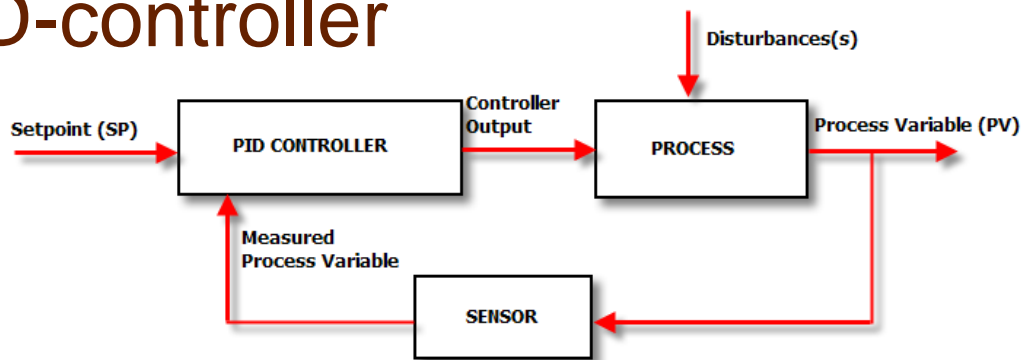


PID-controller



Functionality:

PID controllers automatically influence the physical parameters in usually a technical process in such a way that a predetermined value is maintained as well as possible even when interfering flows occur.

For this purpose, controllers within a control circuit continuously compare the signal of the "reference variable (set-point)" with the measured and returned "feedback variable (actual value)" and determine a "control variable" from the difference between the two variables of the control deviation. The control path is influenced in such a way that the control deviation becomes a minimum in the steady state.

Because the individual control circuits have a time response, the controller must amplify the value of the control deviation and at the same time compensate the time behavior of the line in such a way that the control variable is able to reach the set point value in a desired manner from aperiodic to damped oscillation.

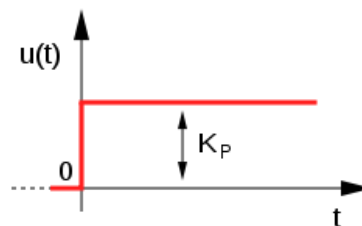
Incorrectly set controllers make the control loop too slow, lead to a large control deviation or to undamped vibrations of the control variable and therefore possibly to the destruction of the control path.

This control function component can be used as a P-controller, I-controller, PI-

controller, PD controller and PID-controller.

P-controller:

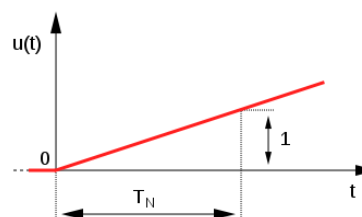
Jump response P-amount with K_p



The P-controller only consists of a proportional amount of the amplification K_p . With its output signal u it is proportional to the input signal e .

I-controller:

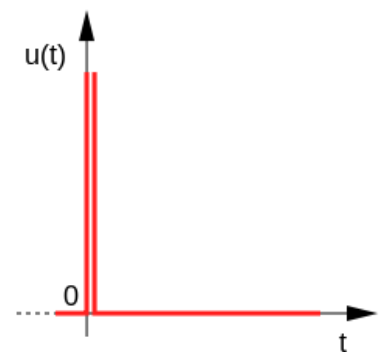
Jump response I-amount



An I-controller (integrated controller, I-ied) affects the control variable through temporal integration of the control deviation $e(t)$ with the weighting according to the reset time T_N .

D-Unit:

Jump response of the ideal D-unit



The D-unit is a differentiator, which is used as a controller only in conjunction with controllers with P- and / or I-behavior. It does not react to the height of the control deviation $e(t)$ but only to its rate of change.

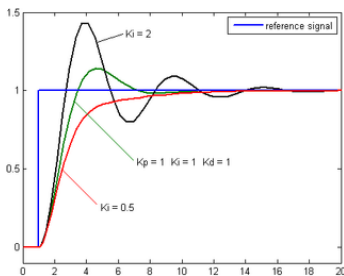
Empirical dimensioning:

In practice, control loops are often implemented without using a model by simply trying out controller settings. The controller parameters are simply preselected and varied according to practical experience. Therefore, this method is also only suitable for dimensioning simple systems.

Source: Wikipedia

The procedure is as follows:

One starts with a noncritical setting by choosing the P-part small and setting I and D to 0. Now slowly increase the P-part so long until the damping becomes bad. If an oscillation inclination occurs, the gain P is decreased by a little bit. Subsequently, the integral part and the differential part are also added, and they are also slowly increased until the result is quite acceptable. If the regulation becomes more stable, you can again increase P or I and test until everything fits.



- Go to „Controls“ in the device configuration . Create a new control function with the green plus.
- Press the button „Output“.
- Create the „PID-Regulation“ function component.



- At name enter e.g.: „Controller 1“.
- At „Actual Value“ select your e.g.: PT1000 temperature sensors that is responsible for the actual value.
- At „Enable“ (set point) you select e.g.. Fix Value and a tem-

perature of e.g.: 65°C.

Here you also have the possibility to select a not fixed set point that e.g.: is affected by the outdoor temperature.

- At „Update time“ select the speed of how often this control is refreshed e.g.: 1 s.
- At „positive“ select the control direction.

This function is set to "negative“ at e.g.: export controls.

- At „Min. deviation“ you enter the smallest deviation step e.g.: 5.
- At „Ymin“ you can set the start value. It usually starts with 0. But it can also be higher e.g.: 20.
- At „Ymax“ you can set the end value. This value is usually at 100. But it can also be lower.
- At „Kp“ you can enter the proportional amount. See P-Controller.
- At „Ki“ you enter the integral amount. See I-controller.
- At „Kd“ you enter the differential amount. See D-unit.
- At „Interface“ you go to „Select Interface“ and select the „Physical output“ or an „internal Memory“.
- At „Select Enabled“ you can turn the control on and off with another component.
- Confirm with „OK“.
- Press on „Save“.