

1 Device Configuration

No.	Function	Scope
0103	Setting Group Change Option	Disabled
0110	Trip mode	1-/3pole
0114	21 Distance protection pickup program	Z< (quadrilateral)
0119	Additional Threshold $I_{ph}>(Z1)$	Disabled
0120	68 Power Swing detection	Enabled
0121	85-21 Pilot Protection for Distance prot	POTT
0122	DTT Direct Transfer Trip	Disabled
0124	50HS Instantaneous SOTF	Enabled
0125	Weak Infeed (Trip and/or Echo)	Disabled
0126	50(N)/51(N) Backup OverCurrent	Time Overcurrent Curve IEC
0131	50N/51N Ground OverCurrent	Time Overcurrent Curve IEC
0132	85-67N Pilot Protection Gnd. OverCurrent	Directional Comparison Pickup
0133	79 Auto-Reclose Function	1 AR-cycle
0134	Auto-Reclose control mode	with Trip and Action time
0135	25 Synchronism and Voltage Check	Enabled
0136	81 Over/Underfrequency Protection	Disabled
0137	27, 59 Under/Overvoltage Protection	Disabled
0138	Fault Locator	Enabled
0139	50BF Breaker Failure Protection	Disabled
0140	74TC Trip Circuit Supervision	3 trip circuits
0142	49 Thermal Overload Protection	Disabled
0145	Protection Interface 1 (Port D)	Disabled
0147	Number of relays	2 relays

2 Configuration - short (column-oriented)

2.1 Binary inputs

Binary inputs

Binary inputs	No.	Group	Information	Type	Configuration
1	00353	P.System Data 2	>52-a Phase C (Position Contact=Breaker)	SP	H
2	00356	P.System Data 2	>Manual close signal	SP	H
3		AUX SIGNALS	79_OFF_Ext	SP	H
4	00361	P.System Data 2	>Failure: Feeder VT (MCB tripped)	SP	H
5		AUX SIGNALS	79 Encendido por senal externa	SP	H
6		AUX SIGNALS	Recepcion 85A Sistema 1	SP	H
7	01318	85-67N PilotGnd	>85-67N Carrier RECEPTION, Channel 1	SP	H
8	00380	P.System Data 2	>52b Bkr. aux. contact (3pole open)	SP	H
9		AUX SIGNALS	79 Habilitada desde sistema 2	SP	H
10	02716	79 Auto Recl.	>79: External 3pole trip for AR start	SP	H
10		AUX SIGNALS	Arranque 79 desde S2	SP	H
11	00351	P.System Data 2	>52-a Phase A (Position Contact=Breaker)	SP	H
12	00352	P.System Data 2	>52-a Phase B (Position Contact=Breaker)	SP	H
13	02702	79 Auto Recl.	>79 OFF	SP	H
14		AUX SIGNALS	Bloq_Inser	SP	L
15	02905	25 Sync. Check	>25: Start synchro-check f. Manual Close	SP	L
16		AUX SIGNALS	Inhibido 79 desde S2	SP	H
17		AUX SIGNALS	Recepcion 85A Sistema 2	SP	H
18		AUX SIGNALS	Recepción 85D	SP	H
19		AUX SIGNALS	Sup. bob_A	SP	L
20		AUX SIGNALS	Sup. bob_B	SP	L
21		AUX SIGNALS	Sup. bob_C	SP	L

2.2 Binary outputs

Binary outputs

BO	No.	Group	Information	Type	Configuration
1	00511	P.System Data 2	Relay GENERAL TRIP command	OUT	U
1	03801	21 Dis.General	21 Distance General TRIP command	OUT	U
1	03805	21 Dis.General	21 TRIP command Phases ABC	OUT	U
2	01361	50N/51N Gnd.O/C	50N / 51N General TRIP command	OUT	U
3	02851	79 Auto Recl.	79 - Close command	OUT	U
6	02851	79 Auto Recl.	79 - Close command	OUT	U
7	00511	P.System Data 2	Relay GENERAL TRIP command	OUT	U
8	04056	85-21 PilotDist	85-21 Carrier SEND signal	OUT	U
9	01384	85-67N PilotGnd	85-67N Carrier SEND signal	OUT	U
10	00507	P.System Data 2	Relay TRIP command Phase A	OUT	U
10	00511	P.System Data 2	Relay GENERAL TRIP command	OUT	U

Binary outputs(2)

