POWERFACTORY

PowerFactory 2021

Technical Reference

ABB REJ 525

POWER SYSTEM SOLUTIONS
MADE IN GERMANY

Contents

1 Model information

Manufacturer ABB

Model REJ 525

Variants This family of PowerFactory relay models covers the features present in the ABB REJ 525 relay.

2 General description

The combined overcurrent and earth-fault microprocessor relay REJ 525 is intended for selective short-circuit protection and non-directional earth-fault protection in medium voltage distribution networks but can also be used for protection of generators, motors and transformers.

The ABB REJ 525 relay has been modeled using two PowerFactory ABB REJ 525 relay models which include any protective element available in the relay:

- REJ 525 Ie 0.2&1 A (containing the 0.2 A and the 1 A CT secondary current relay version setting range)

- REJ 525 Ie 1&5 A (containing the 1 A and the 5 A CT secondary current relay version setting range)

The unique difference between these models is the setting range definition. 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 phase currents flowing in the power system are converted by an element simulating a 3 phases CT, the earth current by an element mocking a single phase (Core) CT or a 3ph CT with an Holmgreeen's phase connection; the secondary currents are then measured by two elements modeling the analog filter of the relay.

3.1.1 Available Units

- one 3phases current transformer ("Ct-3p" block)

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

- one 3phases phase measurement element ("Measure Ph" block)

- one single phase measurement element ("Measure 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 is 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

Please notice that the CT secondary nominal current value must be entered in the measurement units.

3.2 Protective elements

A set of inverse time and definite time overcurrent elements is modeling the relay overcurrent and phase discontinuity protective functions. The inverse characteristics available in the relay are available as well in the inverse time model block.

3.2.1 Available Units

- one 3phases current inverse time overcurrent protective element ("I>" block)

- one 3phases current definite time overcurrent protective element ("I>>" block)

- one earth current inverse time overcurrent element ("Io>" block)

- one earth current definite time overcurrent element ("Io>>" block)

- one phase discontinuity element ("Id>","Id_t" and "Delta I" block)

3.2.2 Functionality

The PF model contains all the protective elements available in the relay. The inverse time overcurrent elements support the following trip characteristics:

- Definite time

- IEC "Extremely inverse"

- IEC "Very inverse"

- IEC "Normal inverse"

- IEC "Long time inverse"

- "RI - Type Inverse"

- "RXIDG"

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
	Stage I> start value (I>/In)	I>	Current Setting	
	Stage I> time current characteristic	I>	Characteristic	
	Stage I> operate time t>	I>	Time Dial	
	Stage I> time multiplier k	I>	Time Dial	
	Stage I>> start value (I>>/In)	I>>	Pickup Current	
	Stage I>> operate time t>>	I>>	Time Setting	
	Stage Io> start value (Io>/In)	Io>	Current Setting	
	Stage Io> time current characteristic	Io>	Characteristic	
	Stage Io> operate time to>	Io>	Time Dial	
	Stage Io> time multiplier ko	Io>	Time Dial	
	Stage Io>> start value (Io>>/In)	Io>>	Pickup Current	
	Stage Io>> operate time to>>	Io>>	Time Setting	
	Phase discontinuity Threshold ΔI>	Id>	Current I>>	
	Phase discontinuity Operate Time Δt>	Id_t	Time Setting	

The phase discontinuity logic block includes the *SGB2* DIP switch which is set equal to zero ("off") by default. It can be used to block the phase discontinuity feature: to block the phase discontinuity feature please set qual to 1 ("on") the *SGB2* DIP switch in the "Delta I" block dialog.

It is possible to block the tripping of the protective elements by applying some digital input signals to the relay. The following relay input signals are available:

- *SGB_1_5* controlling *I>*

- *SGB_1_6* controlling *I>>*

- *SGB_1_7* controlling *Io>)*

- *SGB_1_8* controlling *Io>>*

- *SGB2* controlling *Delta I(phase discontinuity feature)*

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 ("Output Logic" block)

3.3.2   Functionality

The "Output Logic" block is collecting the trip signals coming from the protective elements and operating the relay output contacts.
Four ouput signals are available:

- PO1

- PO2

- SO1

- SO2

The output signals operating the breaker are "PO1" and "PO2"; they are both operated with the same logic by the protective element trip signals.
The relay output signals "SO1" and "SO1" can be used for signaling purposes.

Both the tripping and signaling logic can be customized by the user inserting the required relationship between the "Output Logic" input and output signals in the "Logic" tab page of the "Output Logic" dialog:
Please consider the following relationship between the the "Output Logic" input signals and the protective blocks outputs:

- SGR1 : I> block starting signal

- SGR2 : I> block trip signal

- SGR3 : I>> block starting signal

- SGR4 : I>> block trip signal

- SGR5 : Io> block starting signal

- SGR6 : Io> block trip signal

- SGR7 : Io>> block starting signal

- SGR8 : Io>> block trip signal

- SGR9 : I> block starting signal

- SGR10 : I> block trip signal

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

- Breaker failure protection

- High set stage trip threshold doubling during the inrush

- Ability of the *High stage* elements("I>>" and "I0>>" block) to interblock the *Low stage* elements ("I>" and "Io>" block) when a current greater than their trip threshold has been detected

5 References

[1] ABB Ltd Distribution Automation, P.O.box 699, FI-65101 Vaasa , FINLAND. *Overcurrent and Earth-Fault Relay REJ 525 Technical Reference Manual 1MRS750941-MUM Issued: 14.09.1998 Version: D/14.11.2005*, 1998.