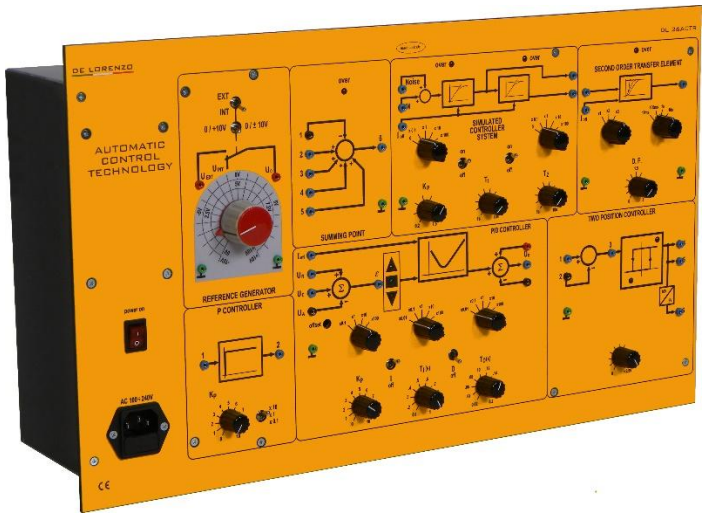
AUTOMATION AND CONTROL

BOARD FOR THE STUDY OF THE AUTOMATIC CONTROL TECHNOLOGY



DL 26ACTR

The board covers the following topics and experiments:

- 1st order process simulator
- 2nd order process simulator
- High order process simulator
- PID controller
- P controller positive and negative
- I controller (integrators)
- D controller (derivators), negative (negative zero) and positive (positive zero)
- 5 input adders
- ON-OFF controller with hysteresis

PID CONTROLLER

- Standard industrial controller that can be used as P, PI, PD or PID controller in the closed loop automatic control systems.
- Input summing node for two different reference variables UR and UC and for one controlled variable UA.
- Signal voltage range: -10V .... +10V
- Parameters of the controller continuously adjustable
- Proportional gain Kp = 0 ... 1000
- Time of the integral action TI = 1ms ... 100s
- Time of the derivative action TD = 0.2ms ... 20s
- Reset input of the integral controller
- Output summing node to add or subtract noise variables
- Measurement terminal for the error signal
- Adjustment screw for the output offset
- Three led indicator of the sense of deviation
- Coarse and fine adjustment of the proportional gain Kp, of the time of the integral action TI and of the time of the derivative action TD
- Input I_{off} for resetting the I controller

SIMULATED CONTROLLED SYSTEM

- It allows the simulation of different processes, such as 1st and 2nd order processes, proportional (P) action processes, integral I) action processes, double integral (I2) action processes.
- Input summing point for controlling variable (y) and noise variable (z).
- Signal voltage range: -10V, ..., +10V
- Coefficient of the proportional action of the process
- KP = 0.2 (attenuation) ....1.5 (amplification)
- Time constant T1 = 0.1 .... 1000 s
- Time constant T2 = 0.1 .... 1000 s
- Reset input for the restoration of the initial conditions
- Coarse setting through rotary switches
- Potentiometer fine setting
- Led indicators of over-range

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P CONTROLLER

- Proportional action controller suitable for the closed loop continuous control systems.
- Signal voltage range: -10V, ..., +10V
- Proportional gain Kp = 0 ... 100
- Three position switch coarse setting
- Potentiometer fine setting

TWO POSITION CONTROLLER

- Two position controllers for discontinuous closed loop control systems.
- It is provided with an input summing point to which the reference variable (non-inverting input) and the controlled variable (inverting input) are connected.
- By means of two led the binary state of the controller,whose hysteresis can be changed, is visualized.
- The controller is provided with two binary outputs at different voltages.
- Input summing point
- Signal voltage range: -10V, ..., +10V
- Output voltages: 0/+5 V ; 0/+10 V
- Adjustable hysteresis: 0 .... ± 2.5 V

SECOND ORDER TRANSFER ELEMENT

- It allows us to analyze the behaviour of an element with proportional transfer function able to oscillate, with a delay of the second order, both in the time domain and in the frequency domain.
- Signal voltage range: -10V, ..., +10V
- Gain factor = 1
- Time constant T = 10 ms .... 30 s, selectable through two rotary switches
- Damping coefficient d = 0 .... 3, with potentiometer setting
- Reset input for the restoration of the initial conditions
- Led indicators of over-range

SUMMING POINT - 5 INPUTS

- Five input summing point; three of them, non-inverting, can be used in the realization of particular configurations of the controller, using separately the elements P, I and D; the remaining inputs, one inverting and one non inverting, can be used to add the noise variables.
- Signal voltage range: -10V, ..., +10V
- Gain factor = 1
- Led indicator of over-range

LIST OF EXPERIMENTS

- P-type process
- I-type process
- I2-type process
- 1st order process
- Higher than 1st order process
- P controller
- I controller
- D controller
- PI controller
- PD controller

The trainer is provided complete with data acquisition board DL 1893 as an interface unit and processing software DL ACTSW developed in LabVIEW environment. The software guides the students to perform the experiments and processes the data to draw the relevant graphs.

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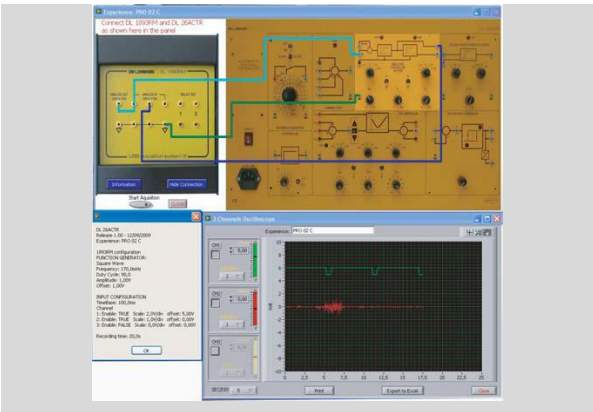
- PID controller
- P control, P-type process
- P control, 1st and higher order processes
- 2nd order I control, I-type processes
- Ziegler-Nichols dynamic method
- Chien-Hrones-Reswick static method
- 2 position controllers, 1st order process
- 2 position controller, delayed feedback, 2nd order process
- 2 position controller, elastic feedback, 2nd order process



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