BO	No.	Group	Information	Type	Configuration
11	00508	P.System Data 2	Relay TRIP command Phase B	OUT	U
11	00511	P.System Data 2	Relay GENERAL TRIP command	OUT	U
12	00509	P.System Data 2	Relay TRIP command Phase C	OUT	U
12	00511	P.System Data 2	Relay GENERAL TRIP command	OUT	U
13	00507	P.System Data 2	Relay TRIP command Phase A	OUT	U
13	00511	P.System Data 2	Relay GENERAL TRIP command	OUT	U
14	00508	P.System Data 2	Relay TRIP command Phase B	OUT	U
14	00511	P.System Data 2	Relay GENERAL TRIP command	OUT	U
15	00509	P.System Data 2	Relay TRIP command Phase C	OUT	U
15	00511	P.System Data 2	Relay GENERAL TRIP command	OUT	U
23	03811	21 Dis.General	21 TRIP single-phase Z1	OUT	U
23	03823	21 Dis.General	21 TRIP 3phase in Z1 with single-ph Flt.	OUT	U
23	03824	21 Dis.General	21 TRIP 3phase in Z1 with multi-ph Flt.	OUT	U
23	03813	21 Dis.General	21 TRIP single-phase Z1B	OUT	U
23	03825	21 Dis.General	21 TRIP 3phase in Z1B with single-ph Flt	OUT	U
23	03826	21 Dis.General	21 TRIP 3phase in Z1B with multi-ph Flt.	OUT	U
23	03850	21 Dis.General	21 TRIP Z1B with Pilot Protection scheme	OUT	U
23		85-67N PilotGnd	85C_Tr_Sca	SP	U
24	03816	21 Dis.General	21 TRIP single-phase Z2	OUT	U
24	03817	21 Dis.General	21 TRIP 3phase in Z2	OUT	U
24	03818	21 Dis.General	21 TRIP 3phase in Z3	OUT	U
24	03821	21 Dis.General	21 TRIP 3phase in Z4	OUT	U
24	07223	50(N)/51(N) O/C	51(N)-B TRIP	OUT	U
24	01369	50N/51N Gnd.O/C	51N TRIP	OUT	U

2.3 LEDs

LEDs

LEDs	No.	Group	Information	Type	Configuration
1	00511	P.System Data 2	Relay GENERAL TRIP command	OUT	L
2	00351	P.System Data 2	>52-a Phase A (Position Contact=Breaker)	SP	U
2	00352	P.System Data 2	>52-a Phase B (Position Contact=Breaker)	SP	U
2	00353	P.System Data 2	>52-a Phase C (Position Contact=Breaker)	SP	U
3	00361	P.System Data 2	>Failure: Feeder VT (MCB tripped)	SP	U
4	03811	21 Dis.General	21 TRIP single-phase Z1	OUT	L
4	03823	21 Dis.General	21 TRIP 3phase in Z1 with single-ph Flt.	OUT	L
4	03824	21 Dis.General	21 TRIP 3phase in Z1 with multi-ph Flt.	OUT	L
4	03825	21 Dis.General	21 TRIP 3phase in Z1B with single-ph Flt	OUT	L
4	03826	21 Dis.General	21 TRIP 3phase in Z1B with multi-ph Flt.	OUT	L
5	03850	21 Dis.General	21 TRIP Z1B with Pilot Protection scheme	OUT	L
6	03817	21 Dis.General	21 TRIP 3phase in Z2	OUT	L

LEDs(2)

LEDs	No.	Group	Information	Type	Configuration
7	03818	21 Dis.General	21 TRIP 3phase in Z3	OUT	L
8	03821	21 Dis.General	21 TRIP 3phase in Z4	OUT	L
9	04295	50HS SOTF	50HS SOTF-O/C TRIP command Phases ABC	OUT	L
10	07211	50(N)/51(N) O/C	50(N)/51(N)-B General TRIP command	OUT	L
11	01361	50N/51N Gnd.O/C	50N / 51N General TRIP command	OUT	L
12	04006	85-21 PilotDist	>85-21 Carrier RECEPTION, Channel 1	SP	L
13	01318	85-67N PilotGnd	>85-67N Carrier RECEPTION, Channel 1	SP	L
14	04056	85-21 PilotDist	85-21 Carrier SEND signal	OUT	L
14	01384	85-67N PilotGnd	85-67N Carrier SEND signal	OUT	L

2.4 CFC

CFC

No.	Group	Information	Source	Destination
00016	Device, General	>DataStop / >Stop data transmission		X
	Device, General	Brk OPENED / Breaker OPENED	X	
	Device, General	Feeder gnd / Feeder GROUNDED	X	
00004	Osc. Fault Rec.	>Trig.Wave.Cap. / >Trigger Waveform Capture	X	
00351	P.System Data 2	>52-a ØA / >52-a Phase A (Position Contact=Breaker)		X
00352	P.System Data 2	>52-a ØB / >52-a Phase B (Position Contact=Breaker)		X
00353	P.System Data 2	>52-a ØC / >52-a Phase C (Position Contact=Breaker)		X
00379	P.System Data 2	>52a 3p Closed / >52a Bkr. aux. contact (3pole closed)		X
00380	P.System Data 2	>52b 3p Open / >52b Bkr. aux. contact (3pole open)		X
00503	P.System Data 2	Relay PICKUP ØA / Relay PICKUP Phase A		X
00504	P.System Data 2	Relay PICKUP ØB / Relay PICKUP Phase B		X
00505	P.System Data 2	Relay PICKUP ØC / Relay PICKUP Phase C		X
00506	P.System Data 2	Relay PICKUP G / Relay PICKUP GROUND		X
00511	P.System Data 2	Relay TRIP / Relay GENERAL TRIP command		X
00536	P.System Data 2	Definitive TRIP / Relay Definitive TRIP		X
04001	85-21 PilotDist	>85-21 Pilot ON / >85-21 Pilot Prot. Distance ON	X	
04003	85-21 PilotDist	>85-21 PilotBlk / >85-21 Pilot Prot. Distance BLOCK	X	X
04006	85-21 PilotDist	>85-21 Rec.Ch1 / >85-21 Carrier RECEPTION, Channel 1	X	X
	85-21 PilotDist	Hab/Des 85 / Hab/Des 85	X	X
	85-21 PilotDist	Hab/Des 85 / Hab/Des 85	X	X
	85-21 PilotDist	85_Hab / 85_Hab	X	
	85-21 PilotDist	85_Desh / 85_Desh	X	
01369	50N/51N Gnd.O/C	51N TRIP / 51N TRIP		X
01311	85-67N PilotGnd	>85-67N PilotON / >85-67N Pilot Prot. Gnd. O/C ON	X	
01313	85-67N PilotGnd	>85-67NPilotBlk / >85-67N Pilot Prot. Gnd. O/C BLOCK	X	X
01318	85-67N PilotGnd	>85-67N Rec.Ch1 / >85-67N Carrier RECEPTION, Channel 1		X
	85-67N PilotGnd	85C_Tr_Sca / 85C_Tr_Sca	X	

