



POWERFACTORY

PowerFactory 2021

Technical Reference

ABB RXIDK 2H

POWER SYSTEM SOLUTIONS
MADE IN GERMANY

F2021

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>

Copyright © 2021 DlgSILENT GmbH

All rights reserved. No part of this
publication may be reproduced or
distributed in any form without written
permission of DlgSILENT GmbH.

November 15, 2019
PowerFactory 2021
Revision 924

Contents

1 Model information	1
2 General description	1
3 Supported features	2
3.1 Measurement and acquisition	2
3.1.1 Available Units	2
3.1.2 Functionality	3
3.1.3 Data input	3
3.2 Protective elements	3
3.2.1 Available Units	3
3.2.2 Functionality	3
3.2.3 Data input	4
3.3 Output logic	4
3.3.1 Available Units	4
3.3.2 Functionality	4
3.3.3 Data input	5
4 Features not supported	6
5 References	7

1 Model information

Manufacturer ABB

Model RXIDK 2H

Variants This family of PowerFactory relay model types simulates the ABB RXIDK 2H relay and the RAIDK protection assemblies containing the RXIDK 2H measuring relays.

2 General description

The ABB RXIDK 2H protective relays are microprocessor non directional ac overcurrent devices. Single, two-, three-phase and three-phase to earth variants are available for short circuit and earth fault protection of all type of objects in the network. Three variants with 0.2, 1, and 5 A secondary rated current have been manufactured.

For the user convenience the relevant PowerFactory ABB RXIDK 2H relay models have been implemented including a 3 phase time defined overcurrent element which can be used to mock a set of 3 RXIDK 2H devices. Moreover some relay models have been implemented with a single phase time defined overcurrent element which can be used to simulate a single RXIDK 2H device which can be used for single phase protection or for earth protection.

Available relay models are simulating any secondary rated current; however they are simulating only the relays manufactured with 50-60 Hertz standard filters ("C1", "C6", "C11", "A1", "A6" and "A11" order code).

The ABB RXIDK 2H family of PowerFactory relay models consists of models using three different schemes:

- *TOC-IOC RXIDK* scheme type: One 3 phase inverse time element ("Toc") and one time defined element("Ioc") which can be used to model 3 phases or 2 phases assemblies
- *TOC-IOC RXIDK 1ph* scheme type: One single phase inverse time element ("Toc") and one single phase time defined element("Ioc") which can be used to model one single RXIDK 2H used for phase overcurrent protection
- *TOC-IOC RXIDK Earth* scheme type: One single phase inverse time element ("Toc") and one single phase time defined element("Ioc") which can be used to model one single RXIDK 2H used for earth overcurrent protection

The PowerFactory ABB RXIDK 2H relay model type names have the following structure:

<type name>("RXIDK 2H") + "<nominal current> (i.e. "1A") + "-" + <code id>("i.e."A1")-" + "RAIDK1")

The "RAIDK1" string is present only for relay types simulating such assembly. Please notice that the overcurrent protections RAIDK1 are built-up based upon the RXIDK 2H overcurrent relays.

The PowerFactory ABB RXIDK 2H relay model types can be found at:

\Library\Relays\Relays\Overcurrent Relays\ABB\Westinghouse\RX\RXIG

where they are arranged in two directories hosting the earth ("Earth Relays" directory) and the 3, 2, single phase relay ("Phase Relays" directory) models.

The following relay models are available:

- Earth Relays
 - RXIDK 2H 0.2A-C11 (scheme type: TOC-IOC RXIDK Earth)
 - RXIDK 2H 1A-C1 (scheme type: TOC-IOC RXIDK Earth)
 - RXIDK 2H 5A-C6 (scheme type: TOC-IOC RXIDK Earth)
- Phase Relays
 - RXIDK 2H 0.2A-A11 (scheme type: TOC-IOC RXIDK)
 - RXIDK 2H 0.2A-A11-RAIDK1 (scheme type: TOC-IOC RXIDK 1ph)
 - RXIDK 2H 1A-A1 (scheme type: TOC-IOC RXIDK)
 - RXIDK 2H 1A-A1-RAIDK1 (scheme type: TOC-IOC RXIDK 1ph)
 - RXIDK 2H 5A-A6 (scheme type: TOC-IOC RXIDK)
 - RXIDK 2H 5A-A6-RAIDK1 (scheme type: TOC-IOC RXIDK 1ph)

Please notice that different relay models using the same scheme type (i.e. "RXIDK 2H 0.2A-A11" and "RXIDK 2H 1A-A1") have the same type of protective elements with different setting ranges.

