POWERFACTORY

PowerFactory 2021

Technical Reference

ABB RXIDK 4

POWER SYSTEM SOLUTIONS
MADE IN GERMANY

PF2021

Contents

1   Model information

Manufacturer   ABB

Model   RXIDK 4

Variants   This family of PowerFactory relay model types simulates the ABB RXIDK 4 relay and the RAIDK 400 protection assemblies containing the RXIDK 4 relays.

2   General description

The ABB RXIDK 4 is a microprocessor 3 phase time overcurrent and earth fault protective relay with starting, delayed and instantaneous tripping functions. It contains independent phase and neutral overcurrent elements designed as I>, I>>, I_N>, I_N>>.

The ABB RXIDK 4 relay has been modeled using five PowerFactory relay models:

- RXIDK 4 A5C5
- RXIDK 4-A1C1
- RXIDK 4-A1C10
- RXIDK 4-A5C1
- RXIDK 4-A5C10

They include all the protective elements and most of the features available in the relay.

The PowerFactory ABB RXIDK 4 relay model type names have the following structure:

<type name>("RXIDK 4") + <phase rated current code> + <neutral rated current code>

Accordingly to the relay manual [1] the following *"phase rated current codes"* have been used:

- *A1* (1 A I_r rated current)
- *A5* (5 A I_r rated current)

In the same way the following *"neutral rated current codes"* have been used:

- *C1* (1 A I_N rated current)
- *C5* (5 A I_N rated current)
- *C10* (0.1 A I_N rated current)

The PowerFactory ABB RXIDK 4 relay model types can be found at:
\Library\Relays\Relays\Overcurrent Relays\ABB/Westinghouse\RX\RXIDK 4

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 by an element simulating a 3 phase CT and by an element simulating a single phase CT; the secondary currents are then measured by two elements modeling the analog filter of the relay.

3.1.1   Available Units

- one 3 phase current transformer ("Ct-3P" block)

- one 3/single phase current transformer ("Ct-3I0" block)

- one 3 phase measurement element ("Meas 3ph" block)

- one single measurement element ("Meas 3I0" block)

3.1.2   Functionality

The "Ct-3P" and the "Ct-3I0" 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 "Meas 3ph" and the "Meas 3I0" block model second order low pass analog filter with DC component filter; it's time constant is 10 ms.

If no core CT is available, please select a 3 phases CT in the "Ct-3I0" slot: the earth current will be calculated assuming that an Holmgreen's connection of the phases is used.

3.1.3   Data input

No manual data input is required.

3.2   Protective elements

A set of inverse time and definite time overcurrent elements is modeling the relay protective functions. All protective functions available in the relay are available as well in the PowerFactory relay model .

3.2.1   Available Units

- one 3 phase inverse time overcurrent element ("I> t" block)

- one 3 phase definite time overcurrent element ("I>>" block)

- one zero sequence inverse time overcurrent element ("Io> t" block)

- one zero sequence definite time overcurrent element ("Io>>" block)

3.2.2   Functionality

All the inverse characteristics available in the relay are supported by the inverse time overcurrent element. The following trip characteristics are modeled:

- C1 Normal Inverse

- C2 Very Inverse

- C3 Extremely Inverse

- C4 Long Time Inverse

- RI Inverse

- Def.Time 0.05-20

3.2.3   Data input

The relationships between the relay settings and the model parameters can be found in the following table:

Address	Relay Setting	Model block	Model Parameter	Note
	I> Current Setting	I> t	Current Setting ("Ipset")	
	I> Characteristic	I> t	Characteristic ("pcharac")	
	I> Time Delay	I> t	Time Dial ("Tpset")	
	I>> Current Setting	I>>	Current Pickup ("Ipset")	
	I>> Time Delay	I>>	Time Delay ("Tset")	
	I_N> Current Setting	Io> t	Current Setting ("Ipset")	
	I_N> Characteristic	Io> t	Characteristic ("pcharac")	
	I_N> Time Delay	Io> t	Time Dial ("Tpset")	
	I_N>> Current Setting	Io>>	Current Pickup ("Ipset")	
	I_N>> Time Delay	Io>>	Time Delay ("Tset")	

3.3   Output logic

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

3.3.1   Available Units

- one output element ("Logic Type" block)

3.3.2   Functionality

The "Logic Type" block is collecting the trip signals coming from the phase and the earth protective elements; it's operating the relay output contacts and the power breaker. The output contacts are "yout1" and "yout2": "yout1" is asserting when one of the phase protective elements ("I> t" or "I>>")is tripping, "yout2" is asserting when one of the earth fault protective elements ("Io> t" or "Io>>")is tripping.

3.3.3   Data input

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

4   Features not supported

The following features are not supported:

- Protective elements start signals

5   References

[1] ABB Automation Products AB, Substation Automation Division, SE-721 59 Vasteras, Sweden. *RXIDK 4 and RAIDK 3-phase and neutral overcurrent relay and protection assemblies 1MRK 509 035-BEN Issued March 1998*, 1998.