CFC(2)

No.	Group	Information	Source	Destination
02701	79 Auto Recl.	>79 ON / >79 ON	X	X
02702	79 Auto Recl.	>79 OFF / >79 OFF		X
02703	79 Auto Recl.	>BLOCK 79 / >BLOCK 79	X	
02943	25 Sync. Check	25 Synchronism / 25: Synchronism detected		X
02944	25 Sync. Check	25 Vsy1> Vsy2< / 25: SYNC Condition Vsy1>Vsy2< true		X
02945	25 Sync. Check	25 Vsy1< Vsy2> / 25: SYNC Condition Vsy1<Vsy2> true		X
02946	25 Sync. Check	25 Vsy1< Vsy2< / 25: SYNC Condition Vsy1<Vsy2< true		X
	25 Sync. Check	25_Scada / 25_Scada	X	
	AUX SIGNALS	74_Alarm_A / 74 falla supervisión fase A	X	X
	AUX SIGNALS	74_Alarm_B / 74 falla supervisión fase B	X	X
	AUX SIGNALS	74_Alarm_C / 74 falla supervisión fase C	X	X
	AUX SIGNALS	85D_Rcv / Recepción 85D		X
	AUX SIGNALS	79_ON_S2 / 79 Habilitada desde sistema 2		X
	AUX SIGNALS	79_Inh_S2 / Inhibido 79 desde S2		X
	AUX SIGNALS	85A_Rcv_S1 / Recepcion 85A Sistema 1		X
	AUX SIGNALS	85A_Rcv_S2 / Recepcion 85A Sistema 2		X
	AUX SIGNALS	79_ON_Ext / 79 Encendido por senal externa		X
	AUX SIGNALS	Bloq_Inser / Bloq_Inser		X
	AUX SIGNALS	79_OFF_Ext / 79_OFF_Ext		X
	AUX SIGNALS	Sup. bob_A / Sup. bob_A		X
	AUX SIGNALS	Sup. bob_B / Sup. bob_B		X
	AUX SIGNALS	Sup. bob_C / Sup. bob_C		X
	AUX SIGNALS	Trip_A_Sca / Trip_A_Sca	X	
	AUX SIGNALS	Trip_B_Sca / Trip_B_Sca	X	
	AUX SIGNALS	Trip_C_Sca / Trip_C_Sca	X	
	AUX SIGNALS	Trip_N_Sca / Trip_N_Sca	X	
06854	74TC TripCirc.	>74TC-1 TripRel / >74TC-1 Trip circuit superv.:Trip Relay	X	X
06855	74TC TripCirc.	>74TC-1 Bkr.Rel / >74TC-1 Trip circuit superv.:Breaker Rel	X	X
06856	74TC TripCirc.	>74TC-2 TripRel / >74TC-2 Trip circuit superv.:Trip Relay	X	X
06857	74TC TripCirc.	>74TC-2 Bkr.Rel / >74TC-2 Trip circuit superv.:Breaker Rel	X	X
06858	74TC TripCirc.	>74TC-3 TripRel / >74TC-3 Trip circuit superv.:Trip Relay	X	X
06859	74TC TripCirc.	>74TC-3 Bkr.Rel / >74TC-3 Trip circuit superv.:Breaker Rel	X	X
	Control Device	52Breaker / 52 Breaker		X
	Control Device	52Breaker / 52 Breaker		X
	Control Device	Disc.Swit. / Disconnect Switch		X
	Control Device	Disc.Swit. / Disconnect Switch		X
	Control Device	GndSwit. / Ground Switch		X
	Control Device	GndSwit. / Ground Switch		X
	Control Device	52 Open / Interlocking: 52 Open	X	
	Control Device	52 Close / Interlocking: 52 Close	X	
	Control Device	Disc.Open / Interlocking: Disconnect switch Open	X	
	Control Device	Disc.Close / Interlocking: Disconnect switch Close	X	

CFC(3)

No.	Group	Information	Source	Destination
	Control Device	GndSw Open / Interlocking: Ground switch Open	X	
	Control Device	GndSw Cl. / Interlocking: Ground switch Close	X	
	Control Device	UnlockDT / Unlock data transmission via BI	X	
	Process Data	>Door open / >Cabinet door open		X
	Process Data	>CB wait / >CB waiting for Spring charged		X
00643	Measurement	PF = / Power Factor		X
	Set Points(MV)	PF < / Power Factor <		X
00285	Set Points(MV)	SP. PF(55)alarm / Set Point 55 Power factor alarm	X	

