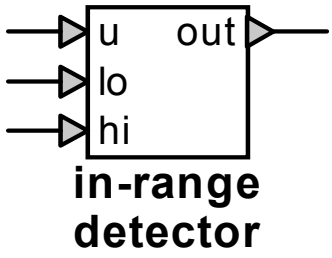
Control function: in-range detector



1 Description

This device indicates when the value of a signal lies within a defined interval.
The output value is 1 when *lo* ≤ *u* < *hi*, and is 0 otherwise.

1.1 Pins

This device has four pins:

pin	*type*	*description*
u	input	measured input
lo	input	range low boundary
hi	input	range high boundary
out	output	detector output

1.2 Parameters

The following parameter must be defined:

parameter	*description*	*units*
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-Δt and t.

1.3 Input

The input pins may be connected to any control signal.

1.4 Output

The output has the value 1 or 0 indicating the result of the in-range detection. When the input signal *u(t)* lies inside the range defined by the boundary values *lo(t)* and *hi(t)*, the output is 1, otherwise it is 0.

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:

$$\begin{array}{ll} \text{when } lo(t) \le u(t) < hi(t) & \text{output} = 1 \\ \text{otherwise} & \text{output} = 0 \end{array} \qquad (1)$$