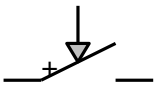
Controlled switch



1 Description 1
2 Parameters and rules 1
3 Netlist format 2
4 Steady-state model and initial conditions 2
5 Frequency Scan model 2
6 Time-domain model 3

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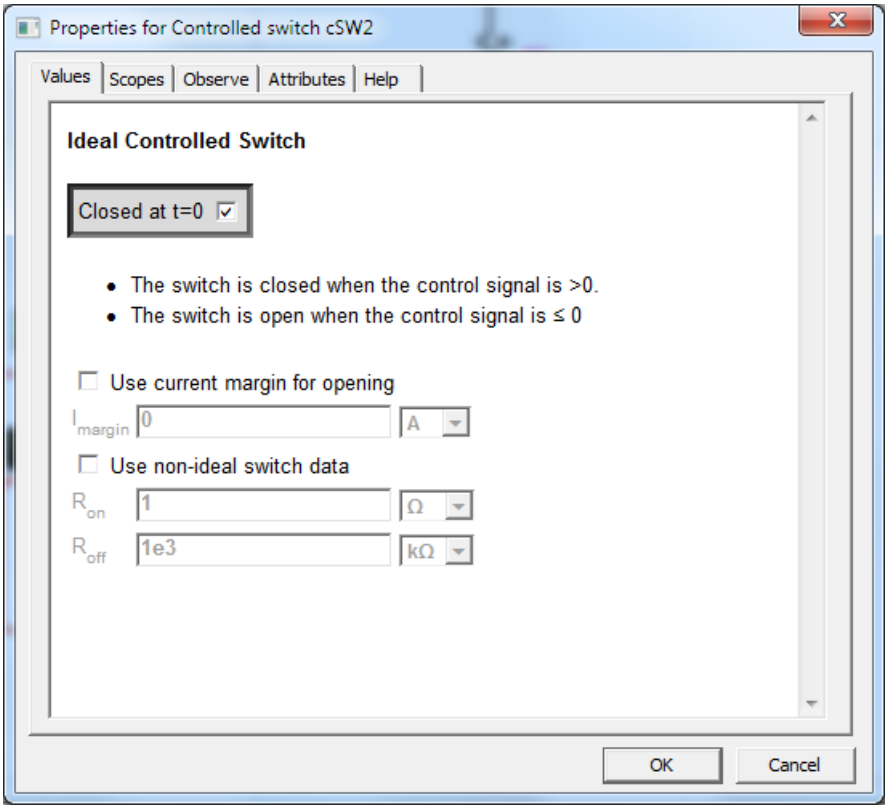
1 Description

This device is an ideal switch controlled by a control signal. It has a zero resistance and zero voltage drop when closed and infinite resistance when open. It is a 1-phase device.
It is optionally possible to use a current margin for switch opening and non-ideal switch resistances.

2 Parameters and rules



Parameters:

- Closed at t=0

  This option is used for initializing the simulated network in steady-state solution. When this option is checked the switch is closed in the steady-state solution and its symbol changes to the closed switch symbol.
- Use current margin or opening: option allowing to delay opening with a current margin.
  - I_{margin} is the absolute current margin
- Use non-ideal switch data: option allowing to create a non-ideal switch
  - R_{on} : resistance when the switch is closed
  - R_{off} : resistance when the switch is open

When the control signal is greater than 0 the switch is closed. When the control signal is ≤ 0 the switch is open.

This is a 1-phase device and it is not allowed to change its pin attributes. It is not allowed to delete any pins. This is an ideal device. Placing several switches in parallel is acceptable if the switches are not closed at the same time. When paralleled switches are closed at the same time, mathematically impossible conditions will result and EMTP will *try* to solve such cases by inserting dummy resistances.

It is optionally possible to save the switching instants into an ASCII file (text file). This option (Save status change instants) is available on the Scopes tab and its tooltip includes further details on generated files.

3 Netlist format

```
_cSw;cSW1;3;3;k,m,control,
1,1,1,1,4,1e06,1,?v,?i,?p,>v,>i,>p,>S,
```

Field	Description
_cSw	Part name
cSW1	Instance name, any name.
3	Total number of pins
3	Number of pins given in this data section
k	Signal name connected to k-pin, any name
m	Signal name connected to m-pin, any name
control	Control signal name, any name
Closed at t=0	1 means closed in steady-state, 0 means open in steady-state
Use current marging for opening	1 means use current margin
Current margin	Current margin value
Use non-ideal switch data	1 means use non-ideal switch data
Resistance when on	On resistance
Resistance when off	Off resistance
Save status change instants	1 means that the status change instants will be saved into a file. See the tooltip of this option for further details.
?v, ?i, ?p	Optional scope requests
>v, >i, >p, >S	Optional observe requests

Device data fields are saved into the ParamsA device attribute.

4 Steady-state model and initial conditions

If the switch is closed at t=0, it is modeled as a closed switch. It is an open switch otherwise.

5 Frequency Scan model

Similar to the steady-state option.

6 Time-domain model

The switch is modeled by a zero resistance when conducting and by an infinite resistance when turned off. As indicated above, it is optionally possible to model using R_{on} and R_{off} resistances instead of an ideal switch.