

Project:

Location:

Contract:

Engineer:

Filename:

grid5

ETAP

19.0.1C

Study Case: LF

Page:

Date:

SN:

Revision:

Config.:

1

07-11-2025

Base

Normal

Electrical Transient Analyzer Program

Load Flow Analysis

Loading Category (1): Design

Generation Category (1): Design

Load Diversity Factor: None

Number of Buses:	Swing	V-Control	Load	Total			
	1	2	6	9			
Number of Branches:	XFMR2	XFMR3	Reactor	Line/Cable/ Busway	Impedance	Tie PD	Total
	5	0	0	3	0	0	8

Method of Solution:

Maximum No. of Iteration:

Precision of Solution:

System Frequency:

Unit System:

Project Filename:

Output Filename:

Adaptive Newton-Raphson Method

99

0.0001000

60.00 Hz

English

grid5

C:\Users\owner's\Desktop\PSA PBL\grid5\grid5\Untitled.lfr

Project: **ETAP**
Location: **19.0.1C**
Contract:
Engineer:
Filename: grid5
Study Case: LF

Page: 2
Date: 07-11-2025
SN:
Revision: Base
Config.: Normal

Adjustments

<u>Tolerance</u>	<u>Apply Adjustments</u>	<u>Individual /Global</u>	<u>Percent</u>
Transformer Impedance:	Yes	Individual	
Reactor Impedance:	Yes	Individual	
Overload Heater Resistance:	No		
Transmission Line Length:	No		
Cable / Busway Length:	No		
<u>Temperature Correction</u>	<u>Apply Adjustments</u>	<u>Individual /Global</u>	<u>Degree C</u>
Transmission Line Resistance:	Yes	Individual	
Cable / Busway Resistance:	Yes	Individual	

Bus Input Data

Bus			Initial Voltage		Load							
					Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus1	11.000	1	100.0	0.0	0.272	0.169	0.068	0.042				
Bus2	129.400	1	100.0	0.0								
Bus3	129.500	1	100.0	0.0								
Bus4	129.400	1	100.0	0.0								
Bus5	10.760	1	100.0	0.0	1.360	0.843	0.325	0.202				
Bus6	10.760	1	102.2	0.0	0.068	0.042	0.016	0.010				
Bus7	129.400	1	100.0	0.0	0.007	0.004	0.002	0.001				
Bus8	10.800	1	101.9	0.0	0.586	0.343	0.115	0.071				
Bus9	0.414	1	100.0	0.0	0.041	0.025	0.008	0.005				
Total Number of Buses: 9					2.333	1.426	0.534	0.331	0.000	0.000	0.000	0.000

Generation Bus				Voltage		Generation			Mvar Limits	
ID	kV	Type	Sub-sys	% Mag.	Angle	MW	Mvar	% PF	Max	Min
Bus1	11.000	Swing	1	100.0	0.0					
Bus6	10.760	Voltage Control	1	102.2	0.0	0.000			0.000	0.000
Bus8	10.800	Voltage Control	1	101.9	0.0	0.000			37.211	0.000
						0.000	0.000			

Project:ETAP

Location:19.0.1C

Contract:

Engineer:

Filename:grid5

Page:4

Date:07-11-2025

SN:

Revision:Base

Config.:Normal

Study Case: LF

Line/Cable/Busway Input Data

ohms or siemens/1000 ft per Conductor (Cable) or per Phase (Line/Busway)									
Line/Cable/Busway		Length							
ID	Library	Size	Adj. (ft)	% Tol.	#/Phase	T (°C)	R	X	Y
Line1		477	5280.0	0.0	1	75	0.044604	0.157749	0.0000010
Line3		477	5280.0	0.0	1	75	0.044604	0.157749	0.0000010
Line7		477	5280.0	0.0	1	75	0.044604	0.157749	0.0000010

Line / Cable / Busway resistances are listed at the specified temperatures.