3 General Device Settings

3.1 Group Device, General Settings

Group Device, General Settings

No.	Settings	Value	Group
0610	Fault Display on LED / LCD	Display Targets on every Pickup	All
0625A	Minimum hold time of latched LEDs	0 min	All
0640	Start image Default Display	image 1	All

4 Power System Data 1

4.1 Group Power System Data 1; Group Transformers

Group Power System Data 1; Group Transformers

No.	Settings	Value	Group
0201	CT Starpoint	towards Line	All
0203	Rated Primary Voltage	230,0 kV	All
0204	Rated Secondary Voltage (Ph-Ph)	115 V	All
0205	CT Rated Primary Current	800 A	All
0206	CT Rated Secondary Current	5A	All
0210	V4 voltage transformer is	not connected	All
0211	Matching ratio Phase-VT To Open-Delta-VT	1,73	All
0212	VT connection for Vsy2	A-B	All
0214A	Angle adjustment Vsy2-Vsy1	0 °	All
0215	Matching ratio Vsy1 / Vsy2	1,00	All
0220	I4 current transformer is	Neutral Current (of the protected line)	All
0221	Matching ratio I4/Iph for CT's	1,000	All

4.2 Group Power System Data 1; Group Power System

Group Power System Data 1; Group Power System

No.	Settings	Value	Group
0207	System Starpoint is	Solid Grounded	All
0230	Rated Frequency	50 Hz	All
0235	Phase Sequence	A B C	All
0236	Distance measurement unit	km	All
0237	Setting format for zero seq.comp. format	Zero seq. comp. factor K0 and angle(K0)	All
0238A	50N/51N Gnd O/C: setting for 1p. 79 AR	all elements together	All

4.3 Group Power System Data 1; Group Breaker

Group Power System Data 1; Group Breaker

No.	Settings	Value	Group
0239	Closing (operating) time of 52 (CB)	0,06 sec	All

Group Power System Data 1; Group Breaker(2)

No.	Settings	Value	Group
0240A	Minimum TRIP Command Duration	0,10 sec	All
0241A	Maximum Close Command Duration	0,10 sec	All
0242	Dead Time for CB test-autoreclosure	0,10 sec	All

5 Settings groups

5.1 Group Power System Data 2; Group Power System

Group Power System Data 2; Group Power System

No.	Settings	Value	Group
1103	Measurement: Full Scale Voltage (100%)	230,0 kV	A
1104	Measurement: Full Scale Current (100%)	800 A	A
1105	Line Angle	75 °	A
1211	Angle of inclination, distance charact.	75 °	A
1107	P,Q operational measured values sign	not reversed	A
1110	x' - Line Reactance per length unit	0,313 Ohm / km	A
1111	Line Length	74,0 km	A
1120	Zero seq. comp. factor K0 for zone Z1	0,700	A
1121	Zero seq. comp. angle for zone Z1	-4,92 °	A
1122	Zero seq.comp.factor K0, higher zones >Z1	0,700	A
1123	Zero seq. comp. angle, higher zones >Z1	-4,92 °	A

5.2 Group Power System Data 2; Group Line Status

Group Power System Data 2; Group Line Status

No.	Settings	Value	Group
1130A	Pole Open Current Threshold	80 A	A
1131A	Pole Open Voltage Threshold	60,0 kV	A
1132A	Seal-in Time after ALL closures	0,10 sec	A
1133A	minimal time for line open before SOTF	0,25 sec	A
1134	Recognition of Line Closures with	Current OR Voltage or Manual close BI	A
1135	RESET of Trip Command	with Pole Open Current Threshold only	A
1136	open pole detector	with measurement (V/I, trip, pickup, 52a	A
1140A	CT Saturation Threshold	16000 A	A
1150A	Seal-in Time after MANUAL closures	0,30 sec	A
1151	Manual CLOSE COMMAND generation	NO	A
1152	MANUAL Closure Impulse after CONTROL	<none>	All

5.3 Group Power System Data 2; Group Trip 1-/3-pole

Group Power System Data 2; Group Trip 1-/3-pole

No.	Settings	Value	Group
1155	3 pole coupling	with Trip	A
1156A	Trip type with 2phase faults	3pole	A

5.4 Group 21 Distance protection, general settings; Group General

Group 21 Distance protection, general settings; Group General

No.	Settings	Value	Group
1201	21 Distance protection is	ON	A
1202	Phase Current threshold for dist. meas.	80 A	A
1211	Angle of inclination, distance charact.	75 °	A
1208	Series compensated line	NO	A
1232	Instantaneous trip after SwitchOnToFault	with Zone Z1B	A
1241	R load, minimum Load Impedance (ph-g)	119,125 Ohm	A
1242	PHI load, maximum Load Angle (ph-g)	30 °	A
1243	R load, minimum Load Impedance (ph-ph)	119,125 Ohm	A
1244	PHI load, maximum Load Angle (ph-ph)	30 °	A
1317A	Single pole trip for faults in Z2	NO	A
1357	Z1B enabled before 1st AR (int. or ext.)	YES	A

