: each 1500mL
- mixing tank: 7L

Capacitive proximity switches, NO contacts
2/2-way solenoid valves DN 8 and DN 20
Power supply unit: 24VDC, 8A

Dimensions and Weight

LxWxH: 1380x610x1850mm
Weight: approx. 145kg

Required for Operation

230V, 50/60Hz, 1 phase or 120V, 60Hz/CSA, 1 phase

Scope of Delivery

1 trainer
1 set of instructional material

Order Details

080.80000 RT 800 PLC Application: Mixing Process

IA 130 PLC Module

*** Self-contained PLC module for basic exercises**

*** Suitable for use in complex applications**

*** Programming software to IEC 61131-3**

Technical Description

The IA 130 can be used to perform basic exercises on a PLC (programmable logic controller). A PLC is essentially a computer adapted to the needs of industry. Its inputs and outputs are not designed for humans, but for use in the control of machines. Machine and operator interact solely by way of limit switches, momentary-contact switches or photoelectric switches.

The front panel is designed as a laboratory patchboard, where the input ports and output ports of the PLC can be connected to switches and displays via laboratory cables. In order to write programs the PLC must be connected to a PC (not supplied) via an RS232 interface.

The PLC programming software conforms to the international standard IEC 61131-3, and permits programming in the following languages: Statement List (STL), Ladder Diagram (LD), Structured Text (ST) and Function Block Diagram (FBD). Ladder Diagrams are based on graphical representations with contacts, coils and boxes, as per the circuit diagrams. Function Block Diagram language is based on graphical representation of the interlinking of logical function blocks, analogous to the logic diagrams. Statement List is an assembler-type language with a small, standardised non-hardware-dependent command set. Structured Text is a language similar to PASCAL, with mathematical expressions, assignments, function calls, iteration, condition selection, and PLC-specific add-ons. An example program is included in the module.

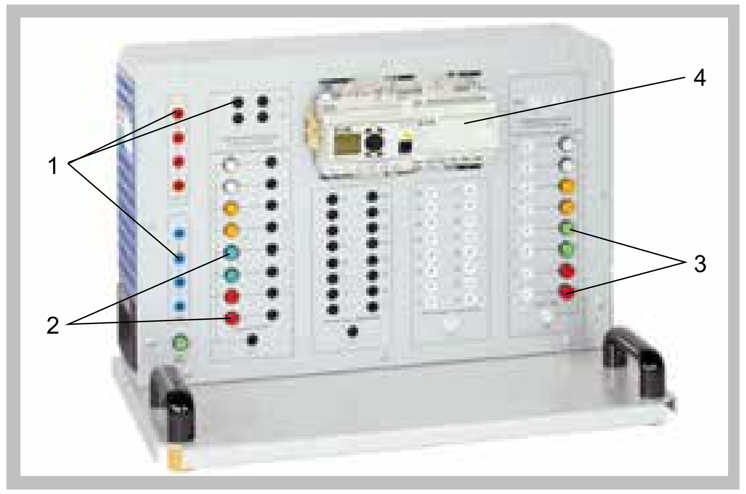
IA 130 can be used as a control element in conjunction with electrical, pneumatic or hydraulic applications, such as with the handling device IA 210 or the mixing process RT 800.

The well-structured instructional material sets out the fundamentals and provides a step-by-step guide through the experiments.

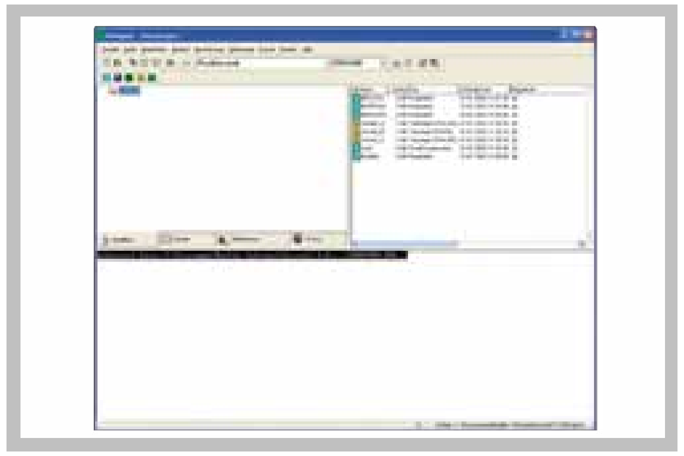
Learning Objectives / Experiments

- familiarisation with a PLC
- familiarisation with the essential fundamentals such as
  * Boolean algebra
  * compiling statement lists
  * interconnection diagrams and block diagrams
- exercises in
  * programming
  * logical "AND" / "OR" gates
  * logic relays
  * output and input
- configuration of program sequences by way of connectors, incorporating
  * timers
  * counters
  * cascade circuits
  * higher-order monitoring relays etc.
- fault finding

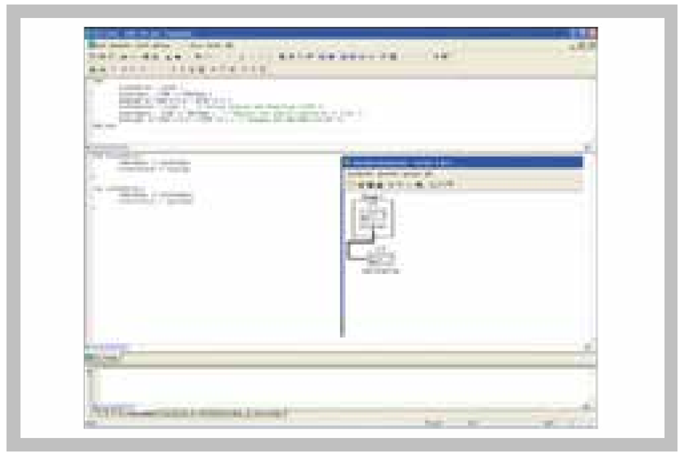
IA 130 PLC Module



1 lab jacks, 2 pushbutton, 3 lamps, 4 PLC



Screenshot of PLC software: start screen



Screenshot of PLC software: POU editor (POU = Program Organisation Unit) and topology configurator

Specification

[1] module for basic exercises on a programmable logic controller (PLC)
[2] self-contained PLC module, usable as part of a complex system
[3] integrated patchboard for creating circuits with input and output elements
[4] PLC with 2 integrated setpoint encoders
[5] programming software to IEC 61131-3
[6] example program supplied

Technical Data

PLC
- connections
  * 16 digital inputs
  * 16 digital outputs
  * 2 analogue inputs
  * 1 analogue output
- memory type: PLC back-up battery for 32kByte RAM and clock
- Rated voltage: 24VDC

Software
- graphical user interfaces
- programming languages to IEC/EN 61131-3:
  * statement list (STL)
  * ladder diagram (LD)
  * function block diagram (FBD)
  * structured text (ST)
- multiple dialogue languages (German, English, French, Spanish)
- graphical topology configurator
- system requirements: Windows Vista or Windows 7

Dimensions and Weight

LxWxH: 620x350x450mm
Weight: approx. 15kg

Required for Operation

230V, 50/60Hz, 1 phase or 120V, 60Hz/CSA, 1 phase

Scope of Delivery

1 PLC Module
1 PLC software with programming cable
1 set of laboratory cables
1 set of instructional material

Order Details

058.13000 IA 130 PLC Module