2-Winding Transformer Input Data

Transformer		Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	Phase	MVA	Prim. kV	Sec. kV	% Z1	X1/R1	+ 5%	- 5%	% Tol.	Prim.	Sec.	% Z	Type	Angle
T1	3-Phase	10.000	11.000	132.000	9.00	2.47	0	0	0	0	0	9.0000	YNd	0.000
T3	3-Phase	100.000	11.000	132.000	9.00	2.47	0	0	0	0	0	9.0000	YNd	0.000
T7	3-Phase	15.000	11.000	132.000	9.00	2.47	0	0	0	0	0	9.0000	YNd	0.000
T10	3-Phase	0.500	11.000	0.415	5.20	5.10	0	0	0	0	0	5.2000	Dyn	0.000
T12	3-Phase	0.400	11.000	132.000	9.00	2.47	0	0	0	0	0	9.0000	YNd	0.000

Branch Connections

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA Base			
ID	Type	From Bus	To Bus	R	X	Z	Y
T1	2W XFMR	Bus1	Bus2	33.77	83.42	90.00	
T3	2W XFMR	Bus5	Bus4	3.38	8.34	9.00	
T7	2W XFMR	Bus8	Bus3	22.52	55.61	60.00	
T10	2W XFMR	Bus8	Bus9	200.11	1020.57	1040.00	
T12	2W XFMR	Bus6	Bus7	844.36	2085.56	2250.00	
Line1	Line	Bus3	Bus2	0.14	0.48	0.50	0.0895860
Line3	Line	Bus3	Bus4	0.14	0.48	0.50	0.0895860
Line7	Line	Bus5	Bus6	19.46	68.84	71.53	0.0006221

Project: ETAP
Location: 19.0.1C
Contract:
Engineer:
Filename: grid5
Study Case: LF

Page: 7
Date: 07-11-2025
SN:
Revision: Base
Config.: Normal

LOAD FLOW REPORT

Bus		Voltage		Generation		Load		Load Flow					XFMR	
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap	
* Bus1	11.000	100.000	0.0	2.912	-0.119	0.340	0.211	Bus2	2.572	-0.330	136.1	-99.2		
Bus2	129.400	101.430	-1.3	0.000	0.000	0.000	0.000	Bus3	2.549	-0.386	11.3	-98.9		
Bus3	129.500	101.350	-1.3	0.000	0.000	0.000	0.000	Bus1	-2.549	0.386	11.3	-98.9		
								Bus2	-2.549	0.298	11.3	-99.3		
								Bus4	1.790	1.023	9.1	86.8		
Bus4	129.400	101.421	-1.3	0.000	0.000	0.000	0.000	Bus8	0.759	-1.321	6.7	-49.8		
								Bus3	-1.790	-1.111	9.3	85.0		
Bus5	10.760	101.483	-1.4	0.000	0.000	1.695	1.050	Bus5	1.790	1.111	9.3	85.0		
								Bus6	0.093	0.057	5.8	85.2		
Bus6	10.760	101.424	-1.4	0.000	0.000	0.085	0.053	Bus4	-1.788	-1.108	111.2	85.0		
								Bus5	-0.093	-0.058	5.8	85.0		
Bus7	129.400	101.018	-1.5	0.000	0.000	0.008	0.005	Bus7	0.008	0.005	0.5	84.9		
								Bus6	-0.008	-0.005	0.0	85.0		
* Bus8	10.800	101.852	-1.7	0.000	1.782	0.705	0.417	Bus3	-0.754	1.334	80.4	-49.2		
Bus9	0.414	99.829	-2.0	0.000	0.000	0.049	0.030	Bus9	0.049	0.031	3.0	84.8		
								Bus8	-0.049	-0.030	80.8	85.1		

* Indicates a voltage regulated bus (voltage controlled or swing type machine connected to it)

Indicates a bus with a load mismatch of more than 0.1 MVA

Project: ETAP
Location: 19.0.1C
Contract:
Engineer:
Filename: grid5
Study Case: LF

Page: 8
Date: 07-11-2025
SN:
Revision: Base
Config.: Normal

Bus Loading Summary Report

Bus			Directly Connected Load								Total Bus Load			
			Constant kVA		Constant Z		Constant I		Generic		MVA	% PF	Amp	Percent Loading
ID	kV	Rated Amp	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar				
Bus1	11.000		0.272	0.169	0.068	0.042					2.931	99.4	153.8	
Bus2	129.400										2.578	98.9	11.3	
Bus3	129.500										2.871	88.8	12.6	
Bus4	129.400										2.107	85.0	9.3	
Bus5	10.760		1.360	0.843	0.335	0.208					2.104	85.0	111.2	
Bus6	10.760		0.068	0.042	0.017	0.010					0.110	85.0	5.8	
Bus7	129.400		0.007	0.004	0.002	0.001					0.010	85.0	-	
Bus8	10.800		0.586	0.343	0.119	0.074					1.935	39.0	101.6	
Bus9	0.414		0.041	0.025	0.008	0.005					0.058	85.1	80.8	

* Indicates operating load of a bus exceeds the bus critical limit (100.0% of the Continuous Ampere rating).
Indicates operating load of a bus exceeds the bus marginal limit (95.0% of the Continuous Ampere rating).

