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PowerFactory 2021

Technical Reference

Cooper Power Systems Form 5

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MADE IN GERMANY

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Contents

1 Model information

Manufacturer   Cooper Power Systems

Model   Form 5

Variants   The Cooper Power Systems Form 5 PowerFactory relay model simulates the features available in the Cooper Power Systems Form 5 pole mount and rack mount recloser control.

2 General description

The Form 5 recloser control is a powerful and flexible system to provide custom solutions for distribution protection. The Form 5 rack, yard, and pole mount microprocessor-based recloser controls include comprehensive system protection functionality, including phase, and ground overcurrent protection, over/underfrequency and voltage protection, directionality, and sensitive earth fault.

The Cooper Power Systems Form 5 recloser has been modeled using one PowerFactory Cooper Power Systems Form 5 relay model which includes most of the protective elements available in the recloser.

The relay model consists of a main relay model and of the following sub relays:

- Phase HC lockout

- Ground HC lockout

The relay model includes the measurement and acquisition units, the overcurrent, frequency, and voltage protective elements, the reclosing elements and the output logic.

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

3 Supported features

3.1 Measurement and acquisition

It represents the interface between the power system and the relay protective elements.

The primary current is converted by one three phase current transformer ("Ct" block), the primary voltage is converted by one three phase voltage transformer ("Vt-3P" block). The converted current and voltages are then measured by one 3 phase measurement unit ("Measurement" block).

3.1.1 Available Units

- one 3 phase current transformer ('Ct" block).

- one 3 phase voltage transformer ("Vt-3P" block).

- one 3 phase measurement element ("Measurement" block).

3.1.2 Functionality

The "Ct" block represents an ideal CT. 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 input signals are sampled in the relay model at 20 samples/cycle; the RMS values are calculated with a rectangular integration over a full cycle.

3.1.3 Data input

No user input is required.

Please notice that in the Cooper Power Systems Form 5 model all current threshold ranges are in terms of primary amperes as the settings of the Cooper Power Systems Form 5 recloser. For the reason the ratio of the CT and of the VT feeding the Form 5 PF model measurement block should be 1/1.

3.2 Protective elements

A set of inverse time and definite time overcurrent elements models the relay phase,earthh and sensitive earth overcurrent protective functions. The inverse characteristics available in the relay are available as well in the inverse time model block.

3.2.1 Available Units

- Four phase fault inverse time elements ("Phase threshold", "Phase TCC1", "Phase TCC2", "Phase TCC3" and "Phase TCC4" block). Please note that the current trip threshold is unique for any element and is stored inside the "Phase threshold" block.

- Four ground fault inverse time elements ("Ground threshold", "Ground TCC1", "Ground TCC2", "Ground TCC3" and "Ground TCC4" block). Please note that the current trip threshold is unique for any element and is stored inside the "Ground threshold" block.

- One phase fault "high current" definite time elements ("Phase HC" block).

- One ground fault "high current" definite time elements ("Ground HC" block).

- One sensitive ground fault definite time element with directional feature ("Sensitive Ground" and "Dir 1ph" block).

- One phase fault inverse time element enabled during the cold load conditions ("Phase ColdLoadTCC" block).

- One phase fault "high current" definite time element enabled during the cold load conditions and putting the recloser to the *lockout* status("Cold Load Phase HC Lockout" block). Please note that the block must be set to associate a definite time lockout characteristic to the relevant inverse characteristic block ("Phase ColdLoadTCC" block).

- One phase fault inverse time element enabled when the fast trips are disabled ("Phase FTDTCC" block, activated by the *Fast Trips disabled* parameter in the "Phase recllogic" block).

- One ground fault inverse time elements enabled during the cold load conditions ("Ground ColdLoadTCC" block).

- One ground fault "high current" definite time element enabled during the cold load conditions and putting the recloser to the *lockout* status("Cold Load Ground HC Lockout" block). Please note that the block must be set to associate a definite time lockout characteristic to the relevant inverse characteristic block ("Ground ColdLoadTCC" block).

- One ground fault inverse time element enabled when the fast trips are disabled ("Ground FTDTCC" block, activated by the *Fast Trips disabled* parameter in the "Ground recllogic" block).

- One phase lockout subrelay ("Phase HC Lockout" block).

- Oneground lockout subrelay ("Ground HC Lockout" block).

