

DlgSILENT Technical Documentation

AEG RR3M PowerFactory V001 Relay model description



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AEG RR3M

PowerFactory
V001 Relay model description

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1 Model general description

The AEG RR3M relay is a reverse over power relay. The AEG RR3M PowerFactory relay model is implementing a good approximation of the reverse power trip characteristics of the relay.

The blocks present inside the model can be classified in terms of functionality as measurement and acquisition block, time counter and control blocks and output logic blocks.

1.1 Measurement and acquisition

1.1.1 Available Units

The primary currents are measured by one current transformer ("CT" block), the primary voltages by one voltage transformer ("Vt" block).

Two measurement units ("Measurement" and "Vnom Inom" block) are fed by this CT and this VT. The "Direction Calculator" block is then fed by the "Measurement" block.

1.1.2 Functionality

The "Measurement" block is calculating the apparent power using the algorithm used by the relay. The "Direction Calculator" block calculates the power flow direction and blocks the overpower element and the current dependant time characteristic blocks when the power is not flowing in the reverse direction. The "Vnom Inom" block can be used as user interface to allow the user to define the rated values.

1.1.3 Data inputs

Usually no user input is required.

The "Nominal current" and the "Nominal voltage" value can be set inside the "Vnom Inom" block. The "Nominal current" is the CT secondary rated current. The "Nominal voltage" is the VT secondary phase to ground rated voltage. By default the "Nominal current" is 5 A and the "Nominal voltage" is 230 V (phase-ground value assuming a phase-phase voltage equal to 400 V)

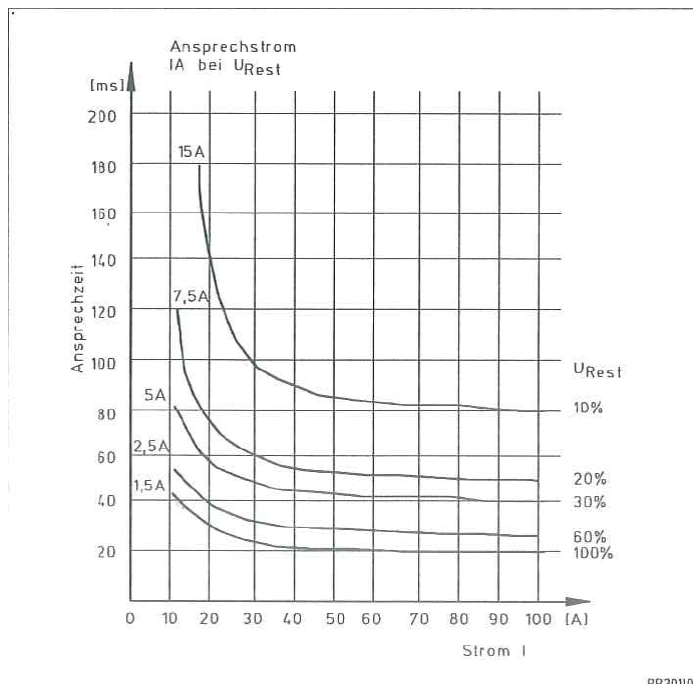
1.2 Time counter and control blocks

1.2.1 Available Units

- Five current dependant time characteristics ("Delay I 100", "Delay I 60", "Delay I 30", "Delay I 20" and "Delay I 10" block)
- One voltage dependant time characteristics ("Delay U" block)
- One overpower control element ("Power Threshold" block)
- One instantaneous no directional overcurrent blocking element ("Instantaneous trip" block)
- Three logic control elements ("Block logic I", "Block logic U" and "Delay I time logic")

1.2.2 Functionality

The trip characteristic of the relay as been modelled assuming a time constant part depending up on the voltage and an inverse characteristic depending up on the current and the voltage. The picture here below shows the relay trip characteristics as described in the relay documentation.



Internally to the model the trip characteristic active when for instance the voltage is 30% U_n is decoupled in a constant part equal to 40 ms and in an inverse part depending upon the current with time values set between 40 and 80 ms. The relay tripping time is modelled adding together the trip time of these two parts.

The voltage dependent time constant characteristic is implemented by the "Delay U" block. The current dependant time characteristics by the "Delay I 100", "Delay I 60", "Delay I 30", "Delay I 20" and the "Delay I 10" block. Only one of such block is active for a given voltage value. The selection of the active characteristic/block is made by the "Block logic I" block.

The "Power Threshold" block has the purpose of checking that the power flowing in the circuit is greater than the trip threshold set by the customer. A value in "pu" must be entered and the dialog calculates the phase power threshold value.

The "Block logic U" block has the task to block the "Delay U" block if the "Power Threshold" block didn't detect a power flow above the given threshold.

The "Instantaneous trip" block implements a simple not directional instantaneous overcurrent element which is blocking the reverse power main element if the current is not above a fixed threshold set at $2I_n$.