5.5 Group 21 Distance protection, general settings; Group Ground faults

Group 21 Distance protection, general settings; Group Ground faults

No.	Settings	Value	Group
1203	3I0 threshold for neutral current pickup	80 A	A
1204	3V0 threshold zero seq. voltage pickup	10,0 kV	A
1207A	3I0>-pickup-stabilisation (3I0>/ Iphmax)	0,10	A
1209A	Criterion of ground fault recognition	3I0> OR 3V0>	A
1221A	Loop selection with 2Ph-G faults	block leading ph-g loop	A

5.6 Group 21 Distance protection, general settings; Group Time Delays

Group 21 Distance protection, general settings; Group Time Delays

No.	Settings	Value	Group
1210	21 Condition for zone timer start	with distance pickup	A
1305	T1-1phase, delay for single phase faults	0,00 sec	A
1306	T1multi-ph, delay for multi phase faults	0,00 sec	A
1315	T2-1phase, delay for single phase faults	0,40 sec	A
1316	T2multi-ph, delay for multi phase faults	0,40 sec	A
1325	T3 delay	1,00 sec	A
1335	T4 delay	1,20 sec	A
1345	T5 delay	oo sec	A
1365	T6 delay	oo sec	A
1355	T1B-1phase, delay for single ph. faults	0,00 sec	A
1356	T1B-multi-ph, delay for multi ph. faults	0,00 sec	A

5.7 Group 21 Distance zones (quadrilateral); Group Zone Z1

Group 21 Distance zones (quadrilateral); Group Zone Z1

No.	Settings	Value	Group
1301	Operating mode Z1	Forward	A
1302	R(Z1), Resistance for ph-ph-faults	9,875 Ohm	A
1303	X(Z1), Reactance	18,375 Ohm	A
1304	RG(Z1), Resistance for ph-gnd faults	54,875 Ohm	A
1305	T1-1phase, delay for single phase faults	0,00 sec	A
1306	T1multi-ph, delay for multi phase faults	0,00 sec	A
1307	Zone Reduction Angle (load compensation)	0 °	A

5.8 Group 21 Distance zones (quadrilateral); Group Zone Z1B-exten.

Group 21 Distance zones (quadrilateral); Group Zone Z1B-exten.

No.	Settings	Value	Group
1351	Operating mode Z1B (overreach zone)	Forward	A
1352	R(Z1B), Resistance for ph-ph-faults	14,875 Ohm	A
1353	X(Z1B), Reactance	27,625 Ohm	A
1354	RG(Z1B), Resistance for ph-gnd faults	73,875 Ohm	A
1355	T1B-1phase, delay for single ph. faults	0,00 sec	A
1356	T1B-multi-ph, delay for multi ph. faults	0,00 sec	A

Group 21 Distance zones (quadrilateral); Group Zone Z1B-exten.(2)

No.	Settings	Value	Group
1357	Z1B enabled before 1st AR (int. or ext.)	YES	A

5.9 Group 21 Distance zones (quadrilateral); Group Zone Z2

Group 21 Distance zones (quadrilateral); Group Zone Z2

No.	Settings	Value	Group
1311	Operating mode Z2	Forward	A
1312	R(Z2), Resistance for ph-ph-faults	14,875 Ohm	A
1313	X(Z2), Reactance	27,625 Ohm	A
1314	RG(Z2), Resistance for ph-gnd faults	73,875 Ohm	A
1315	T2-1phase, delay for single phase faults	0,40 sec	A
1316	T2multi-ph, delay for multi phase faults	0,40 sec	A
1317A	Single pole trip for faults in Z2	NO	A

5.10 Group 21 Distance zones (quadrilateral); Group Zone Z3

Group 21 Distance zones (quadrilateral); Group Zone Z3

No.	Settings	Value	Group
1321	Operating mode Z3	Reverse	A
1322	R(Z3), Resistance for ph-ph-faults	3,625 Ohm	A
1323	X(Z3), Reactance	6,875 Ohm	A
1324	RG(Z3), Resistance for ph-gnd faults	20,625 Ohm	A
1325	T3 delay	1,00 sec	A

5.11 Group 21 Distance zones (quadrilateral); Group Zone Z4

Group 21 Distance zones (quadrilateral); Group Zone Z4

No.	Settings	Value	Group
1331	Operating mode Z4	Forward	A
1332	R(Z4), Resistance for ph-ph-faults	23,625 Ohm	A
1333	X(Z4), Reactance	44,000 Ohm	A
1334	RG(Z4), Resistance for ph-gnd faults	131,875 Ohm	A

Group 21 Distance zones (quadrilateral); Group Zone Z4(2)

No.	Settings	Value	Group
1335	T4 delay	1,20 sec	A

5.12 Group 21 Distance zones (quadrilateral); Group Zone Z5

Group 21 Distance zones (quadrilateral); Group Zone Z5

No.	Settings	Value	Group
1341	Operating mode Z5	Non-Directional	A
1342	R(Z5), Resistance for ph-ph-faults	48,250 Ohm	A
1343	X(Z5)+, Reactance for Forward direction	48,250 Ohm	A
1344	RG(Z5), Resistance for ph-gnd faults	145,125 Ohm	A
1345	T5 delay	oo sec	A
1346	X(Z5)-, Reactance for Reverse direction	48,250 Ohm	A