- Three independent reclosing logics for the phase, the ground and the sensitive ground elements ("Phase recllogic ", "Ground recllogic" and "SEF recllogic" 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:

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The reclosing procedure settings are available in the "Phase recllogic", "Ground recllogic", and "SEF recllogic" block.
The Cooper Power Systems Form 5 relay model provides the following features:

- User configurable maximum number of operations before the lockout.

- Reclosing time for each reclosing attempt.

- Reset time of the reclosing procedure.

- Sequence coordination with an user configurable maximum number of operations.

- Ground trip precedence.

- Definite time high trip element configurable for each reclosing attempt.

- Definite time high trip lockout element configurable for each reclosing attempt.

- User configurable number of operations of the SEF elements before the lockout.

- Reset time of the SEF reclosing procedure.

- Reclosing time for each SEF reclosing attempt.

- SEF elements with directional characteristic.

- *High Current* and *High Current Lockout* elements which can be independently enabled or disabled for each reclosing attempt.

- *Fast trip disabled* mode with alternative user configurable maximum number of operations before the lockout.

- *Fast trip disabled* mode phase and ground TCC.

- *Cold Load* condition detection.

- *Cold Load* condition phase and ground TCC.

- *Cold Load* condition user configurable maximum number of operations before the lockout.

- *Cold Load* condition reclosing interval.

- *Cold Load* condition maximum duration.

- Multiple operation modes (3ph trip-3ph lockout mode,1ph trip-3ph lockout mode, and the 1ph trip-1ph lockout mode).

3.2.3 Data input

In the model separated phase and ground protective elements are active for each reclosing attempt; such model feature allows a detailed recloser control simulation.
Only one group of settings is available in the model.

The relationships between the relay settings and the model parameters can be found in the following table (the relay model parameter names are listed between brackets):

Overcurrent :

Address	Relay Setting	Model block	Model setting	Note
	Phase Minimum Trip	Phase min trip	Pickup Current (Ipsetr)	
	Ground Minimum Trip	Ground min trip	Pickup Current (Ipsetr)	
	Phase TCC's TCC 1	Phase TCC1	Characteristic (pcharac)	Set accordingly with the *Operation Sequence-Phase /Negative Sequence* relay setting
	Phase TCC's TCC 2	Phase TCC2	Characteristic (pcharac)	As above
	Phase TCC's TCC 3	Phase TCC3	Characteristic (pcharac)	As above
	Phase TCC's TCC 4	Phase TCC4	Characteristic (pcharac)	As above
	Ground TCC's TCC 1	Ground TCC1	Characteristic (pcharac)	Set accordingly with the *Operation Sequence-Ground* relay setting
	Ground TCC's TCC 2	Ground TCC2	Characteristic (pcharac)	As above
	Ground TCC's TCC 3	Ground TCC3	Characteristic (pcharac)	As above
	Ground TCC's TCC 4	Ground TCC4	Characteristic (pcharac)	As above
	Phase Enable modifiers TCC 1	Phase TCC1	Enable TCC modifiers (Mod-Frame)	Set accordingly with the *Operation Sequence-Phase /Negative Sequence* relay setting
	Phase Enable modifiers TCC 2	Phase TCC2	Enable TCC modifiers (Mod-Frame)	
	Phase Enable modifiers TCC 3	Phase TCC3	Enable TCC modifiers (Mod-Frame)	
	Phase Enable modifiers TCC 4	Phase TCC4	Enable TCC modifiers (Mod-Frame)	
	Ground Enable modifiers TCC 1	Ground TCC1	Enable TCC modifiers (Mod-Frame)	Set accordingly with the *Operation Sequence Ground* relay setting
	Ground Enable modifiers TCC 2	Ground TCC2	Enable TCC modifiers (Mod-Frame)	
	Ground Enable modifiers TCC 3	Ground TCC3	Enable TCC modifiers (Mod-Frame)	
	Ground Enable modifiers TCC 4	Ground TCC4	Enable TCC modifiers (Mod-Frame)	

