162254

PID controller

PID

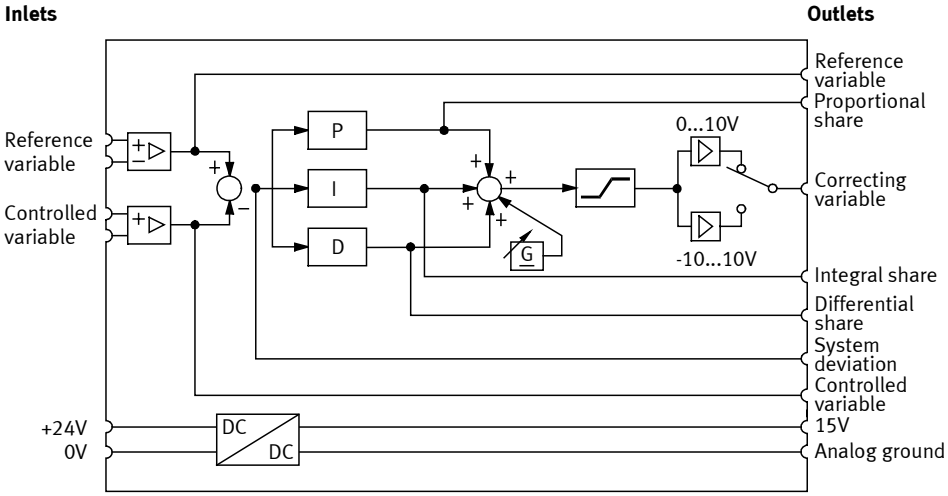
Design

The PID controller is made up of the following function areas:

- Power supply
- Differential inputs
- Comparator
- Controller components: Proportional component, Integral component, Differential component
- Correcting variable offset
- Summation point
- Limiter
- Output

Function

This PID controller can be used, among other things, as a controller for closed-loop pneumatic and hydraulic control circuits.



Representation in circuit diagram

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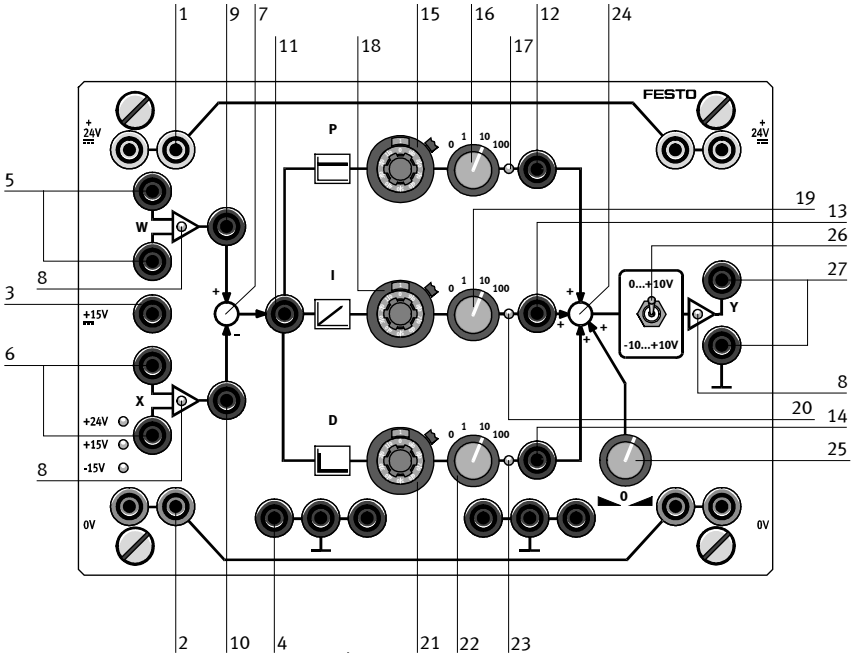

Key to operator facilities

1	Power supply + 24 V
2	Power supply ground 0 V
3	Sensor power supply + 15 V
4	Sensor ground or analogue ground
5	Differential setpoint input
6	Differential actual-value input
7	Comparator
8	Overmodulation indicator
9	Test socket Setpoint
10	Test socket Actual value
11	Test socket System deviation
12	Test socket Proportional gain
13	Test socket Integral gain
14	Test socket Differential gain
15	Rotary potentiometer P component
16	Rotary switch P component
17	Power-on indicator P component
18	Rotary potentiometer I component
19	Rotary switch I component
20	Power-on indicator I component
21	Rotary potentiometer D component
22	Rotary switch D component
23	Power-on indicator D component
24	Summation point
25	Rotary potentiometer for correcting variable offset
26	Range selector switch
27	Correcting variable output

Power supply	The PID controller requires a power supply of 24 V. This voltage is converted internally to +/- 15 V and fed to the controller electronics. The voltages are electrically isolated from each other, i.e. the controller card has two zero potentials (analogue ground and power-supply ground (0 V)).
Note	The analogue ground and power-supply ground should never be connected together, since this may cause interference to signals. The 15 V should be used in conjunction with the analogue ground as the power supply for sensors in order to ensure that noise signals are kept to a minimum.
Differential inputs	A differential input is provided in each case on the PID controller for the setpoint and actual-value signals. The differential signal can be measured against analogue ground. The differential inputs are fitted with low-pass filters to suppress interference. Overmodulation of below -10 V or above +10 V is indicated by LEDs.
Comparator	The comparator is connected in series with the signal inputs and calculates the system deviation between the setpoint and actual value.
Controller components	The three controller components (P, I and D components) can be switched on and off separately, allowing different combinations to be used. The individual controller parameters are adjusted with the aid of potentiometers and rotary switches.
Correcting variable offset	The correcting variable offset can be used to impose constant voltages on the control signal in order, for example, to compensate for the zero-point shift of actuators.
Correcting-variable limiter	The correcting-variable limiter converts the controller signals to the working range required by the actuators. Any overmodulation of the output signal is indicated by an LED.
Output	The correcting variable can be tapped against analogue ground at the output.
Test sockets	Various test sockets allow signal voltages to be measured against analogue ground.

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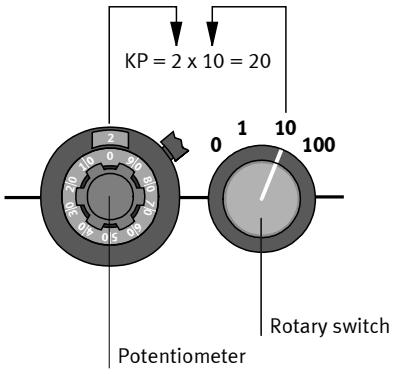
Setting the coefficients

The coefficients KP, KI and KD of the controller components are the product of the values set on the rotary potentiometer and rotary switch.



Technical data

Electrical	
Power supply	24 V DC +/-10 %
Overmodulation indicator	-10 > Ue > +10 V
Input voltage range	-13 V – +13 V
Position coefficient Kx	0 – 10
Speed coefficient K $\dot{x}$	0 – 100 ms
Acceleration coefficient K $\ddot{x}$	0 – 10 ms²
Overall gain P	0 – 1000
Output voltage limitation	[0 V – +10 V] [-10 V – +10 V]
Correcting variable offset	5 V ±3,5 V bei [0 V – +10 V] 0 V ±7 V bei [-10 V – +10 V]
Connection	for 4 mm safety connector plug
Electromagnetic compatibility	CE
Emitted interference	tested to EN 500 81-1
Noise immunity	tested to EN 500 81-1