5.13 Group 21 Distance zones (quadrilateral); Group Zone Z6

Group 21 Distance zones (quadrilateral); Group Zone Z6

No.	Settings	Value	Group
1361	Operating mode Z6	Inactive	A
1362	R(Z6), Resistance for ph-ph-faults	62,725 Ohm	A
1363	X(Z6)+, Reactance for Forward direction	62,725 Ohm	A
1364	RE(Z6), Resistance for ph-g faults	62,725 Ohm	A
1365	T6 delay	oo sec	A
1366	X(Z6)-, Reactance for Reverse direction	16,725 Ohm	A

5.14 Group 68 Power Swing detection

Group 68 Power Swing detection

No.	Settings	Value	Group
2002	Power Swing Operating mode	all zones blocked	A
2006	68T Power swing trip	NO	A

5.15 Group 85-21 Pilot Prot. for Distance prot.

Group 85-21 Pilot Prot. for Distance prot.

No.	Settings	Value	Group
2101	85-21 Pilot Prot. for Distance prot.	ON	A
2102	Type of Line	Two Terminals	A
2103A	Time for send signal prolongation	0,05 sec	A
2109A	Transient Block.: Duration external flt.	0,04 sec	A
2110A	Transient Block.: Blk.T. after ext. flt.	0,05 sec	A
2112A	DIS transient block by EF	YES	A
2113	Memorize receive signal	NO	A

5.16 Group 50HS Instantaneous SOTF

Group 50HS Instantaneous SOTF

No.	Settings	Value	Group
2401	50HS Instantaneous SOTF-O/C is	ON	A
2404	50HS SOTF-O/C PICKUP	960 A	A

5.17 Group 50(N)/51(N) Backup OverCurrent; Group General

Group 50(N)/51(N) Backup OverCurrent; Group General

No.	Settings	Value	Group
2601	Operating mode	ON:only active with Loss of VT sec. cir.	A
2680	Trip time delay after SOTF	0,00 sec	A

5.18 Group 50(N)/51(N) Backup OverCurrent; Group 50(N)-B1

Group 50(N)/51(N) Backup OverCurrent; Group 50(N)-B1

No.	Settings	Value	Group
2610	50-B1 Pickup	oo A	A
2611	50-B1 Delay	0,30 sec	A

Group 50(N)/51(N) Backup OverCurrent; Group 50(N)-B1(2)

No.	Settings	Value	Group
2612	50N-B1 Pickup	oo A	A
2613	50N-B1 Delay	oo sec	A
2614	Instantaneous trip via BI	YES	A
2615	Instantaneous trip after SwitchOnToFault	NO	A

5.19 Group 50(N)/51(N) Backup OverCurrent; Group 50(N)-B2

Group 50(N)/51(N) Backup OverCurrent; Group 50(N)-B2

No.	Settings	Value	Group
2620	50-B2 Pickup	oo A	A
2621	50-B2 Delay	0,50 sec	A
2622	50N-B2 Pickup	oo A	A
2623	50N-B2 Delay	oo sec	A
2624	Instantaneous trip via Pilot Prot./BI	NO	A
2625	Instantaneous trip after SwitchOnToFault	NO	A

5.20 Group 50(N)/51(N) Backup OverCurrent; Group 51(N)-B

Group 50(N)/51(N) Backup OverCurrent; Group 51(N)-B

No.	Settings	Value	Group
2640	51-B Pickup	890 A	A
2642	51-B Time Dial	0,12 sec	A
2646	51-B Additional Time Delay	0,00 sec	A
2650	51N-B Pickup	80 A	A
2652	51N-B Time Dial	0,25 sec	A
2656	51N-B Additional Time Delay	0,00 sec	A
2660	IEC Curve	Normal Inverse	A
2670	Instantaneous trip via Pilot Prot./BI	NO	A
2671	Instantaneous trip after SwitchOnToFault	NO	A

5.21 Group 50(N)/51(N) Backup OverCurrent; Group 50(N)-STUB

Group 50(N)/51(N) Backup OverCurrent; Group 50(N)-STUB

No.	Settings	Value	Group
2630	50-STUB Pickup	oo A	A
2631	50-STUB Delay	0,30 sec	A
2632	50N-STUB Pickup	oo A	A
2633	50N-STUB Delay	2,00 sec	A
2634	Instantaneous trip via Pilot Prot./BI	NO	A
2635	Instantaneous trip after SwitchOnToFault	NO	A

5.22 Group Measurement Supervision; Group Balance / Summ.

Group Measurement Supervision; Group Balance / Summ.