Address	Relay Setting	Model block	Model setting	Note
	Phase Time Multiplier TCC 1	Phase TCC1	Time Dial (Tpset)	Set accordingly with the *Operation Sequence-Phase /Negative Sequence* relay setting
	Phase Time Multiplier TCC 2	Phase TCC2	Time Dial (Tpset)	
	Phase Time Multiplier TCC 3	Phase TCC3	Time Dial (Tpset)	
	Phase Time Multiplier TCC 4	Phase TCC4	Time Dial (Tpset)	
	Ground Time Multiplier TCC 1	Ground TCC1	Time Dial (Tpset)	Set accordingly with the *Operation Sequence Ground* relay setting
	Ground Time Multiplier TCC 2	Ground TCC2	Time Dial (Tpset)	
	Ground Time Multiplier TCC 3	Ground TCC3	Time Dial (Tpset)	
	Ground Time Multiplier TCC 4	Ground TCC4	Time Dial (Tpset)	
	Phase Time Adder TCC 1	Phase TCC1	Time Adder (Tadder)	Set accordingly with the *Operation Sequence-Phase /Negative Sequence* relay setting
	Phase Time Adder TCC 2	Phase TCC2	Time Adder (Tadder)	
	Phase Time Adder TCC 3	Phase TCC3	Time Adder (Tadder)	
	Phase Time Adder TCC 4	Phase TCC4	Time Adder (Tadder)	
	Ground Time Adder TCC 1	Ground TCC1	Time Adder (Tadder)	Set accordingly with the *Operation Sequence Ground* relay setting
	Ground Time Adder TCC 2	Ground TCC2	Time Adder (Tadder)	
	Ground Time Adder TCC 3	Ground TCC3	Time Adder (Tadder)	
	Ground Time Adder TCC 4	Ground TCC4	Time Adder (Tadder)	
	Phase Minimum Response Time TCC 1	Phase TCC1	Min. Response Time (minresptime)	Set accordingly with the *Operation Sequence-Phase /Negative Sequence* relay setting
	Phase Minimum Response Time TCC 2	Phase TCC2	Min. Response Time (minresptime)	
	Phase Minimum Response Time TCC 3	Phase TCC3	Min. Response Time (minresptime)	
	Phase Minimum Response Time TCC 4	Phase TCC4	Min. Response Time (minresptime)	
	Ground Minimum Response Time TCC 1	Ground TCC1	Min. Response Time (minresptime)	Set accordingly with the *Operation Sequence Ground* relay setting
	Ground Minimum Response Time TCC 2	Ground TCC2	Min. Response Time (minresptime)	
	Ground Minimum Response Time TCC 3	Ground TCC3	Min. Response Time (minresptime)	
	Ground Minimum Response Time TCC 4	Ground TCC4	Min. Response Time (minresptime)	
	High Current Trip - Phase - Activation Current	Phase HC	Pickup Current (Ipset)	Set accordingly with the *Operation Sequence-Phase /Negative Sequence* relay setting
	High Current Trip - Ground - Activation Current	Ground HC	Pickup Current (Ipset)	Set accordingly with the *Operation Sequence Ground relay setting*
	High Current Trip - Phase - Trip Modification Time	Phase HC	Time Setting (cTset)	Set accordingly with the *Operation Sequence-Phase /Negative Sequence* relay setting

Address	Relay Setting	Model block	Model setting	Note
	High Current Trip - Ground - Trip Modification Time	Ground HC	Time Setting (cTset)	Set accordingly with the *Operation Sequence Ground* relay setting
	Fault Directional Ground	Dir 1Ph	Tripping Direction (idir)	
		Ground TCC1,Ground TCC2	Tripping Direction (idir)	Set *None* for a not directional trip
		Ground TCC3,Ground TCC4	Tripping Direction (idir)	Set *None* for a not directional trip
		Ground HC	Tripping Direction (idir)	Set *None* for a not directional trip
	Maximum Torque Angle - Fault	Dir 1Ph	Max. Torque Angle (mtau)	In the "Voltage Polarizing" tab page

Reclosing :

