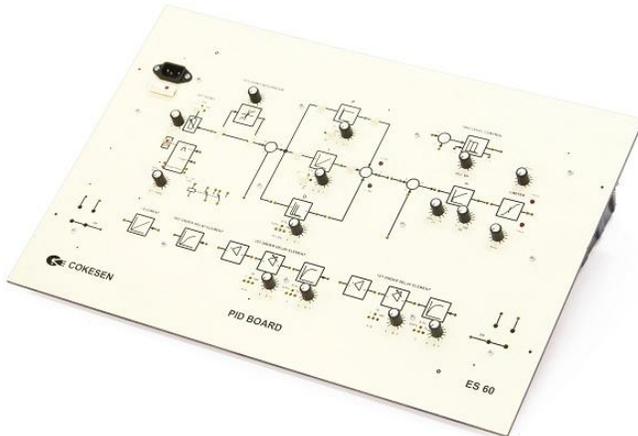


# PID CONTROL

## ES60.01(Board Typ) or ES05 60( Modul Typ)

A) Bag type ES60.01:

- **Universal training unit for control engineering .**
- **Built-in power supply unit (short-circuit-proof) .**
- **All fundamental experiments possible without storage oscilloscope .**
- **A pre-trigger circuit guarantees complete display of the signal .**
- **With detailed experiment descriptions**



B) Modul Typ ES05xx

- Can be use with ES05GK10 Electronic Trainer
- Connection with D-Sub 26pin connector to ES05GK10
- All experiments are same with typ ES60.01 PID Control Board

The unit can also be used as  
a controller for the following

- **MOTOR BOARD(Type ES60.20)**

- Temperature and Brightness  
Controlled System (ES60.02)



The characteristic data of all the controllers are settable within a wide range by connectors and potentiometers.

The polarity of the signals can be adapted to the requirements of the overall circuit or the wishes of the experiment leader by various summers, comparators and inverters. Limit value sensors at the output of the controllers report exceeding of the range clearly with LEDs. One I-element, several delay elements and P-elements are available for the electronic simulation of controlled systems.

With a few exceptions, all the elements of the control circuit with a time-dependent behaviour are designed so that their jump reply can be When an oscilloscope is used, this generator enables the measuring process to be repeated cyclically, whereby all the participating capacitors are discharged before each cycle. A pre-trigger circuit guarantees an optimum display of the signal on the oscilloscope. For measurements with a recorder, every measuring cycle can be triggered individually. The trigger output is available in connection with a relay for controlling the stylus.

The process control can also be controlled by a computer or a PLC through an additional RESET input. To conduct the experiments, the PID trainers is placed on a table or suspended in an rack for demonstration purposes.

### Function Groups on the PID Trainer:

#### Setpoint potentiometer:

voltage: 0 ... +10 V;  
0 ... -10 V; 0 ... +5 V

#### Sequence control:

voltage: 0 ... +10 V  
frequency: approx. 0 ... 100 Hz; can be replugged to single operation

#### Relay:

with 2 change-over contacts for setpoint jumps and recorder control

**Setpoint integrator:**

continuously adjustable time constant

**Comparator 1:**

forms the control difference  $e = w - x$

**P-controller:**

proportional correction value  $K_P$  adjustable by connectors and potentiometers in the range of approx. 0.1 ... 100

**I-controller:**

integral action time  $T_n$  adjustable by connectors and potentiometers in the range of approx. 1 ms ... 10 s

**D-controller:**

derivative action time adjustable by connectors and potentiometers of approx. 1 ms ... 10 s

**Summer:**

sums the controller output voltages

**Comparator 2:**

as additional comparator for setting up a cascade control. Forms the control difference  $e = w - x$

**Two-point controller:**

threshold switch with adjustable switching difference

**PI controller:**

controller for setting up a cascade control

**Limiter:**

conceived for matching to external control circuit elements and as a level detector for troubleshooting on the PID BOARD. The upper and lower reaction thresholds are separately adjustable.

**1st order delay element:**

two 1st order delay elements, for simulation of controlled systems, for matching of the feedback signal and the actual value of true controlled systems.

**3rd order delay element:**

for simulating a controlled system with delay time, e. g. a temperature control. By connecting it in series with the first order delay element, it can be further extended up to 5th order elements.

**I-element:**

for simulating a controlled system with I-behaviour, for example a filling level or position controlled system

## Accessories Recommended

- Experiment manual : " Introduction to Control Engineering" (Type EK60.01 or ES05 xx)
- Set of Accessories : (TypeES60.03), consisting of connecting leads and plugs

Subject to technical modification:

### Mains connection (only by ES60.01)

- Voltage: 230 V AC 50 Hz; 8 VA

### Dimensions and weights

**- PID Board (TypeES60.01):**

540 x 340 x 150mm(w x h x d) weight: ca. 3.35 kg

**- PID Modul (Typ ES05 60):**

210 x 299 mm x 30mm ca : 1kg

**Order no: PID Board (TypeES60.01) (Bag type)**

**Order no: PID Modul (Typ ES05 60) (for use with main unit ES05GKxx)**

**Order no: Motorboard : ES60 20**