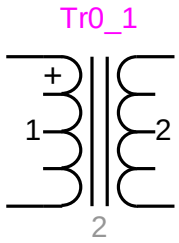
Ideal unit transformer



1 Description

This device provides an ideal transformer unit. There are no losses in both primary and secondary windings. It is using four 1-phase (General Signal) pins. The windings are identified by the numbers 1 for primary and 2 for secondary.

2 Parameters and rules

There are 3 parameters:

- **Primary voltage V1**: Voltage of primary winding, optional, when ratio is not selected
- **Secondary voltage V2**: Voltage of secondary winding, optional, when ratio is not selected
- **Ratio**: Ratio V2/V1 entered directly

When the Ratio option is not selected then it is automatically calculated from V1 and V2. Since the transmitted (only model data) data is Ratio, it is not possible to enter variables in the data fields of V1 and V2.
Since this is a pure (no losses) transformer model, some configurations may result in mathematically impossible conditions and should be avoided.
It is not allowed to delete any pins or to change a pin Phase attribute.

3 Netlist format

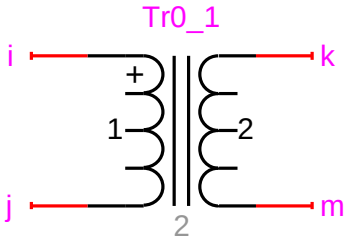


Figure 1 Example

The Netlist of the device shown in Figure 1 is given by:

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_Tr0;Tr0_1;4;4;i,j,k,m,
2,,,
```

Field	Description
_Tr0	Part name
Tr0_1	Instance name, any name.
4	Total number of pins
4	Number of pins given in this data section
i	Signal name connected to i-pin
j	Signal name connected to j-pin
k	Signal name connected to k-pin
m	Signal name connected to m-pin
2	Ratio

Device data fields are saved in the ParamsA device attributes.

4 Steady-state model

The unknown variable is the current i_{km} (from k-pin to m-pin) in winding 2. The transformer voltage equation is given by:

$$v_k - v_m - gv_i + gv_j = 0 \quad (1)$$

where g is the transformation ratio. The current equation of the current flowing from i-pin to j-pin is given by:

$$i_{ij} = -gi_{km} \quad (2)$$

It is noticed that currents entering the transformer nodes are given by:

$$i_k = i_{km} \quad (3)$$

$$i_m = -i_{km} \quad (4)$$

$$i_i = -gi_{km} \quad (5)$$

$$i_j = gi_{km} \quad (6)$$

5 Load-Flow model

Identical to the steady-state version.

6 Frequency Scan model

Identical to the steady-state version.

7 Time-domain model

Identical to the steady-state version.