1.2.3 Data input

Please insert the reverse power threshold in the "Power Threshold" block. No other user data input is required in the other blocks.

1.3 Output logic

1.3.1 Available Units

The output logic is implemented by the "Output logic" and by the "Trip" block.

1.3.2 Functionality

The "Output logic" block is performing some internal logic operations: the trip times coming from the voltage dependant time characteristic ("Delay U" block) and from the current dependant time characteristics ("Delay I 100", "Delay I 60", "Delay I 30", "Delay I 20" and "Delay I 10" block) are put together and the output of the

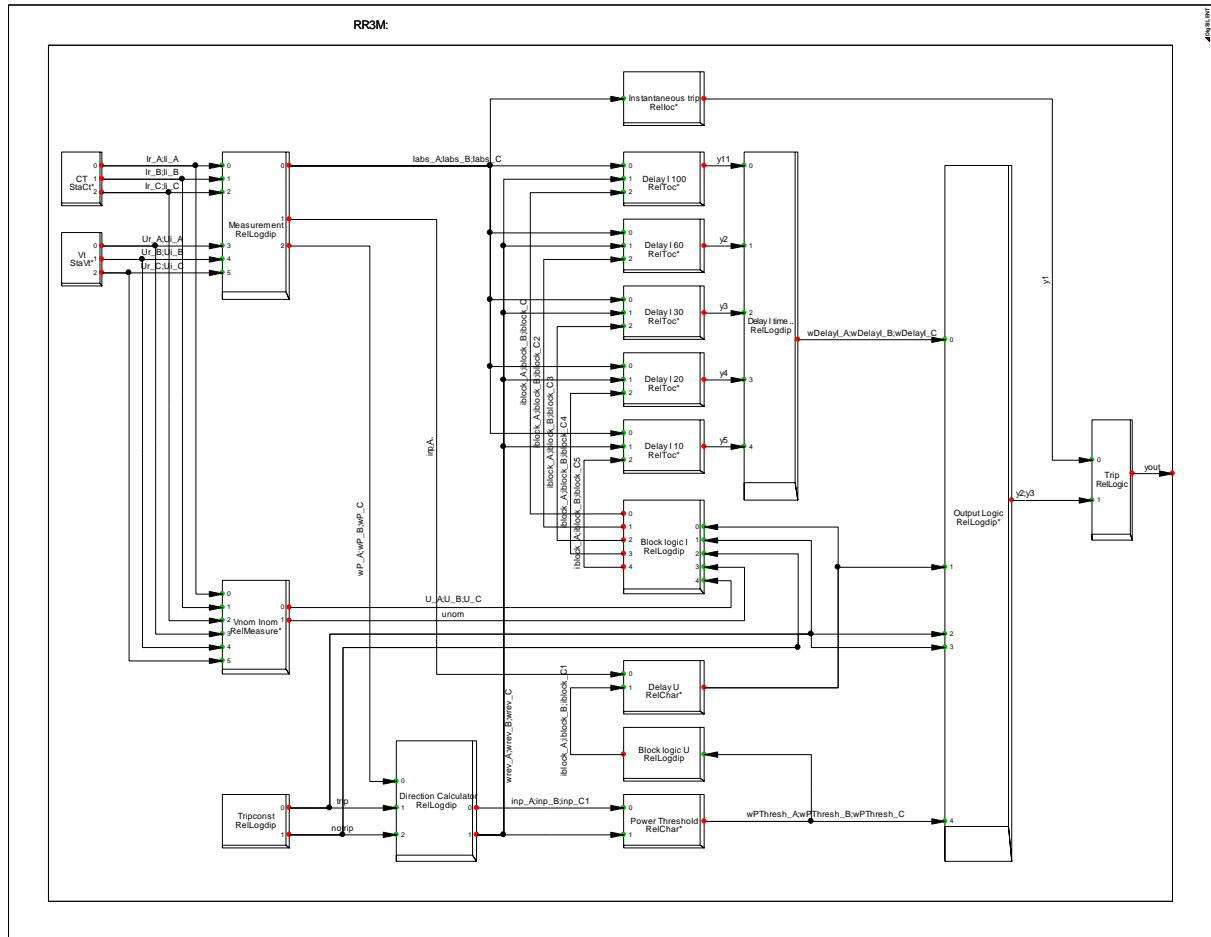
The "Trip" block is operating the breaker. Please disable the "Trip" block to disable the relay model ability to open the power circuit.

The output signal made available by the relay model is "yout".

1.3.3 Data input

No user data input is required.

2 Model scheme



3 References

The model implementation has been based on the information available in the following document:

- "Ruckleistungsrelais für Maschennetze RR3M(k)b AEG 88180/SLTS 12.05241"