



POWERFACTORY

PowerFactory 2021

Technical Reference

Siemens 7SJ72

POWER SYSTEM SOLUTIONS
MADE IN GERMANY

F2021

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1 Model information

Manufacturer Siemens

Model 7SJ72

Variants The PowerFactory relay model simulates the features present in the Siemens 7SJ72 relay.

2 General description

The Siemens 7SJ72 is a first generation static overcurrent protection relay mainly designed for the selective short-circuit and earth fault protection of feeders in secondary distribution networks and for backup protection.

The Siemens 7SJ72 relay family has been modeled using four PowerFactory relay models which include any protective element available in the relay.

The Siemens 7SJ72 family of PowerFactory relay models consists of models using four different schemes:

- *7SJ72 (2ph+E)0* scheme type: one two phases (*A* and *C*) and ground overcurrent defined time element("*I>*").
- *7SJ72 (2ph+E)1* scheme type: one two phases (*A* and *C*) and ground overcurrent defined time element("*I>*"), one two phases (*A* and *C*) and ground overcurrent instantaneous time element("*I>>*").
- *7SJ72 (3ph) 0* scheme type: one three phases overcurrent defined time element("*I>*").
- *7SJ72 (3ph) 1* scheme type: one three phases overcurrent defined time element("*I>*"), one three phases overcurrent instantaneous time element("*I>>*").

The following PowerFactory relay model types have been implemented:

- 7SJ72 (2ph+E) 0
- 7SJ72 (2ph+E)1
- 7SJ72 (3ph) 0
- 7SJ72 (3ph)1

The model implementation has been based on the information available in the relay manual [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 in the "7SJ72 (2ph+E) 0" and in the "7SJ72 (2ph+E)1" relay model by an element which simulates a 2 phases CT and by an element which simulates a Core CT, by an element which simulates a 3 phases CT in the other relay models; the secondary currents are then measured by one element which models the analog filter of the relay.

3.1.1 Available Units

- One 2 phases current transformer in the "7SJ72 (2ph+E) 0" and in the "7SJ72 (2ph+E)1" relay model ("Ct" block).
- One 3 phases current transformer in the "7SJ72 (3ph) 0" and in the "7SJ72 (3ph)1" relay model ("Ct" block).
- One Core Ct in the "7SJ72 (2ph+E) 0" and in the "7SJ72 (2ph+E)1" relay model ("Ct_Zero" block).
- One 3 channels measurement element ("Measure" block).

3.1.2 Functionality

The "Ct" and the "Ct_Zero" block represent ideal CTs. 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 models a second order low pass analog filter with DC component filter; its time constant is 1 ms.

3.1.3 Data input

The relay nominal current value (relay "Inom" variable) must be set in the measurement block.

3.2 Protective elements

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

3.2.1 Available Units

- "7SJ72 (2ph+E) 0"
 - one 2 phases and ground overcurrent definite time element ("*I*>" block).
- "7SJ72 (2ph+E) 1"
 - one 2 phases and ground overcurrent definite time element ("*I*>" block).
 - one 2 phases and ground overcurrent instantaneous time element ("*I*>>" block).
- "7SJ72 (3ph) 0"
 - one 3 phases overcurrent definite time element ("*I*>" block).
- "7SJ72 (3ph) 1"
 - one 3 phases overcurrent definite time element ("*I*>" block).
 - one 3 phases overcurrent instantaneous time element ("*I*>>" block).

3.2.2 Functionality

The PF model contains all the protective elements available in the relay.

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 50 ms, the fixed pickup time is equal to 10 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 50 ms, the fixed pickup time is equal to 10 ms.

3.2.3 Data input

The relationships between the relay settings and the model parameters can be found in the following table (the relay model parameter names are listed between brackets):

Address	Relay Setting	Model block	Model setting	Note
	J>-Stufe	I>	Current Setting(Ipset)	
	Ausloesezeit	I>	Time Dial (Tpset)	
	J>>-Stufe	I>>	Current Setting (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 element ("*Output Logic*" block)

3.3.2 Functionality

The *"Output Logic"* block collects the trip signals coming from the protective elements and operates the relay output contact when at least one protective element trips. The relay output contact is *"yout"*.

3.3.3 Data input

To disable the relay model ability to open the power circuit breaker simply disable the *"Output Logic"* block.

4 Features not supported

None.

5 References

- [1] Siemens, Werner-von-Siemens- Strasse 50 8520 Erlangen. *7SJ72 Überstromzeitschutz im Einheitsgehäuse für Gleich oder Wandlerstromversorgung Nr E141/148-000 E14041-F4163-U211-A4*.