PowerFactory 2021

Technical Reference

ABB/Westinghouse IKT9

PF2021

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Contents

1 Model information

Manufacturer ABB/Westinghouse

Model IKT9

Variants This family of PowerFactory relay model types simulates the following overcurrent relays manufactured by ABB;

- IKT 941

- IKT 943

2 General description

The ABB/Westinghouse IKT9 protective relays are single phase, three phases or 2 phases and earth current non directional definite time overcurrent devices. The ABB/Westinghouse IKT9 family of PowerFactory relay model types consists of models using four different schemes:

- *IKT941-Earth* (single phase input, one definite time overcurrent element)

- *IKT941-1p* (single phase input, one definite time overcurrent element)

- *IKT943-2p-E* (3 current inputs, two 2 phase definite time overcurrent elements, two earth definite time overcurrent elements)

- *IKT943-3p* (3 current inputs, two 3 phases definite time overcurrent elements)

The PowerFactory relay library tries to cover most of the ABB/Westinghouse IKT9 subtypes.

The PowerFactory ABB/Westinghouse IKT9 relay model type names have the following structure: <type name>(i.e. "ITK941") + "-" + "rated current in Amps" + "- 1" (where "1" is the number of external tripping relays)

They following PowerFactory relay model types can be found at \Library\Relays\Relays\Overcurrent Relays\ABB/Westinghouse\ITK9..:

- IKT941-1-1 (1Ph) (scheme type: IKT941-1p)

- IKT941-1-1 (3I0) (scheme type: IKT941- Earth)

- IKT941-5-1 (1Ph) (scheme type: IKT941-1p)

- IKT941-5-1 (3I0) (scheme type: IKT941- Earth)

- IKT943-1-1 (2Ph-E) (scheme type: IKT943-2p-E)

- IKT943-1-1 (3Ph) (scheme type: IKT943-3p)

- IKT943-5-1 (2Ph-E) (scheme type: IKT943-2p-E)

- IKT943-5-1 (3Ph) (scheme type: IKT943-3p)

Please notice that different relay models using the same scheme type (i.e. "IKT943-1-1 (2Ph-E)" and "IKT943-5-1 (2Ph-E)") have the same protective elements with different setting ranges.

The model implementation has been based on the information available in the 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 3 phase CT or a single phase CT.

3.1.1 Available Units

- *IKT941 - Earth* scheme type

    – one 3ph/single phase current transformer calculating/measuring the earth current ("Ct-3I0" block)
    – one single phase measurement block ("Measure" block)

- *IKT941-1p* scheme type

    – one 1ph current transformer measuring the phase current ("Ct" block)
    – one 1ph measurement block ("Measure" block)

- *IKT943-2p-E* scheme type

    – one 3ph current transformer measuring two phase currents ("Ct-2ph" block)
    – one 3ph/single current transformer calculating/measuring the earth current ("Ct-3I0" block)
    – one 3ph measurement block calculating both the phase currents and the earth current("Measure" block)

- *IKT943-3p* scheme type

    – one 3ph current transformer measuring the phase currents ("Ct" block)
    – one 3ph measurement block calculating the phase currents("Measure" block)

3.1.2 Functionality

The "Ct", the "Ct-2P" and the "Ct-3I0" block represent an ideal CT. 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 simulates 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 overcurrent elements is modeling the relay protective functions.

3.2.1   Available Units

- *IKT941- Earth* scheme type

    – one earth definite time overcurrent element("I>" block)

- *IKT941-1p* scheme type

    – one single phase definite time overcurrent element("I>" block) with external input blocking signal ("I>" block relay signal)

- *IKT943-2p-E* scheme type

    – two single phase definite time overcurrent elements("I>" and "I>>" block) getting the greater phase current with external input blocking signals ("I> block" and "I>>" block relay signal)

    – two earth definite time overcurrent elements("I0>" and "I0>>" block) with external input blocking signals ("I>" block and "I>>" block relay signal)

- *IKT943-3p* scheme type

    – two single phase definite time overcurrent elements("I>" and "I>>" block) getting the greater phase current with external input blocking signals ("I> block" and "I>> block" relay signal)

3.2.2   Functionality

The PowerFactory ABB/Westinghouse IKT9 relay model types simulates exactly all the protective elements available in the relays.

In the "IKT941-1p", "IKT943-2p-E" and in the "IKT943-3p" scheme some external input blocking signals are available ("I>" block and "I>>" block relay signal).

3.2.3   Data input

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

IKT941- Earth scheme type:

Address	Relay Setting	Model block	Model setting	Note
	Current Setting	I>	Pickup Current	
	Timer Setting	I>	Time Setting	

IKT941-1p scheme type:

Address	Relay Setting	Model block	Model setting	Note
	Current Setting	I>	Pickup Current	
	Timer Setting	I>	Time Setting	

IKT943-2p-E scheme type:

Address	Relay Setting	Model block	Model setting	Note
	Phase Delayed Stage Current Setting	I>	Pickup Current	
	Phase Delayed Stage Timer Setting	I>	Time Setting	
	Phase High Set Stage Current Setting	I>>	Pickup Current	
	Phase High Set Stage Timer Setting	I>>	Time Setting	
	Earth Delayed Stage Current Setting	I0>	Pickup Current	
	Earth Delayed Stage Timer Setting	I0>	Time Setting	
	Earth High Set Current Setting	I0>>	Pickup Current	
	Earth High Set Timer Setting	I0>>	Time Setting	

IKT943-3p scheme type:

Address	Relay Setting	Model block	Model setting	Note
	Phase Delayed Stage Current Setting	I>	Pickup Current	
	Phase Delayed Stage Timer Setting	I>	Time Setting	
	Phase High Set Stage Current Setting	I>>	Pickup Current	
	Phase High Set Stage Timer Setting	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 collecting the trip signals coming from the protective elements and is operating 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:

- Autoreclose control logic

5   References

[1] ABB Power T&D Company Inc Relay Division, Coral Springs, FL 33065 USA. *IKT941, IKT943 Overcurrent Protection Relay 1MRB520094-Ben April 1996*, 1996.