



POWERFACTORY

PowerFactory 2021

Technical Reference

Siemens RxAs72k

PF2021

POWER SYSTEM SOLUTIONS
MADE IN GERMANY

Publisher:

DlgSILENT GmbH
Heinrich-Hertz-Straße 9
72810 Gomaringen / Germany
Tel.: +49 (0) 7072-9168-0
Fax: +49 (0) 7072-9168-88
info@digsilent.de

Please visit our homepage at:
<https://www.digsilent.de>

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1 Model information

Manufacturer Siemens

Model RxA72k

Variants This family of PowerFactory relay model types simulates the following overcurrent relays manufactured by Siemens:

- R2A7(k)
- R3A7(k)
- R3A7e(k)

2 General description

The Siemens RxA72k protective relays are double phase or three phase non directional ac overcurrent devices. The Siemens RxA72k family of PowerFactory relay models consists of models using two different schemes:

- *IOC-IOC-2p* scheme type: one two phases overcurrent time defined element("/>") and one two phases overcurrent instantaneous element("/>>").
- *IOC-IOC* scheme type: one three phases overcurrent time defined element("/>") and one three phases overcurrent instantaneous element("/>>").

The following PowerFactory relay model types have been implemented:

- R2A72k
 - R2A72k-1A
 - R2A72k-5A
- R3A72k
 - R3A72k-1A
 - R3A72k-5A

The model implementation has been based on the information available in the Siemens relay documentation [1].

3 Supported features

3.1 Measurement and acquisition

It represents the interface between the power system and the relay protective elements. The currents flowing in the power system are converted by an element simulating a 2 phases CT (*IOC-IOC-2p* scheme) or a 3 phases CT (*IOC-IOC* scheme).

3.1.1 Available Units

- one current transformer ("Ct" block in the *IOC-IOC* scheme, "Ct-2p" block in the *IOC-IOC-2p* scheme).
- one phase measurement element ("Measure" block).

3.1.2 Functionality

The "Ct" and the "Ct-2p" block represent an ideal CT. The "Ct" block models a 3 phase current transformer, the "Ct-2p" a two phases current transformer. Using the CT default configuration the current at the primary side are converted to the secondary side using the CT ratio. The CT saturation and/or its magnetizing characteristic are not considered. Please set the "Detailed Model" check box in the "Detailed Data" tab page of the CT dialog and insert the data regarding the CT burden, the CT secondary resistance and the CT excitation parameter if more accurate simulation results are required.

The measurement block simulate a second order low pass analog filter with DC component filter; its time constant is 1 ms.

3.1.3 Data input

No user input is required

3.2 Protective elements

A set of definite time and instantaneous overcurrent elements is modeling the relay protective functions.

3.2.1 Available Units

- *IOC-IOC-2p* scheme type
 - one 2 phases definite time overcurrent element("/>" block).
 - one 2 phases instantaneous overcurrent element("/>>" block).
- *IOC-IOC* scheme type
 - one 3 phases definite time overcurrent element("/>" block).
 - one 3 phases instantaneous overcurrent element("/>>" block).

3.2.2 Functionality

The **"I>"** block implements a overcurrent threshold with constant user configurable trip time. Both the current trip threshold and the trip delay can be set continuously to any value belonging to the setting range. The reset time is fixed and equal to 150 ms, the fixed pickup time is equal to 60 ms.

The **"I>>"** block implements a overcurrent threshold with instantaneous trip time. The current trip threshold can be set continuously to any value belonging to the setting range. The reset time is fixed and equal to 30 ms, the fixed pickup time is equal to 60 ms.

3.2.3 Data input

The relationships between the relay settings and the model parameters can be found in the following tables.

IOC-IOC-2p scheme type:

Address	Relay Setting	Model block	Model setting	Note
	Stromrelais RA14	I>	Pickup Current (Ipsetr)	
	Zeitrelais RS7	I>	Time Setting (Tset)	
	Kurzschluss-Schnellausloeserelais RA19	I>>	Pickup Current (Ipsetr)	

IOC-IOC scheme type:

Address	Relay Setting	Model block	Model setting	Note
	Stromrelais RA14	I>	Current Setting (Ipset)	
	Zeitrelais RS7	I>	Time Dial (Tset)	
	Kurzschluss-Schnellausloeserelais RA19	I>>	Pickup Current (Ipset)	

3.3 Output logic

It represents the output stage of the relay; it is the interface between the relay and the power breaker.

3.3.1 Available Units

- one output logic element ("*Logic*" block)

3.3.2 Functionality

The "*Logic*" block collects the trip signals coming from the protective elements and operates the relay output contact. The output contact is named "*yout*".

3.3.3 Data input

No user input is required. To disable the relay model ability to open the power circuit breaker simply disable the "*Logic*" block.

4 Features not supported

The following features are not supported:

- Delayed reset time of the inverse time characteristic

5 References

- [1] Siemens, Erlangen. *Unabhaengiger Überstromzeitschutz R2As7(k), R3As7(k), R3As7e(k)*, around 1960.