No.	Settings	Value	Group
2901	Measurement Supervision	ON	A
2902A	Voltage Threshold for Balance Monitoring	100,0 kV	A
2903A	Balance Factor for Voltage Monitor	0,75	A
2904A	Current Threshold for Balance Monitoring	400 A	A
2905A	Balance Factor for Current Monitor	0,50	A
2906A	Summated Current Monitoring Threshold	80 A	A
2907A	Summated Current Monitoring Factor	0,10	A
2908A	T Balance Factor for Voltage Monitor	5 sec	A
2909A	T Current Balance Monitor	5 sec	A

5.23 Group Measurement Supervision; Group Meas.Volt.Fail

Group Measurement Supervision; Group Meas.Volt.Fail

No.	Settings	Value	Group
2910	Fuse Failure Monitor	ON	A
2911A	Minimum Voltage Threshold V>	20,0 kV	A
2912A	Maximum Current Threshold I<	80 A	A
2913A	Maximum Voltage Threshold V< (3phase)	10,0 kV	A
2914A	Differential Current Threshold (3phase)	80 A	A
2915	Voltage Failure Supervision	with current superv. and CBpos(52a)	A
2916A	Delay Voltage Failure Supervision	5,00 sec	A

5.24 Group Measurement Supervision; Group VT mcb

Group Measurement Supervision; Group VT mcb

No.	Settings	Value	Group
2921	VT mcb operating time	20 ms	A

5.25 Group Measurement Supervision; Group Load Angle

Group Measurement Supervision; Group Load Angle

No.	Settings	Value	Group
2941	Limit setting PhiA	200 °	A
2942	Limit setting PhiB	340 °	A
2943	Minimum value I1>	50 A	A
2944	Minimum value U1>	84,0 kV	A

5.26 Group 50N/51N Ground OverCurrent; Group General

Group 50N/51N Ground OverCurrent; Group General

No.	Settings	Value	Group
3101	50N/51N Ground Overcurrent	ON	A
3102	Block 50N/51N for Distance protection	with every Pickup	A
3174	Block 50N/51N for Pickup 21	in each zone	A
3103	Block 50N/51N for 1pole Dead time	YES	A
3104A	Stabilisation Slope with Iphase	10 %	A
3105	3I0-Min threshold for Pilot Prot.schemes	400 A	A
3109	Single pole trip with ground flt.prot.	YES	A
3170	2nd harmonic ratio for inrush restraint	15 %	A
3171	Max.Current, overriding inrush restraint	6000 A	A
3172	Instantaneous mode after SwitchOnToFault	with Pickup and direction	A
3173	Trip time delay after SOTF	0,00 sec	A

5.27 Group 50N/51N Ground OverCurrent; Group 50N-1

Group 50N/51N Ground OverCurrent; Group 50N-1

No.	Settings	Value	Group
3110	Operating mode	Inactive	A
3111	Pickup	3200 A	A
3112	Time Delay	0,30 sec	A
3113	Instantaneous trip via Pilot Prot./BI	NO	A
3114	Instantaneous trip after SwitchOnToFault	NO	A
3115	Inrush Blocking	NO	A

5.28 Group 50N/51N Ground OverCurrent; Group 50N-2

Group 50N/51N Ground OverCurrent; Group 50N-2

No.	Settings	Value	Group
3120	Operating mode	Inactive	A
3121	Pickup	1600 A	A
3122	Time Delay	0,60 sec	A
3123	Instantaneous trip via Pilot Prot./BI	NO	A
3124	Instantaneous trip after SwitchOnToFault	NO	A
3125	Inrush Blocking	NO	A

5.29 Group 50N/51N Ground OverCurrent; Group 50N-3

Group 50N/51N Ground OverCurrent; Group 50N-3

No.	Settings	Value	Group
3130	Operating mode	Inactive	A
3131	Pickup	20000 A	A
3132	Time Delay	oo sec	A
3133	Instantaneous trip via Pilot Prot./BI	YES	A
3134	Instantaneous trip after SwitchOnToFault	NO	A
3135	Inrush Blocking	NO	A

5.30 Group 50N/51N Ground OverCurrent; Group 51N InverseTime

Group 50N/51N Ground OverCurrent; Group 51N InverseTime

No.	Settings	Value	Group
3140	Operating mode	Forward	A
3141	Pickup	160 A	A
3143	Time Dial	0,39 sec	A
3147	Additional Time Delay	0,00 sec	A
3148	Instantaneous trip via Pilot Prot./BI	YES	A
3149	Instantaneous trip after SwitchOnToFault	NO	A
3150	Inrush Blocking	YES	A
3151	IEC Curve	Normal Inverse	A

5.31 Group 50N/51N Ground OverCurrent; Group Direction

Group 50N/51N Ground OverCurrent; Group Direction

No.	Settings	Value	Group
3160	Polarization	with Vo + Ig or V2	A
3162A	ALPHA, lower angle for forward direction	338 °	A
3163A	BETA, upper angle for forward direction	122 °	A
3164	Min. zero seq.voltage 3Vo for polarizing	1,0 kV	A
3166	Min. neg. seq. polarizing voltage 3V2	1,0 kV	A
3167	Min. neg. seq. polarizing current 3I2	40 A	A
3168	Compensation angle PHI comp. for Sr	255 °	A
3169	Forward direction power threshold	0,48 MVA	A
3186A	3V0 min for forward direction	1,0 kV	A
3187A	Reactance X of series capacitor	0,000 Ohm	A

5.32 Group 85-67N Pilot Prot. Gnd. OverCurrent

Group 85-67N Pilot Prot. Gnd. OverCurrent

No.	Settings	Value	Group
3201	85-67N Pilot Prot. for Dir.Ground O/C	ON	A
3202	Line Configuration	Two Terminals	A
3203A	Time for send signal prolongation	0,08 sec	A
3209A	Transient Block.: Duration external flt.	0,04 sec	A
3210A	Transient Block.: Blk.T. after ext. flt.	0,05 sec	A
3212A	EF transient block by DIS	YES	A

