



POWERFACTORY

PowerFactory 2021

Technical Reference

ABB REF 601 IEC

PF2021

POWER SYSTEM SOLUTIONS
MADE IN GERMANY

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1 Model information

Manufacturer ABB

Model REF 601 IEC

Variants This model covers the features present in the ABB REF 601 IEC relay belonging to the ABB Relion 605 series. To model the ABB REJ 603 please use the PowerFactory ABBREJ 603 relay model.

2 General description

The ABB REF 601 IEC relay has been modeled using two PowerFactory relay models:

- *REF 601 IEC B1*
- *REF 601 IEC B5*

The PowerFactory ABB REF 601 IEC relay models simulate most of the protective elements available in the relay.

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 a block simulating the 3 phase CT and by a block simulating a single phase CT measuring the earth current; the secondary currents are then measured by an element modeling the digital sampling of the relay.

3.1.1 Available Units

- one 3ph current transformer ("Ct-3p" block)
- one single phase current transformer ("Ct-E/N" block)
- one measurement element ("Measure" block)

3.1.2 Functionality

The "Ct-3p" and the "Ct-E/N" 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 "Measure" block simulates a DFT ("Discrete Fourier Transform) using 20 samples per cycle.

3.1.3 Data input

The CT secondary rated current (1 or 5 A) value must be set in the "Measure" block.

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

3.2 Protective elements

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

3.2.1 Available Units

- Three-phase non-directional overcurrent, low-set stage ("3I>" block)
- Three-phase non-directional overcurrent, high-set stage ("3I>>" block)
- Three-phase non-directional overcurrent, very high-set stage ("3I>>>" block)
- Non-directional earth-fault, low-set stage ("Io>" block)
- Non-directional earth-fault, high-set stage ("Io>>" block)

3.2.2 Functionality

The inverse time overcurrent elements support the following trip characteristics:

- Definite time (51)
- IEC Extremely Inverse
- IEC Long time inverse
- IEC Normal Inverse
- IEC Very Inverse
- RI-Type characteristic

The relationship between current and time for normal inverse, very inverse, extremely inverse and long time inverse complies with the BS 142.1966 and IEC 60255-3 standards. The RI-type characteristic is a special characteristic used mainly in combination with existing mechanical relays.

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
0	Phase Low set I> Curve	3I>	Characteristic	Active in the relay when the "Definite time" curve is used
1	Phase Low set I> K	3I>	Time Dial	
2	Phase Low set I> Isat	3I>	Current Setting	
3	Phase Low set Time	3I>	Time Dial	
4	Phase High set I>> Isat	3I>>	Pickup Current	
5	Phase High set I>> Time	3I>>	Time Setting	
6	Phase Very High set I>> Isat	3I>>	Pickup Current	
8	Earth Low set I> Curve	Io>	Characteristic	
9	Earth Low set I> K	Io>	Time Dial	Active in the relay when the "Definite time" curve is used
10	Earth Low set I> Isat	Io>	Current Setting	
11	Earth Low set Time	Io>	Time Dial	
12	Earth High set I>> Isat	Io>>	Pickup Current	
13	Earth High set I>> Time	Io>>	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 element ("Trip Logic" block)

3.3.2 Functionality

The "Trip Logic" block is collecting the trip signals coming from the protective elements and operating the relay output contacts. The output contact is "yout".

3.3.3 Data input

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

4 Features not supported

The following features are not supported:

- Three phase transformer inrush detector

5 References

- [1] ABB Ltd. Distribution Automation, Maneja Works, Vadodara - 390 013, India. *User's manual and Technical description Feeder Protection Relay REF601 IEC Document ID: 1MDU07204-YN Issued: 30.09.2010 Revision: C Product version:1.0 SP1*, 2009.