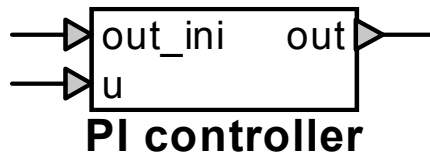


Control function: PI controller, fixed coefficients



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1 Description

This device is an implementation of a PI (proportional-integral) controller with fixed coefficients. For a version with variable coefficients, use the device "PI controller, dynamic".

1.1 Pins

This device has three pins:

<i>pin</i>	<i>type</i>	<i>description</i>
out_ini	input	initial value of output at t=0
u	input	controller input
out	output	controller output

1.2 Parameters

The following parameters must be defined:

<i>parameter</i>	<i>description</i>
Kp	gain of proportional signal
Ki	gain of integral signal
stepped	=1 to indicate stepped transitions =0 to indicate ramped transitions

The value of the parameter *stepped* determines whether the device operates with *stepped* or *ramped* transitions. In *stepped* mode (the default for ideal logical signals), the output is represented as a stepped signal, where changes in value are observed as vertical steps at the time they occur. In *ramped* mode, the value transitions of the output are seen as ramps between $t-\Delta t$ and t .

1.3 Input

The input pins may be connected to any control signals.

1.4 Output

The output is a weighted sum of the input signal (proportional part) and of the time integral of the input signal (integral part).

The representation of the output as having *stepped* or *ramped* transitions is determined by the value given to the parameter *stepped*.

1.5 Representation

The implementation of the model can be inspected by opening the device's subcircuit.

The model applies the following equation:

$$\text{out} = K_p \cdot u + K_i \cdot \int u \cdot dt \quad (1)$$

The model is self-initializing at $t=0$. The initial value of the integral is calculated as the value producing the given initial value of the output at $t=0$:

$$\text{initial value of integral} = (\text{out_ini} - K_p \cdot u(0)) / K_i \quad (2)$$

producing

$$\text{out}(0) = K_p \cdot u(0) + K_i \cdot (\text{initial value of integral}) \quad (3)$$