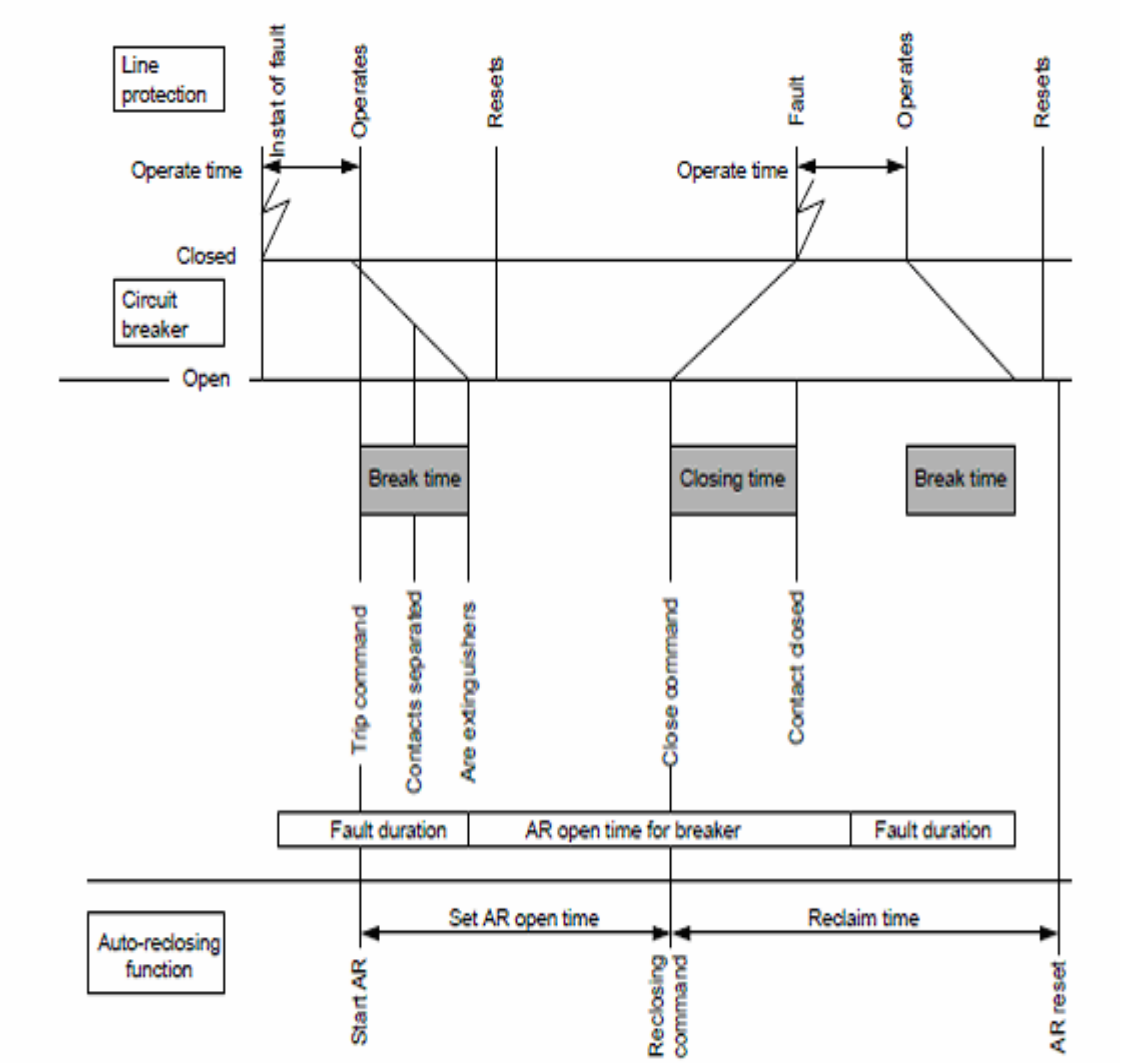
Appendix B

Single-shot auto-reclosing



Appendix C

Autorecloser Parameter Settings

Parameter	Range	Setting	Unit	Description
Operation	Off, Stand-by, On	Stand-by	-	Operating mode for AR function
No.Of Reclosing	1-4	1	-	Maximum number of reclosing attempts
t_{11Ph}		0.5	s	Dead time for first single-phase automatic reclosing shot : 0.3 s closed to the power generation. 0.5 s far from the power generation
t_{21Ph}		-	s	Dead time for first two-phase automatic reclosing shot.
$t_{Reclaim}$		180.0	s	Reclaim time
$t_{CB.Closed}$		15.0	s	The time a breaker must be closed before AR gets ready for a reclosing cycle

Appendix D

Line Distance Relay REL511*2.3 General Information

Software version: 2.3.

