



DgSILENT GmbH
Heinrich-Hertz-Strasse 9
D-72810 Gomaringen
Tel.: +49 7072 9168 - 0
Fax: +49 7072 9168- 88
<http://www.digsilent.de>
e-mail: mail@digsilent.de

SEL 267

PowerFactory
V001 Relay model description

Published by
DgSILENT GmbH, Germany

Copyright 2010. All rights reserved. Unauthorised copying or publishing of this or any part of this document is prohibited.

doc.TechRef, Build 524 12 Januar 2021

Table of Contents

1 MODEL GENERAL DESCRIPTION	4
1.1 MEASUREMENT AND ACQUISITION	4
1.1.1 Available Units	4
1.1.2 Functionality	4
1.1.3 Data input	4
1.2 PROTECTIVE ELEMENTS	4
1.2.1 Available Units	4
1.2.2 Functionality	5
1.2.3 Data input	5
1.2.3.1 Phase directional	6
1.2.3.2 Ground directional	6
1.3 OUTPUT LOGIC	6
1.3.1 Available Units	6
1.3.2 Functionality	6
2 RELAY NOT SUPPORTED FEATURES.....	7
3 MODEL SCHEME	8
4 REFERENCES	9

1 Model general description

The Schweitzer 267 relay is a phase, residual ground overcurrent directional protection relay with reclosing feature. The Schweitzer 267 PowerFactory relay model is implementing all the protective functions available in the relay; it consists of the measurement and acquisition units, the protective elements and the output logic. Two model versions for the available rated input currents (1A and 5A) are provided.

1.1 Measurement and acquisition

1.1.1 Available Units

The primary current is measured by two current transformers ("Ct" and "Ct IP" block), the voltage primary current by one voltage transformer ("Vt" block). "Ct" is a three phase current transformer, "Ct IP" is a single phase current transformer providing the polarizing current for the ground directional element.

Three measurement units ("Meas I - U", "Meas IP" and "Meas seq" block) are fed by these CTs and this VT.

1.1.2 Functionality

The input signals are sampled in the relay model at 4 samples/cycle; a "cosine" filter operating over a cycle calculates the current values used by the protective elements. A "DC offset compensation" filter using two samples is applied as well (this is the best approximation currently available for the filter using 4 samples present in the relay).

1.1.3 Data input

Please select the relay version accordingly with the input rated current value (1 A or 5 A).

1.2 Protective elements

1.2.1 Available Units

- One phase current inverse time overcurrent element ("51P" block)
- Three phase current definite time overcurrent elements ("50P1", "50P2" and "50P3" block)
- One residual current inverse time overcurrent element ("51N" block)

- Three residual current definite time overcurrent elements ("50N1" block, "50N2" and "50N3" block)
- One directional phase current inverse time overcurrent element ("67P" block)
- Three directional phase current definite time overcurrent elements ("67P1", "67P2" and "67P3" block)
- One directional residual current inverse time overcurrent element ("67N" block)
- Three directional residual current definite time overcurrent elements ("67N1" block, "67N2" and "67N3" block)
- 2 Phase directional elements implementing the 32PQ feature ("32PQ (P)" and "32 PQ thr", "32PQ (Q)" and "32 PQ thr rev" block)
- 2 Phase directional elements implementing the 32Q and the 32I feature ("32QE", "32Q" and "32IE +32VE" block)

1.2.2 Functionality

The PF model contains all the protective elements available in the relay. Two sets of overcurrent elements are present in the model: the first one (element names marked as "51" or as "50") generate the non directional tripping signals, the second one (element names marked as "67") generate the directional tripping signals.

The inverse time overcurrent elements ("51P" and "67P" block) support the following trip characteristics:

- Moderately Inverse
- Inverse
- Very Inverse
- Extremely Inverse

The phase directional feature has been implemented in the model including both the positive sequence phasor product ("32PQ (P)" block) and the negative sequence phasor product ("32PQ (Q)" block).

The ground directional feature includes the negative sequence phasor product ("32QE" block) and the zero sequence phasor product ("32Q" block). The zero sequence element is supporting both the zero sequence voltage polarizing and the zero sequence current polarizing.

The reclosing process can be configured to support the "sequence coordination" feature in the "79" block. In the same block dialog the reclosing logic can be configured in the "Logic" tab page.

1.2.3 Data input

Please notice that the overcurrent element tripping thresholds are unique and must be set in the non directional set of elements ("51" and "50" elements). To disable the directional trip please disable the directional elements or change the trip logic in the "Logic" tab page of the "Output Logic" block dialog. To disable the non directional trip please change the trip logic in the "Logic" tab page of the "Output Logic" block dialog. (NOTE: disabling the non directional blocks also the relevant directional blocks are disabled)

1.2.3.1 Phase directional

Please insert the "MTA" value in the "Max. Torque Angle" setting in the "Voltage Polarizing" tab page of the "32PQ (P)" and of the "32PQ (Q)" block.

The "67P3" element can be set to operate in the forward or in the reverse direction ("Tripping direction" setting).