Project: ETAP
Location: 19.0.1C
Contract:
Engineer:
Filename: grid5
Study Case: LF

Page: 9
Date: 07-11-2025
SN:
Revision: Base
Config.: Normal

Branch Loading Summary Report

CKT / Branch		Busway / Cable & Reactor			Transformer				
ID	Type	Ampacity (Amp)	Loading Amp	%	Capability (MVA)	Loading (input)		Loading (output)	
						MVA	%	MVA	%
T1	Transformer				10.000	2.593	25.9	2.578	25.8
T3	Transformer				100.000	2.107	2.1	2.104	2.1
T7	Transformer				15.000	1.532	10.2	1.524	10.2
T10	Transformer				0.500	0.058	11.6	0.058	11.6
T12	Transformer				0.400	0.010	2.5	0.010	2.5

* Indicates a branch with operating load exceeding the branch capability.

Project: ETAP
Location: 19.0.1C
Contract:
Engineer:
Filename: grid5
Study Case: LF

Page: 10
Date: 07-11-2025
SN:
Revision: Base
Config.: Normal

Branch Losses Summary Report

Branch ID	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
	MW	Mvar	MW	Mvar	kW	kvar	From	To	
Line1	2.549	-0.386	-2.549	0.298	0.1	-88.3	101.4	101.4	0.00
Line3	1.790	1.023	-1.790	-1.111	0.1	-88.4	101.4	101.4	0.01
Line7	0.093	0.057	-0.093	-0.058	0.0	-0.5	101.5	101.4	0.06
T1	2.572	-0.330	-2.549	0.386	22.7	56.1	100.0	101.4	0.57
T10	0.049	0.031	-0.049	-0.030	0.1	0.3	101.9	99.8	0.42
T12	0.008	0.005	-0.008	-0.005	0.0	0.0	101.4	101.0	0.19
T3	1.790	1.111	-1.788	-1.108	1.5	3.7	101.4	101.5	0.16
T7	0.759	-1.321	-0.754	1.334	5.3	13.1	101.4	101.9	0.58
					29.8	-103.9			

* This Transmission Line includes Series Capacitor.

Alert Summary Report

	% Alert Settings	
	Critical	Marginal
Loading		
Bus	100.0	95.0
Cable / Busway	100.0	95.0
Reactor	100.0	95.0
Line	100.0	95.0
Transformer	100.0	95.0
Panel	100.0	95.0
Protective Device	100.0	95.0
Generator	100.0	95.0
Inverter/Charger	100.0	95.0
Bus Voltage		
OverVoltage	105.0	102.0
UnderVoltage	95.0	98.0
Generator Excitation		
OverExcited (Q Max.)	100.0	95.0
UnderExcited (Q Min.)	100.0	

Critical Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Gen1	Generator	Under Excited	0.000	Mvar	-0.119	0.0	3-Phase
Gen2	Generator	Under Excited	0.000	Mvar	0.000	0.0	3-Phase
Gen2	Generator	Under Power	0.000	MW	0.000	0.0	3-Phase
Gen3	Generator	Under Power	0.000	MW	0.000	0.0	3-Phase

Project: **ETAP**
Location: **19.0.1C**
Contract:
Engineer:
Filename: grid5
Study Case: LF

Page: 12
Date: 07-11-2025
SN:
Revision: Base
Config.: Normal

SUMMARY OF TOTAL GENERATION , LOADING & DEMAND

	MW	Mvar	MVA	% PF
Source (Swing Buses):	2.912	-0.119	2.914	99.92 Leading
Source (Non-Swing Buses):	0.000	1.782	1.782	0.00 Lagging
Total Demand:	2.912	1.663	3.353	86.84 Lagging
Total Motor Load:	2.333	1.426	2.735	85.32 Lagging
Total Static Load:	0.549	0.340	0.646	85.00 Lagging
Total Constant I Load:	0.000	0.000	0.000	
Total Generic Load:	0.000	0.000	0.000	
Apparent Losses:	0.030	-0.104		
System Mismatch:	0.000	0.000		

Number of Iterations: 2

Project:	ETAP	Page:	1
Location:	19.0.1C	Date:	07-11-2025
Contract:		SN:	
Engineer:	Study Case: SM	Revision:	Base
Filename:	grid5	Config.:	Normal