5.33 Group 79 Auto Reclosing; Group General

Group 79 Auto Reclosing; Group General

No.	Settings	Value	Group
3401	79 Auto-Reclose Function	ON	A
3402	52-ready interrogation at 1st trip	NO	A
3403	Reclaim time after successful AR cycle	3,00 sec	A
3404	AR blocking duration after manual close	1,00 sec	A
3406	Evolving fault recognition	with Trip	A
3407	Evolving fault (during the dead time)	starts 3pole AR-cycle	A
3408	AR start-signal monitoring time	0,20 sec	A
3409	Circuit Breaker (CB) Supervision Time	3,00 sec	A
3410	Send delay for remote close command	oo sec	A
3411A	Maximum dead time extension	oo sec	A

5.34 Group 79 Auto Reclosing; Group 1st AR-cyle

Group 79 Auto Reclosing; Group 1st AR-cyle

No.	Settings	Value	Group
3450	Start of AR allowed in this cycle	YES	A
3451	Action time	0,20 sec	A
3456	Dead time after 1 pole trip	1,20 sec	A
3457	Dead time after 3pole trip	0,50 sec	A
3458	Dead time after evolving fault	1,20 sec	A
3459	52-ready interrogation before reclosing	NO	A
3460	Request for synchro-check after 3pole AR	NO	A

5.35 Group 79 Auto Reclosing; Group 3pTRIP/DLC/RDT

Group 79 Auto Reclosing; Group 3pTRIP/DLC/RDT

No.	Settings	Value	Group
3430	3pole TRIP by AR	YES	A
3431	Dead Line Check or Reduced Dead Time	Without	A
3438	Supervision time for dead/ live voltage	0,10 sec	A

Group 79 Auto Reclosing; Group 3pTRIP/DLC/RDT(2)

No.	Settings	Value	Group
3440	Voltage threshold for live line or bus	60,0 kV	A
3441	Voltage threshold for dead line or bus	126,0 kV	A

5.36 Group 79 Auto Reclosing; Group Start AR with..

Group 79 Auto Reclosing; Group Start AR with..

No.	Settings	Value	Group
3420	AR with 21 (distance protection)	YES	A
3421	AR with 50HS-SOTF (switch-onto-flt.o/c)	YES	A
3423	AR with 50N/51N (ground fault o/c)	YES	A
3425	AR with 50(N)-B (back-up overcurrent)	YES	A

5.37 Group 25 Synchronism and Voltage Check; Group General

Group 25 Synchronism and Voltage Check; Group General

No.	Settings	Value	Group
3501	25 Synchronism and Voltage Check	ON	A
3502	Voltage threshold dead line / bus	40,0 kV	A
3503	Voltage threshold live line / bus	106,0 kV	A
3504	Maximum permissible voltage	146,0 kV	A
3507	Maximum duration of synchronism-check	oo sec	A
3508	Synchronous condition stability timer	0,04 sec	A
3509	Synchronizable circuit breaker	52Breaker	All

5.38 Group 25 Synchronism and Voltage Check; Group with AR

Group 25 Synchronism and Voltage Check; Group with AR

No.	Settings	Value	Group
3510	Operating mode with AR	without consideration of 52 closing time	A
3511	Maximum voltage difference	23,0 kV	A
3512	Maximum frequency difference	0,10 Hz	A
3513	Maximum angle difference	10 °	A

Group 25 Synchronism and Voltage Check; Group with AR(2)

No.	Settings	Value	Group
3515A	79 at Vsy2>, Vsy1>, and Synchr.	YES	A
3516	79 at Vsy1< and Vsy2>	YES	A
3517	79 at Vsy1> and Vsy2<	NO	A
3518	79 at Vsy1< and Vsy2<	NO	A
3519	Override of any check before 79	NO	A

5.39 Group 25 Synchronism and Voltage Check; Group Man.Close+CNTRL

Group 25 Synchronism and Voltage Check; Group Man.Close+CNTRL

No.	Settings	Value	Group
3530	Operating mode with Man.Cl	without consideration of 52 closing time	A
3531	Maximum voltage difference	8,4 kV	A
3532	Maximum frequency difference	0,10 Hz	A
3533	Maximum angle difference	10 °	A
3535A	Manual Close at Vsy2>, Vsy1>, and Synchr	YES	A
3536	Manual Close at Vsy1< and Vsy2>	NO	A
3537	Manual Close at Vsy1> and Vsy2<	NO	A
3538	Manual Close at Vsy1< and Vsy2<	NO	A
3539	Override of any check before Man.Cl	NO	A

5.40 Group Fault Locator; Group Fault Locator

Group Fault Locator; Group Fault Locator

No.	Settings	Value	Group
3802	Start fault locator with	TRIP	A
3806	Load Compensation	NO	A

5.41 Group 74TC Trip Circuit Supervision

Group 74TC Trip Circuit Supervision

No.	Settings	Value	Group
4001	74TC TRIP Circuit Supervision	OFF	A

Group 74TC Trip Circuit Supervision(2)

No.	Settings	Value	Group
4002	Number of Binary Inputs per trip circuit	1	A
4003	Delay Time for alarm	2 sec	A