Address	Relay Setting	Model block	Model setting	Note
	Phase Operations to Lockout	Phase reclogic	Operations to lockout (oplockout)	
	Ground Operations to Lockout	Ground reclogic	Operations to lockout (oplockout)	
	Phase Reclose Intervals 1st Interval	Phase recllogic	Reclosing interval 1 (recltime1)	
	Phase Reclose Intervals 2nd Interval	Phase recllogic	Reclosing interval 2 (recltime2)	
	Phase Reclose Intervals 3rd Interval	Phase recllogic	Reclosing interval 3 (recltime3)	
	Ground Reclose Intervals 1st Interval	Ground recllogic	Reclosing interval 1 (recltime1)	
	Ground Reclose Intervals 2nd Interval	Ground recllogic	Reclosing interval 2 (recltime2)	
	Ground Reclose Intervals 3rd Interval	Ground recllogic	Reclosing interval 3 (recltime3)	
	Reset Time	Phase recllogic	Reset Time (resettime)	
		Ground recllogic	Reset Time (resettime)	
	Fast Trip Block	Phase recllogic	Fast Trip disabled (fasttripdisabl)	
		Ground recllogic	Fast Trip disabled (fasttripdisabl)	
	Fast Trip Disabled Shots to Lockout	Phase recllogic	Fast Trip disabled shots to lockout (fasttripdislock)	
		Ground recllogic	Fast Trip disabled shots to lockout (fasttripdislock)	
	Ground Trip Precedence	Phase recllogic	Ground Trip Precedence (groundtripprec)	
		Ground recllogic	Ground Trip Precedence (groundtripprec)	
	Allow sequence coordination	Phase recllogic	Sequence Coordination (seqaccessory)	
		Ground recllogic	Sequence Coordination (seqaccessory)	
	Up to	Phase recllogic	Max sequence coordination operation number (maxseqcpsno)	
		Ground recllogic	Max sequence coordination operation number (maxseqcpsno)	
	Cold Load Operations to Lockout	Phase recllogic	Trips to lockout (cltripstolockout)	In the "Cold Load Pickup" tab page
		Ground recllogic	Trips to lockout (cltripstolockout)	In the "Cold Load Pickup" tab page
	Cold Load Reclose Interval	Phase recllogic	Reclose Interval (clrecloseinterval)	In the "Cold Load Pickup" tab page

Address	Relay Setting	Model block	Model setting	Note
		Ground recllogic	Reclose Interval (clrecloseinterval)	In the "Cold Load Pickup" tab page
	High-Current Trip-Phase Active Trip Number	Phase recllogic	Trip 1 Enable (hctrip1enable)	In the "High Current Trip" frame
		Phase recllogic	Trip 2 Enable (hctrip2enable)	In the "High Current Trip" frame
		Phase recllogic	Trip 3 Enable (hctrip3enable)	In the "High Current Trip" frame
		Phase recllogic	Trip 4 Enable (hctrip4enable)	In the "High Current Trip" frame
	High-Current Trip-Ground Active Trip Number	Ground recllogic	Trip 1 Enable (hctrip1enable)	In the "High Current Trip" frame
		Ground recllogic	Trip 2 Enable (hctrip2enable)	In the "High Current Trip" frame
		Ground recllogic	Trip 3 Enable (hctrip3enable)	In the "High Current Trip" frame
		Ground recllogic	Trip 4 Enable (hctrip4enable)	In the "High Current Trip" frame
	High Current Lockout Phase Trip 1 Enable	Phase recllogic	HCL active on operation - 1st (hcl1active)	In the "High Current Lock-out" frame
	High Current Lockout Phase Trip 2 Enable	Phase recllogic	HCL active on operation - 2nd (hcl2active)	In the "High Current Lock-out" frame
	High Current Lockout Phase Trip 3 Enable	Phase recllogic	HCL active on operation - 3rd (hcl3active)	In the "High Current Lock-out" frame
	High Current Lockout Ground Trip 1 Enable	Ground recllogic	HCL active on operation - 1st (hcl1active)	In the "High Current Lock-out" frame
	High Current Lockout Ground Trip 2 Enable	Ground recllogic	HCL active on operation - 2nd (hcl2active)	In the "High Current Lock-out" frame
	High Current Lockout Ground Trip 3 Enable	Ground recllogic	HCL active on operation - 3rd (hcl3active)	In the "High Current Lock-out" frame

Cold Load :

Address	Relay Setting	Model block	Model setting	Note
	Enable Cold Load Pickup	Phase recllogic	Enable Cold Load Pickup (clenable)	
		Ground recllogic	Enable Cold Load Pickup (clenable)	
	Activation Time	Phase recllogic	Activation Time (clactivationt)	In the "Cold Load Pickup" tab page
		Ground recllogic	Activation Time (clactivationt)	In the "Cold Load Pickup" tab page
	Phase Minimum Trip	Phase ColdLoadTCC	Current Setting (Ipsetr)	
	Phase TCC	Phase ColdLoadTCC	Characteristic (pcharac)	
	Phase Cold Load Enable Modifiers	Phase ColdLoadTCC	Enable TCC modifiers (Mod-Frame)	
	Phase Cold Load Time Multiplier	Phase ColdLoadTCC	Time Dial (Tpset)	
	Phase Cold Load Time Adder	Phase ColdLoadTCC	Time Adder (Tadder)	
	Phase Cold Load Enable	Phase ColdLoadTCC	Enable TCC modifiers (Mod-Frame)	
	Phase Cold Load Minimum Response Time	Phase ColdLoadTCC	Min.Response Time (minresp-time)	
	Ground Minimum Trip	Ground ColdLoadTCC	Current Setting (Ipsetr)	