1.2.3.2 Ground directional

To enable the current polarizing please set equal to "1" the "_32IE" variable in the "Logic" tab page of the "32IE +32VE" block dialog. Setting equal to "1" the "_32VE" variable in the "Logic" tab page of the "32IE +32VE" block dialog the zero sequence voltage polarizing is activated. Both polarizing methods can be activated at the same time.

Please insert the "MTA" value in the "Max. Torque Angle" setting in the "Voltage Polarizing" tab page of the "32Q" (zero sequence directional element) and of the "32QE" (negative sequence directional element) block, in the "Logic" tab page of the "32IE +32VE" block dialog.

The "67N3" element can be set to operate in the forward or in the reverse direction ("Tripping direction" setting).

1.3 Output logic

1.3.1 Available Units

The output logic is implemented by the "Output logic" block.

1.3.2 Functionality

The "Output logic" block is operating the breaker. Please disable the "Output Logic" block to disable the relay model ability to open the power circuit.

The signal operating the breaker is "yout"; the "Alarm", "A1", "A2", "A3", and "A4" output signals are available as well. Their trip logic can be configured in the "Logic" tab page of the "Output logic" block.

Two additional relay input signals are available and are processed by the trip logic:

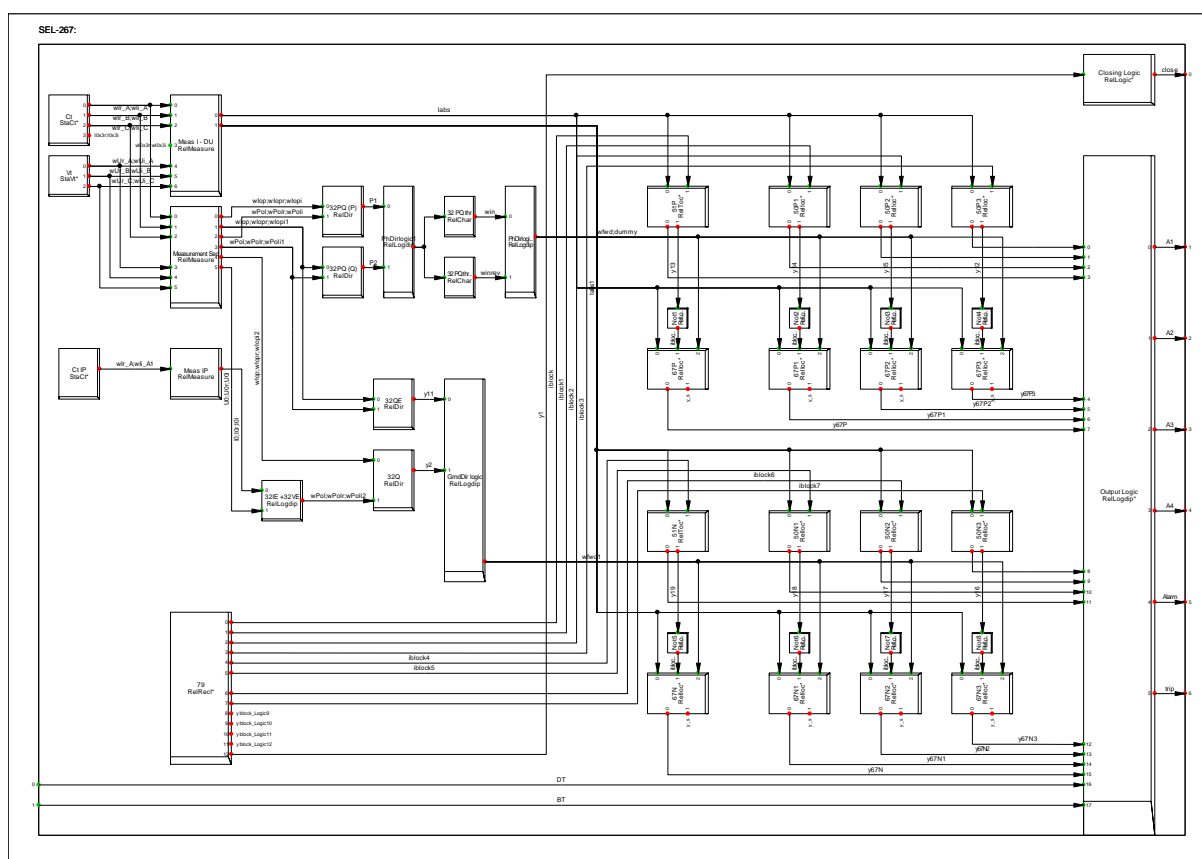
- "DT" signal: when this input signal is "on" the relay model trip is forced.
- "BT" signal: when this input signal is "on" the relay model trip is inhibited.

2 Relay not supported features

The following relay features are not supported by the model:

- Demand overcurrent
- Fault locator
- Detection of operation of the transformer high side fuses
- 52A element

3 Model scheme



4 References

The model implementation has been based on the information available in the "SEL-267D SEL-167D PHASE AND GROUND DIRECTIONAL OVERCURRENT RELAY WITH RECLOSER AND FAULT LOCATOR INSTRUCTION MANUAL Date code 920326" and in the "SEL-267-0-2 PHASE AND GROUND DIRECTIONAL OVERCURRENT RELAY WITH RECLOSER AND FAULT LOCATOR instruction manual 20071030 revision" document.