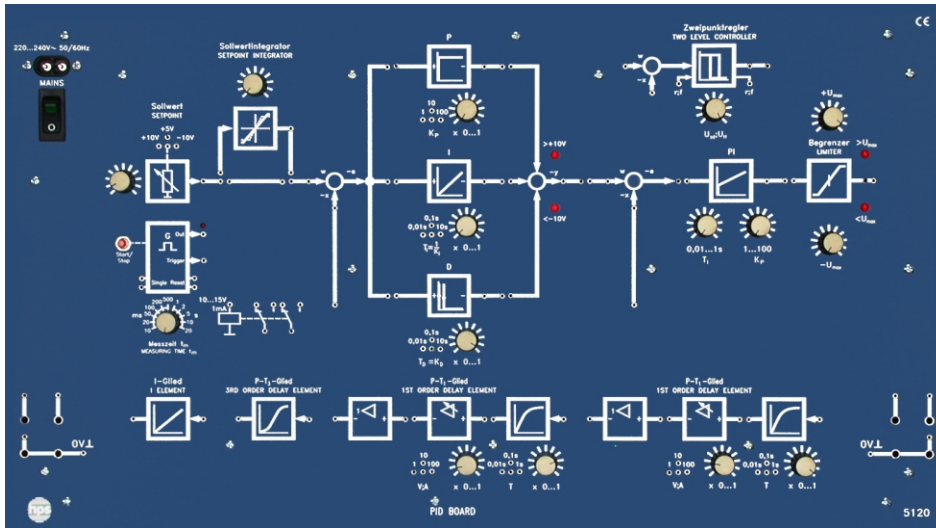


Control Engineering



PID BOARD Type 5120



Front view of the PID BOARD

- 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
- As a test object in computer-aided teaching
- With detailed experiment descriptions

The PID BOARD has been developed by hps System Technik especially for basic and further experimentation in control engineering.

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

- POWER BOARD (Type 5125)
- MOTOR BOARD (Type 5130)
- SERVO BOARD (Type 5131)

- Temperature and Brightness Controlled System (Type 5125.5)

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 measured with a normal

oscilloscope and a storage oscilloscope as well as with a Y-t recorder.

Repetition frequencies up to 100 Hz are possible for operation with an oscilloscope. Measurements with a recorder can be conducted as a one-time procedure at times in the seconds range.

The decisive factor in the reproducibility and comfort for the measurements is the clock generator which hps SystemTechnik has developed especially for this Board.

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.



PID BOARD Type 5120

The process control can also be controlled by a computer or a PLC through an additional RESET input.

To conduct the experiments, the PID BOARD is placed on a table or suspended in an hps rack for demonstration purposes.

The PID BOARD can be converted into a portable training unit by simply screwing it into a Box: All the experiments can be conducted directly in the Box. Dust-free storage and protection against transport damages are further advantages of the Box version.

Function Groups on the PID BOARD

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 re-order 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

Technical Data

Mains connection

- Voltage: 230 V AC / 115 V AC (110 V AC); 50 ... 60 Hz; 8 VA

Mechanical data

- The front panel of the PID BOARD is made of 5 mm thick laminate, matt blue in colour with white engraving representing the built-in function groups.
- The rear of the Board is protected with a grey plastic cover. Its shape allows the Board to be placed at an ergonomically favourable angle for example on a table.

Dimensions and weights

- Board version (Type 5120): 532 x 297 x 110 mm (w x h x d)
weight: ca. 3.35 kg
- Box version, consisting of:
PID BOARD (Type 5120) and
Box (Type 5120.20): 580 x 450 x 155 mm
total weight: approx. 6.1 kg

ments 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 V 0120)
- Set of Accessories (Type 5120.1), consisting of connecting leads and plugs

Subject to technical modification.