Address	Relay Setting	Model block	Model setting	Note
	Ground TCC	Ground ColdLoadTCC	Characteristic (pcharac)	
	Ground Cold Load Enable Modifiers	Ground ColdLoadTCC	Enable TCC modifiers (Mod-Frame)	
	Ground Cold Load Time Multiplier	Ground ColdLoadTCC	Time Dial (Tpset)	
	Ground Cold Load Time Adder	Ground ColdLoadTCC	Time Adder (Tadder)	
	Ground Cold Load Minimum Response Time	Ground ColdLoadTCC	Min.Response Time (minresp-time)	
	High Current Lockout Phase Lockout	Cold Load Phase HC Lock-out	Out of Service (outserv)	
	High Current Lockout Phase Threshold	Cold Load Phase HC Lock-out	Pickup Current (Ipset)	
	High Current Lockout Ground Lockout	Cold Load Ground HC Lock-out	Out of Service (outserv)	
	High Current Lockout Ground Threshold	Cold Load Ground HC Lock-out	Pickup Current (Ipset)	

Fast Trip Disabled   :

Address	Relay Setting	Model block	Model setting	Note
	Enable Fast Trip Disabled Pickup	Phase recllogic	Fast Trip Disabled Pickup (fast-tripdisabl)	
		Ground recllogic	Fast Trip Disabled Pickup (fast-tripdisabl)	
	Phase Minimum Trip	Phase FTDTCC	Current Setting (Ipsetr)	
	Phase TCC	Phase FTDTCCC	Characteristic (pcharac)	
	Phase Fast Trip Disabled Enable Modifiers	Phase FTDTCC	Enable TCC modifiers (Mod-Frame)	
	Phase Fast Trip Disabled Time Multiplier	Phase FTDTCC	Time Dial (Tpset)	
	Phase Fast Trip Disabled Time Adder	Phase FTDTCC	Time Adder (Tadder)	
	Phase Fast Trip Disabled Enable	Phase FTDTCC	Enable TCC modifiers (Mod-Frame)	
	Phase Fast Trip Disabled Minimum Response Time	Phase FTDTCC	Min.Response Time (minresp-time)	
	Ground Minimum Trip	Ground FTDTCC	Current Setting (Ipsetr)	
	Ground TCC	Ground FTDTCC	Characteristic (pcharac)	
	Ground Fast Trip Disabled Enable Modifiers	Ground FTDTCC	Enable TCC modifiers (Mod-Frame)	
	Ground Fast Trip Disabled Time Multiplier	Ground FTDTCC	Time Dial (Tpset)	

Address	Relay Setting	Model block	Model setting	Note
	Ground Fast Trip Disabled Time Adder	Ground FTDTCC	Time Adder (Tadder)	
	Ground Fast Trip Disabled Minimum Response Time	Ground FTDTCC	Min.Response Time (minresptime)	

SEF   :

Address	Relay Setting	Model block	Model setting	Note
	SEF Enable	Sensitive Ground	Out of Service (outserv)	Set *outserv*
	Minimum Trip	Sensitive Ground	Pickup Current (Ipsetr)	
	Trip Time	Sensitive Ground	Time Setting (Tset)	
	Reset Time	SEF recllogic	Reset Time (resettime)	
	Reclose Interval1	SEF recllogic	Reclosing interval 1 (recltime1)	
	Reclose Interval2	SEF recllogic	Reclosing interval 2 (recltime2)	
	Reclose Interval3	SEF recllogic	Reclosing interval 3 (recltime3)	
	Operations to Lockout	SEF recllogic	Operations to lockout (oplockout)	
	Direction Enable	Sensitive Ground	Tripping Direction (idir)	
	Maximum Torque Angle - Fault	Dir 1ph	Max. Torque Angle (mtau)	In the "Voltage Polarizing" tab page
	Torque Angle Width	Dir 1ph	Angle Operating Sector (phisec)	
	Vo Voltage Threshold	Dir 1ph	Polarizing Voltage (upolur)	In the "Voltage Polarizing" tab page

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

The output logic is implemented by the following blocks:

- Output Logic.