The model implementation has been based on the information available in the relay documentation [2] [1].

3 Supported features

3.1 Measurement and acquisition

It represents the interface between the power system and the relay protective element. The currents flowing in the power system are converted by an element simulating a 3 phase CT or a single phase CT.

3.1.1 Available Units

TOC-IOC RXIDK scheme

- one 3 phase current transformer ("Ct" block)
- one 3 phase measurement element ("Measurement" block)

TOC-IOC RXIDK 1ph and TOC-IOC RXIDK Earth scheme

- one single phase current transformer ("Ct" block in the "TOC-IOC RXIDK Earth" scheme, "Ct-1p" block in the "TOC-IOC RXIDK 1ph" scheme)
- one single phase measurement element ("Measurement" block)

3.1.2 Functionality

The "Ct" and the "Ct-1p" 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 simulate a second order low pass analog filter with DC component filter; its time constant is 1 ms.

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

3.1.3 Data input

The "Current setting" model parameter of the "Measurement" block must be set equal to the "Scale constant" relay setting (set using the 10-pole programming switch ("S1") in the relay front panel).

3.2 Protective elements

An inverse time overcurrent element and a time defined overcurrent element are modeling the relay protective functions.

3.2.1 Available Units

- *TOC-IOC RXIDK* scheme type
 - one 3 phase inverse time overcurrent element("I> t" block)
 - one 3 phase time defined overcurrent element("I>>" block)
- *TOC-IOC RXIDK 1ph* scheme type
 - one single phase inverse time overcurrent element("I> t" block)
 - one single phase time defined overcurrent element("I>>" block)
- *TOC-IOC RXIDK Earth* scheme type
 - one earth current inverse time overcurrent element("I>" block)
 - one earth current time defined overcurrent element("I>>" 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 0.05-8.1

The inverse time protective element ("I> t" or "I>" block) can be disabled using the "iblock" relay input signal.

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 setting	Note
	I> operate value	I> t (I> in the TOC-IOC RXIDK Earth scheme)	Current Setting	
	I> time delay	I> t (I> in the TOC-IOC RXIDK Earth scheme)	Time Dial	
	I> characteristic	I> t (I> in the TOC-IOC RXIDK Earth scheme)	Characteristic	
	I>> Set Value	I>>	Pickup Current	
	I>> Time Delay	I>>	Time Setting	

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 logic element ("Logic" block)

3.3.2 Functionality

The "Logic" block is combining with an "OR" boolean operator the trip signals coming from the inverse time and the time defined protective elements and is operating the power circuit breaker and the relay output contact. The output contact is named "yout".

The following relay output signals are available as well and can be used for any control logic:

- *StartToc* (inverse time element starting signal)
- *TripToc* (inverse time element trip signal)
- *Triploc* (definite time element trip signal)

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:

- Cold load input

5 References

- [1] ABB Automation Products AB, Substation Automation Division, SE-721 59 Vasteras, Sweden. *RAIDK, RAIDG, RAPDK and RACIK Phase overcurrent and earth-fault protection assemblies based on single phase measuring elements User's Guide 1MRK 509 031-UEN Version 1 April 1999*, 1985.
- [2] ABB Automation Products AB, Substation Automation Division, SE-721 59 Vasteras, Sweden. *RXIDK 2H, RAIDK, RXIDG 21H, RAIDG Time overcurrent relays and protection assemblies 1MRK 509 002-BEN Issued June 1999*, 1985.