Password for software program: CAP540.

User name: systemadministrator.

Password: a10.

Password for CAP531 log in: new or ABB.

Relay rated voltage: U_r = 110 V.

Base value for voltage functions: U_{xb}= 110 V /√3 = 63.5V.

Relay rated current: I_r = 1 A.

Base value for current functions: I_{xb} = 1A.

So that the impedance must seen by the relay=U_{xb}/ I_{xb}=63.5/1=63.5Ω

Appendix E

Switch-onto-fault Function setting

Parameter	Setting	Remarks
Operation	On	

Appendix F

Dead-line Detection setting

Parameter	Setting	Remarks
Operation	On	
U<	70%	Operating under voltage of U_{1b}
IP<	15%	Operating undercurrent of I_{1b}. Setting must accede the OHL charging current of complete route

Appendix G

Single or Three Pole Trip Logic setting

Parameter	Setting	Remarks
Operation	On	
Prgram.	1/3ph	Single and three-phase tripping
$t_{TripMin}$	0.150 s	

Appendix H

Fuse Failure Supervision setting

Parameter	Setting	Remarks
Zero-Seq.	On	
$3U_o>$	10%	Operating zero-seq. voltage, as a percentage of U_{1b}
$3I_o<$	10%	Operating zero-seq. current, as a percentage of I_{1b}

Appendix I

Current Reversal and WEI logic setting

Parameter	Setting	Remarks
$Curr._{Rev}$	OFF/ON	Operation Current Reversal
WEI	OFF	Week End Infeed

Appendix J

Local Acceleration Logic Setting

Parameter	Setting	Remarks
Zone Extension	OFF	
Loss Of Load	OFF	

Appendix K

Scheme Communication Logic setting

Parameter	Range	Setting	Remarks
Operation	On/Off	On	Communication logic on
Scheme-Type	Intertrip / Permissive UR/ Permissive OR/ Blocking	Permissive UR	
t_{Coord}	0.000 - 60.000 s	0.0 s	Co-ordination timer
$t_{Sendmin}$	0.000 - 60.000 s	0.1 s	Minimum duration of a carrier send signal
Un_{block}	Off / No Restart/ Restart	Off	Operation mode for an unblocking logic.
$t_{Security}$	0.000 - 60.000 s	0.035	Security timer

Appendix L

Minimum operating current Setting Parameters

Minimum operating current for forward directed distance protection zones		
I_{MinOp}	20% of I_{1b}	Setting range 10-30% of I_{1b} Default setting value, which is 20% of basic terminal current, proved in practice as the optimum value for the most of applications, setting is 80 A primary.

Appendix N

Substations Switchgears Short Circuit rating Data

220kV Rabak Substation:

Rated voltage of substation	UN	: 220 kV
Rated frequency	fN	: 50 Hz
Maximum short circuit current	Ik3”max	: 14 kA
Short circuit power of network	Sk3”	: 5335 MVA

220kV Tendelti Substation:

Rated voltage of substation	UN	: 220 kV
Rated frequency	fN	: 50 Hz
Maximum short circuit current	Ik3”max	: 5 kA
Short circuit power of network	Sk3”	: 1905 MVA

220kV Umrawaba Substation:

Rated voltage of substation	UN	: 220 kV
Rated frequency	fN	: 50 Hz
Maximum short circuit current	Ik3”max	: 5 kA
Short circuit power of network	Sk3”	: 1905 MVA

220kV Elobeid Substation:

Rated voltage of substation	UN	: 220 kV
Rated frequency	fN	: 50 Hz
Maximum short circuit current	Ik3”max	: 5 kA
Short circuit power of network	Sk3”	: 1905 MVA

Appendix O

The overhead lines general data from Rabak to Elobeid

*Double circuit Transmission line on self supported steel lattice towers

*Double bundled conductor 2 X 240 mm^2 Aluminum Conductor Steel Reinforce (ACSR)

Section No.	No. of Towers	From Tower…to Tower	Distance /Km
A	283	A283 (Rabak)...A1(Tendelti)	121.7
B	203	B203 (Tandalti)...B1(UmRawaba)	77
C	321	C321 (UmRawaba)...C1(Elobeid)	126
Total	807		324.7

Appendix P

The electrical data of the over head lines

From node	To node	Max Service Current	R_1'	X_1'	R_0'	X_0'	Length
		A	Ω/km	Ω/km	Ω/km	Ω/km	Km
Rabak	Tendelti	940	0.067	0.269	0.262	1.044	121.7
Tendelti	Umrawaba	940	0.067	0.269	0.262	1.044	77
Umrawaba	Elobeid	940	0.067	0.269	0.262	1.044	126