- Closing Logic.

3.3.2 Functionality

The "Output Logic"block has the task to operate the power breaker when a trip command has been issued by any protective element. The relay output signal used to operate the breaker is "yout".
The "Closing Logic" block controlled by the reclosing feature ("Phase recllogic", "Ground recllogic", and "SEF recllogic" block) has the purpose of generating a closing command for the power breaker when a reclosing attempt is triggered; the associated realy output signal is "yout1".

The "Output Logic" block can trigger a 3 phase or a single phase trip command. The trip mode must be set in the "Operation Mode" tab page of the "Phase recllogic" block (phase reclosing logic element). For special purposes the signals enabled to trip the breaker can be set using the *Tripping signals* combo box ("sTripsig" setting) in the "Phase Output Logic" block dialog.

3.3.3 Data input

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

To disable the relay model ability to close the power circuit breaker and start a reclosing procedure disable the "Closing Logic" block.

3.4 Phase HC lockout subrelay

3.4.1 Available Units

- Three instantaneous 3 phase overcurrent elements ("Phase HC Lockout 1", "Phase HC Lockout 2", "Phase HC Lockout 3" block).

- One output logic block ("Logic" block).

3.4.2 Functionality

The subrelay contains three phase overcurrent stages which can stop the reclosing procedure if any phase current is greater than a given, user configurable threshold. Each overcurrent stage is associated to a different reclosing attempt and can be enabled or disabled. Please notice that the relevant relay current threshold setting is unique so all elements must be set with the same value.

3.4.3 Data input

The relationships between the relay settings and the model parameters can be found in the following tables (the relay model parameter names are listed between brackets):

Address	Relay Setting	Model block	Model setting	Note
	Phase HCL Pickup	Phase HC Lockout 1	Pickup Current (Ipsetr)	
		Phase HC Lockout 2	Pickup Current (Ipsetr)	
		Phase HC Lockout 3	Pickup Current (Ipsetr)	
	Enable HCL for Operation #1	Phase HC Lockout 1	Out of Service (outserv)	
	Enable HCL for Operation #2	Phase HC Lockout 2	Out of Service (outserv)	
	Enable HCL for Operation #3	Phase HC Lockout 3	Out of Service (outserv)	

3.5   Ground HC lockout subrelay

3.5.1   Available Units

- Three instantaneous ground overcurrent elements ("Ground HC Lockout 1", "Ground HC Lockout 2", "Ground HC Lockout 3" block).

- One output logic block ("Logic" block).

3.5.2   Functionality

The subrelay contains three ground overcurrent stages which can stop the reclosing procedure if the ground current is greater than a given, user configurable threshold. Each overcurrent stage is associated to a different reclosing attempt and can be enabled or disabled. Please notice that the relevant relay current threshold setting is unique so all elements must be set with the same value.

3.5.3   Data input

The relationships between the relay settings and the model parameters can be found in the following tables (the relay model parameter names are listed between brackets):

Address	Relay Setting	Model block	Model setting	Note
	Ground HCL Pickup	Ground HC Lockout 1	Pickup Current (Ipsetr)	
		Ground HC Lockout 2	Pickup Current (Ipsetr)	
		Ground HC Lockout 3	Pickup Current (Ipsetr)	
	Enable HCL for Operation #1	Ground HC Lockout 1	Out of Service (outserv)	
	Enable HCL for Operation #2	Ground HC Lockout 2	Out of Service (outserv)	
	Enable HCL for Operation #3	Ground HC Lockout 3	Out of Service (outserv)	

4   Features not supported

- Protection Profiles.

- Disk reset.

- Hot line tag.

- Under/Over Frequency Loadshedding.

- Voltage Protection.

- Low current trip.

- Fault Location Distance.

5   References

[1] Cooper Power Systems, P.O. Box 1640 Waukesha, WI 53187 USA. *Form 5 Microprocessor-Based Recloser Control Programming Guide S280-79-2 April 2002 KA2048-416 Rev. 02*, 2002.

[2] Cooper Power Systems, P.O. Box 1640 Waukesha, WI 53187 USA. *Kyle Form 5 and Form 5 LSUDP Microprocessor-Based Recloser Control Installation and Operation Instructions S280-79-1 April 2001 KA2048-415 Rev. R*, 2002.