Electrical Transient Analyzer Program

Short-Circuit Analysis

ANSI Standard

3-Phase, LG, LL, & LLG Fault Currents

1/2 Cycle Network

	Swing	V-Control	Load	Total			
Number of Buses:	1	2	6	9			
	XFMR2	XFMR3	Reactor	Line/Cable/ Busway	Impedance	Tie PD	Total
Number of Branches:	5	0	0	3	0	0	8
	Synchronous Generator	Power Grid	Synchronous Motor	Induction Machines	Lumped Load	Total	
Number of Machines:	3	0	0	2	6	11	

System Frequency:	60.00
Unit System:	English
Project Filename:	grid5
Output Filename:	C:\Users\owner's\Desktop\PSA PBL\grid5\grid5\Untitled.SQ1S

Project:	ETAP	Page:	2
Location:	19.0.1C	Date:	07-11-2025
Contract:		SN:	
Engineer:	Study Case: SM	Revision:	Base
Filename:	grid5	Config.:	Normal

Adjustments

Tolerance	Apply Adjustments	Individual /Global	Percent
Transformer Impedance:	Yes	Individual	
Reactor Impedance:	Yes	Individual	
Overload Heater Resistance:	No		
Transmission Line Length:	No		
Cable / Busway Length:	No		

Temperature Correction	Apply Adjustments	Individual /Global	Degree C
Transmission Line Resistance:	Yes	Individual	
Cable / Busway Resistance:	Yes	Individual	

Project:	ETAP	Page:	3
Location:	19.0.1C	Date:	07-11-2025
Contract:		SN:	
Engineer:	Study Case: SM	Revision:	Base
Filename:	grid5	Config.:	Normal

Bus Input Data

Bus					Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
Bus1	SWNG	11.000	11.000	1	100.00	0.00
Bus2	Load	129.400	132.000	1	100.00	30.00
Bus3	Load	129.500	132.000	1	100.00	30.00
Bus4	Load	129.400	132.000	1	100.00	30.00
Bus5	Load	10.760	11.000	1	100.00	0.00
Bus6	Gen.	10.760	11.000	1	102.23	0.00
Bus7	Load	129.400	132.000	1	100.00	30.00
Bus8	Gen.	10.800	11.000	1	101.85	0.00
Bus9	Load	0.414	0.415	1	100.00	-30.00
9 Buses Total						

All voltages reported by ETAP are in % of bus Nominal kV.
Base kV values of buses are calculated and used internally by ETAP.

Project:

Location:

Contract:

Engineer:

Filename: grid5

ETAP

19.0.1C

Study Case: SM

Page: 4

Date: 07-11-2025

SN:

Revision: Base

Config.: Normal

Line/Cable/Busway Input Data

ohms or siemens per 1000 ft per Conductor (Cable) or per Phase (Line/Busway)												
Line/Cable/Busway												
ID	Library	Size	Length		#/Phase	T (°C)	R1	X1	Y1	R0	X0	Y0
			Adj. (ft)	% Tol.								
Line1		477	5280.0	0.0	1	75	0.0446045	0.1577493	0.000001	0.0956523	0.4853866	0.0000005
Line3		477	5280.0	0.0	1	75	0.0446045	0.1577493	0.000001	0.0956523	0.4853866	0.0000005
Line7		477	5280.0	0.0	1	75	0.0446045	0.1577493	0.000001	0.0956523	0.4853866	0.0000005

Line / Cable / Busway resistances are listed at the specified temperatures.

2-Winding Transformer Input Data

Transformer		Rating				Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	MVA	Prim. kV	Sec. kV	% Z	X/R	+ 5%	- 5%	% Tol.	Prim.	Sec.	% Z	Type	Angle
T1	10.000	11.000	132.000	9.00	2.47	0	0	0	0	0	9.00	YNd	30.00
T3	100.000	11.000	132.000	9.00	2.47	0	0	0	0	0	9.00	YNd	30.00
T7	15.000	11.000	132.000	9.00	2.47	0	0	0	0	0	9.00	YNd	30.00
T10	0.500	11.000	0.415	5.20	5.10	0	0	0	0	0	5.20	Dyn	30.00
T12	0.400	11.000	132.000	9.00	2.47	0	0	0	0	0	9.00	YNd	30.00

