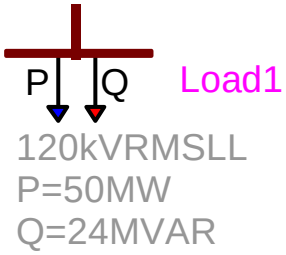
RLC_load (PQ)



RLC_load (PQ) 1
1 Description 1
1.1 Parameters and Rules 1
2 Netlist format 2
3 Steady-state model 3
4 Frequency Scan model 3
5 Time-domain model 3

Jean Mahseredjian, 9/14/2013 1:18:00 PM

1 Description

This device models a 3-phase load. It is a masked device based on the subnetwork of Figure 1. The subnetwork has a 3-phase pin.

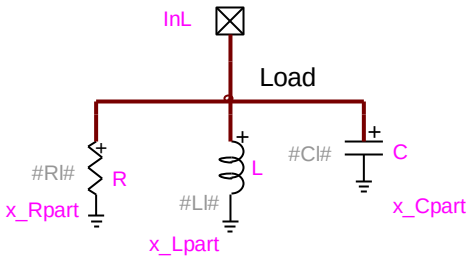


Figure 1 The masked subnetwork of "RLC_Load (PQ)"

Since the mask design is based on scripting (scripted black-box), it is not allowed to enter undetermined values (named values) using variables.

1.1 Parameters and Rules

The parameters are the load nominal Voltage V_{load} (RMS line-to-line voltage), the load Active Power P (3-phase) and the load Reactive Power Q (3-phase).
It is allowed to enter zero for the load nominal voltage and in that case, the load becomes a three-phase short-circuit.
The resistance R value is defined for a positive power P (P>0):

$$R = \frac{V_{load}^2}{P} \quad (1)$$

When $P \le 0$ the R branch is automatically disconnected.
The inductance L value (Ohms, X_L) is defined for a positive reactive power Q (Q>0):

$$L = \frac{V_{load}^2}{Q} \quad (2)$$

The capacitance C value (Siemens, $1/X_C$) is defined for a negative reactive power Q (Q<0):

$$C = \frac{-Q}{V_{load}^2} \quad (3)$$

When Q=0 both the L and C branches are disconnected.

The Apparent Power S and the Power Factor are available as optional input methods. Changes in any parameter value are automatically reflected into other parameters.

2 Netlist format

This device allows method-based scripting. The object data and methods are described in the script file referenced by the device Script.Open.Dev attribute.

The mask of this device is based on scripting. The top level script is identified by the attribute Script.Open.Dev as RLCLoad_info.dwj. It allows to open the device data web, gather data and create the device Netlist. It constitutes a demonstration of advanced options available in EMTPWorks for mask programming sophistication.
Since entered data is not transmitted directly to the Netlist, but translated through a script, it is not possible to enter variables in data fields.
A Netlist example for the default device data is given below:

```
@RLC_Load_dd1ec64d;Load1;3;s1a,s1b,s1c,
Rpart='RLC'
Rl=288;
Lpart='RLC'
Ll=144Ohm;
Cpart='Exclude'
Rl_scope=','
Ll_scope=','
Cl_scope=','
```

Field	Description
@RLC_Load_dd1ec64d	Part name, including code to account for user changes
Load1	Instance name, any name
s1a	Phase-a signal name
s1b	Phase-b signal name
s1c	Phase-c signal name
Rpart	Part name for the R branch
Rl	Resistance value of the load (when connected)
Lpart	Inductance part name
Ll	Inductance value of the load (when connected)
Cpart	Capacitance part name
Cl	Capacitance value of the load (when connected)
Rl_scope	Programmable scope for resistance current and/or power
Ll_scope	Programmable scope for inductance current and/or power
Cl_scope	Programmable scope for capacitance current and/or power

Device data fields are saved into the ModelData attribute. This device is using the variable part name feature of EMTPWorks. When a part name is set to the string ‘Exclude’ the corresponding device becomes excluded from the Netlist.

3 Steady-state model

The calculated R, L and C branches are modeled as the RLC device.

4 Frequency Scan model

The calculated R, L and C branches are modeled as the RLC device.

5 Time-domain model

The calculated R, L and C branches are modeled as the RLC device.