



POWERFACTORY

PowerFactory 2021

Technical Reference

Alstom LFAA

POWER SYSTEM SOLUTIONS
MADE IN GERMANY

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1 Model information

Manufacturer Alstom

Model LFAA

Variants The Alstom LFAA PowerFactory relay model can be used to simulate the different firmware versions of the Alstom LFAA 101 recloser relay. However please consider that the model has been implemented with a reduced set of the features available in the relays.

2 General description

The LFAA auto-reclose relay provides facilities for single or two shot reclosures of one or two circuit breakers following their tripping for a fault on an overhead line. The reclosures can be selected to be either high speed single-phase, or high speed or delayed three-phase. When three-phase reclosure is desired the equipment will convert any single or two-phase tripping into three-phase tripping before initiating the reclosure. Two models are available: the LFAA 101, for application to feeders switched by a single circuit breaker, and the LFAA 102, for application to feeders switched by two circuit breakers.

The Alstom LFAA PowerFactory relay model consist of a monolithic scheme. An unique relay model version is available.

The relay model consists of the measurement and acquisition units, the reclosing elements, the overcurrent element and the output logic. A single circuit breaker can be controlled so only the Alstom LFAA 101 can be modeled.

The model has been conceived to be used together with at least one protective relay that trips the breaker. The trip signal of the protective relay must be sent to an instance of the Alstom LFAA relay model to start the reclosing sequence. The Alstom LFAA relay and the other protective relay must be linked together by an external scheme. Inside the Alstom LFAA relay model the "Reclosing link" generic interconnection scheme can be found and can be used at this purpose.

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

3 Supported features

3.1 Measurement and acquisition

The primary currents are converted by one 3phase current transformers ("Ct" block)

One measurement element ("Measurement" block) is fed by this CT.

3.1.1 Available Units and input signals

The measurement part of the relay model consists of the following elements:

- One 3 phase current transformers converting the phase currents ("Ct" block).
- One 3 phase measurement elements calculating the current RMS values ("Measurement" block).

The following relay input signals are available:

- $w_trip(1)$
- $w_trip(2)$

Both input signals are connected to the reclosing element ("Phase reclogic" block). $w_trip(1)$ is controlling the phase reclosing sequence and $w_trip(2)$ is controlling the ground reclosing sequence.

The "Reclosing Link" interconnection scheme available in the relay model folder, shows how to connect to an instance of the Alstom LFAA relay model ("R2" in the scheme) the protective relay ("R1" in the scheme) which sends the trip command. Please configure the names of the protective relay trip signals accordingly with the names of the available relay output signals.

3.1.2 Functionality

The input currents are sampled at 20 samples/cycle. The values are then integrated over a cycle, and the RMS value is provided to the reclosing element.

3.1.3 Data input

The CT secondary rated current (1 or 5 A) value must be set in the measurement element ("*Nominal current*" parameter).

3.2 Main Relay protective elements

The reclosing element and the overcurrent element are working together to simulate the Alstom LFAA reclosing functionalities.

3.2.1 Available Units

- One 3phase reclosing element ("Phase reclogic" block).
- One overcurrent element ("0 current detector" block).

3.2.2 Functionality

Overcurrent element The overcurrent element acts as zero current detector.

Reclosing elements The reclosing element is driven by the relay input signals ("w_trip(1)" and "w_trip(2)"). The Alstom LFAA relay model reclosing feature is operating only when such signals are carrying the trip signals generated by an external scheme (typically a protection relay not containing the reclosing feature).

Different *Open Interval times* can be inserted for the first reclosing attempt and for the following. A different *Open Interval times* can be defined for the first reclosing attempt after that a single phase trip has been detected. The reclosing logic can be defined in the "Logic" tab page.

The overcurrent element ("0 current detector" block) is used to detect the open breaker condition.

3.2.3 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):

Reclosing feature :

Address	Relay Setting	Model block	Model setting	Note
	Dead time high speed single phase reclosing	Phase reclogic	Reclosing int 1 1Ph-Grnd faults (crecltime11ph)	
	Dead time high speed three phase reclosing	Phase reclogic	Reclosing interval 1 (crecltime1)	
	Dead time delayed second shot three phase reclosing	Phase reclogic	Reclosing interval 2 (crecltime2)	
	Reclaim time	Phase reclogic	Reset Time (cresetime)	
	Reclose pulse	Phase reclogic	Closing command duration (closing-comtime)	

Overcurrent :

No user input is required.

3.3 Output logic

The output logic is the interface between the relay and the power system. A set of relay output signals is available and can be used by the user to implement any control logic using external control schemes.

3.3.1 Available Units and Signals

The trip logic is implemented by the "Output Logic" block, the reclosing logic by the "Closing logic" block.

The following relay output signals are available:

- *yout* ("Phase reclogic" *close* command)
- *yout1* ("Phase reclogic" *trip* command)

3.3.2 Functionality

The "Output Logic" block operates the power breaker when a trip condition has been detected by the recloser element ("Phase reclogic" block).

The "Closing logic" block closes the power breaker when the recloser element triggers a reclosing attempt ("Phase reclogic" block).

3.3.3 Data input

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

4 Features not supported

The following features are not supported:

- Block autoreclose input.
- Single phase trip and reclosing.
- Conversion of any single or two-phase tripping into a three-phase tripping.

5 References

- [1] ALSTOM T&D Protection & Control Ltd, St Leonards works, Stafford ST17 4LX England.
Types LFAA 101, 102 Auto-Reclose Relay R-4076H, 1999.