2-Winding Transformer Grounding Input Data

				Grounding								
Transformer		Rating		Conn.	Primary				Secondary			
ID	MVA	Prim. kV	Sec. kV	Type	Type	kV	Amp	ohm	Type	kV	Amp	ohm
T1	10.000	11.000	132.000	D/Y					Solid			
T3	100.000	11.000	132.000	D/Y					Solid			
T7	15.000	11.000	132.000	D/Y					Solid			
T10	0.500	11.000	0.415	D/Y					Solid			
T12	0.400	11.000	132.000	D/Y					Solid			

Project: ETAP
Location: 19.0.1C
Contract:
Engineer:
Filename: grid5
Study Case: SM

Page: 6
Date: 07-11-2025
SN:
Revision: Base
Config.: Normal

Branch Connections

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVAb			
ID	Type	From Bus	To Bus	R	X	Z	Y
T1	2W XFMR	Bus1	Bus2	33.77	83.42	90.00	
T3	2W XFMR	Bus5	Bus4	3.38	8.34	9.00	
T7	2W XFMR	Bus8	Bus3	22.52	55.61	60.00	
T10	2W XFMR	Bus8	Bus9	200.11	1020.57	1040.00	
T12	2W XFMR	Bus6	Bus7	844.36	2085.56	2250.00	
Line1	Line	Bus3	Bus2	0.14	0.48	0.50	0.0895860
Line3	Line	Bus3	Bus4	0.14	0.48	0.50	0.0895860
Line7	Line	Bus5	Bus6	19.46	68.84	71.53	0.0006221

Synchronous Generator Input Data

Synchronous Generator					Positive Seq. Impedance					Grounding			Zero Seq. Impedance		
					Rating										
ID	Type	MVA	kV	RPM	X"/R	% R	Adj.	Tol.	% Xd'	Conn.	Type	Amp	X/R	% R0	% X0
Gen1	Steam Turbo	70.588	11.000	1800	19.00	1.000	19.00	0.0	28.00	Wye	Solid		7.00	1.000	7.00
Gen2	Steam Turbo	35.294	11.000	1800	19.00	1.000	19.00	0.0	28.00	Wye	Solid		7.00	1.000	7.00
Gen3	Steam Turbo	70.588	11.000	1800	19.00	1.000	19.00	0.0	28.00	Wye	Solid		7.00	1.000	7.00

Total Connected Synchronous Generators (= 3): 176.471 MVA

Project:ETAP

Location:19.0.1C

Contract:

Engineer:

Filename:grid5

Page:8

Date:07-11-2025

SN:

Revision:Base

Config.:Normal

Study Case: SM

Induction Machine Input Data

Induction Machine			Rating (Base)			Positive Seq. Imp.				Grounding			Zero Seq. Imp.		
ID	Type	Qty	kVA	kV	RPM	X"/R	% R	% X"	% X'	Conn.	Type	Amp	X/R	% R0	% X0
Mtr1	Motor	1	119.89	11.000	1800	8.56	2.158	18.46	46.15	Wye	Open		8.56	2.16	18.46
Mtr2	Motor	1	7.91	0.415	1800	2.02	13.802	27.83	9999.00	Wye	Open		2.02	13.80	27.83

Total Connected Induction Machines (= 2): 127.8 kVA

Filename: grid5

Study Case: SM

Config.: Normal

Total Connected Lumped Loads (= 6): 3260.0 kVA

Project:	ETAP	Page:	10
Location:	19.0.1C	Date:	07-11-2025
Contract:		SN:	
Engineer:	Study Case: SM	Revision:	Base
Filename:	grid5	Config.:	Normal

SHORT- CIRCUIT REPORT

Fault at bus: **Bus3**

Prefault voltage = 129.500 kV
= 100.00 % of nominal bus kV (129.500 kV)
= 98.11 % of base kV (132.000 kV)

