PID controller

A proportional–integral–derivative controller (PID controller) is a control loop feedback mechanism widely used in industrial control systems. PID controller is a three component controller featuring proportional, integral and derivative terms. A PID controller continuously calculates an error value as the difference between a desired setpoint and a measured process variable. It then applies a correction based on proportional, integral, and derivative terms.

PID controller uses two TCP/IP channels for communication with a controlled system. One channel is used by PID to send values of control parameters, for example a voltage value in the case of heater, or DC motor and force in the case of a spring model. The second TCP/IP channel is used by PID to receive values of controlled parameters which are then compared to a set point. PID controller widget contains a graph to show value of the controlled parameter compared to a setpoint.

The user specifies the clock values which is used for the PID exchange period and set the point which is related to the controlled system.

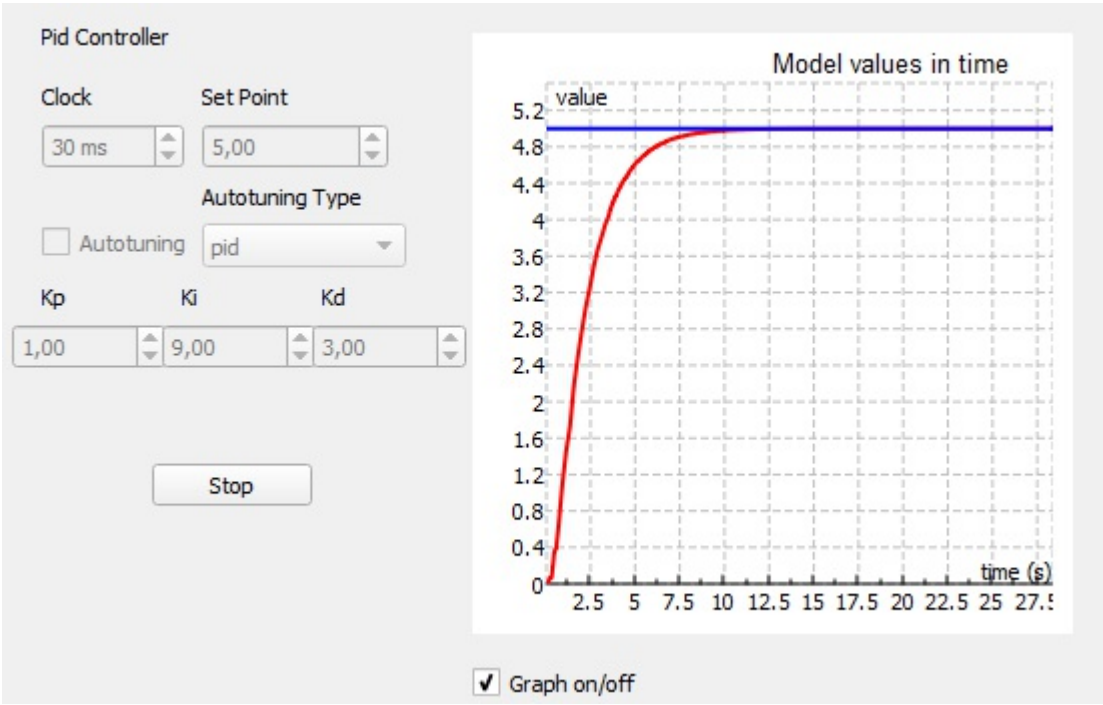
channels table( ) =

ID	Name	IP Address	Port	Origin	Source Name
0	"model 11 input"	"127.0.0.1"	1805	"model 11 input"	"Value"
1	"model 11 output"	"127.0.0.1"	1806	"model 11 output"	"Value"

in1 := channel connect("127.0.0.1" , 1806) Input channel

out := channel connect("127.0.0.1" , 1805) Ouptut channel

p := pid controller widget(0 , "pid1" , in1 , out) Definition of PID controller widget



Automatic tunning

Auto-tuning the PID controller is the adjustment of its control parameters (proportional gain, integral gain, derivative gain) to the optimum values for the desired control response. Ziegler–Nichols method

for auto-tuning is the most common method in practice.

MatDeck provides PID controller for real-time operation and control with communication with a system implemented through TCP/IP channel. The PID controller can be used in a graphical mode by invoking the PID Controller widget and using function pid controller widget(). In the graphical mode all parameters are set by choosing corresponding options. The proportional, integral and derivative gains can be entered manually or they can be determined by auto-tuning. The auto-tuning is based on the Ziegler–Nichols method, with the following different controllers: p, pi, pid, less overshoot, no overshoot, and Pessen integral. PID controller widget contains a graph where it is possible to see the value of the measured process variable versus the set point.