Contribution		3-Phase Fault		Line-To-Ground Fault					Positive & Zero Sequence Impedances Looking into "From Bus"			
From Bus ID	To Bus ID	% V From Bus	kA Symm. rms	% Voltage at From Bus			kA Symm. rms		% Impedance on 100 MVA base			
				Va	Vb	Vc	Ia	3I0	R1	X1	R0	X0
Bus3	Total	0.00	1.228	0.00	86.48	88.72	1.658	1.658	9.09E+000	3.38E+001	2.89E+000	7.60E+000
Bus2	Bus3	0.43	0.369	0.56	86.54	88.80	0.381	0.147	3.53E+001	1.11E+002	3.41E+001	8.49E+001
Bus4	Bus3	0.42	0.359	1.87	86.17	88.71	0.752	1.287	2.23E+001	1.18E+002	3.67E+000	9.81E+000
Bus8	Bus3	70.01	0.501	83.58	77.89	99.44	0.526	0.225 *	2.39E+001	8.22E+001	2.25E+001	5.56E+001
Bus1	Bus2	76.42	0.369	86.18	81.91	97.75	0.381	0.147 *	3.52E+001	1.10E+002	3.38E+001	8.34E+001
Bus5	Bus4	7.96	0.359	53.76	50.58	99.80	0.752	1.287 *	2.21E+001	1.17E+002	3.38E+000	8.34E+000
Bus9	Bus8	69.47	0.003	94.54	72.86	89.92	0.003	0.000	5.66E+004	7.40E+004		
Gen3	Bus8	98.11	5.943	98.11	98.11	98.11	4.634	0.000	1.42E+000	2.69E+001	1.42E+000	9.92E+000
Mtr1	Bus8	98.11	0.010	98.11	98.11	98.11	0.008	0.000	1.80E+003	1.54E+004		
Lump4	Bus8	98.11	0.058	98.11	98.11	98.11	0.045	0.000	4.12E+002	2.75E+003		
Gen1	Bus1	98.11	4.408	98.11	98.11	98.11	3.437	0.000	1.42E+000	2.69E+001	1.42E+000	9.92E+000
Lump5	Bus1	98.11	0.024	98.11	98.11	98.11	0.019	0.000	7.21E+002	4.81E+003		
Bus6	Bus5	61.05	3.814	77.92	73.18	99.66	2.978	0.000	4.74E+001	1.18E+002		
Lump1	Bus5	98.11	0.491	98.11	98.11	98.11	0.383	0.000	9.62E+001	9.62E+002		
Mtr2	Bus9	98.11	0.011	98.11	98.11	98.11	0.005	0.000	1.75E+005	3.52E+005		
Lump6	Bus9	98.11	0.077	98.11	98.11	98.11	0.035	0.000	2.10E+004	5.00E+004		

Indicates fault current contribution is from three-winding transformers

* Indicates a zero sequence fault current contribution (3I0) from a grounded Delta- Y transformer

Short-Circuit Summary Report

1/2 Cycle - 3-Phase, LG, LL, & LLG Fault Currents

Prefault Voltage = 100 % of the Bus Nominal Voltage

Bus		3-Phase Fault			Line-to-Ground Fault			Line-to-Line Fault			*Line-to-Line-to-Ground		
ID	kV	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.	Real	Imag.	Mag.
Bus3	129.500	0.319	-1.185	1.228	0.462	-1.593	1.658	1.030	0.288	1.069	-1.389	0.923	1.668

All fault currents are symmetrical (1/2 Cycle network) values in rms kA.
* LLG fault current is the larger of the two faulted line currents.

Project:

Location:

Contract:

Engineer:

Filename: grid5

ETAP

19.0.1C

Study Case: SM

Page: 12

Date: 07-11-2025

SN:

Revision: Base

Config.: Normal

Sequence Impedance Summary Report

Bus		Positive Seq. Imp. (ohm)			Negative Seq. Imp. (ohm)			Zero Seq. Imp. (ohm)			Fault Zf (ohm)		
ID	kV	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance	Resistance	Reactance	Impedance
Bus3	129.500	15.84017	58.80910	60.90502	16.78235	57.85316	60.23815	5.03376	13.23538	14.16030	0.00000	0.00000	0.00000

Sequence-of-Operation Event Summary Report

Symmetrical 3-Phase Fault at Bus3.

Time (ms)	ID	If (kA)	T1 (ms)	T2 (ms)	Condition
2.1	Relay1	4.432	2.1		Phase - OC1 - 50
20.0	Relay1		20.0		Phase - 87
85.4	CB4		83.3		Tripped by Relay1 Phase - OC1 - 50
85.4	CB5	4.432	83.3		Tripped by Relay1 Phase - OC1 - 50
99.4	Relay1		99.4		Phase - OC1 - 51
103	CB4		83.3		Tripped by Relay1 Phase - 87
103	CB5		83.3		Tripped by Relay1 Phase - 87
183	CB4		83.3		Tripped by Relay1 Phase - OC1 - 51
183	CB5		83.3		Tripped by Relay1 Phase - OC1 - 51