

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

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Electrical Transient Analyzer Program

Load Flow Analysis

Loading Category (1): Design
Generation Category (1): Design
Load Diversity Factor: None

	Swing	V-Control	Load	Total
Number of Buses:	1	0	4	5

	XFMR2	XFMR3	Reactor	Line/Cable/ Busway	Impedance	Tie PD	Total
Number of Branches:	2	0	0	2	0	0	4

Method of Solution: Adaptive Newton-Raphson Method
Maximum No. of Iteration: 99
Precision of Solution: 0.0001000

System Frequency: 50.00 Hz
Unit System: English
Project Filename: powergrid_sld
Output Filename: C:\ETAP 1901\powergrid_sld\Untitled.lfr

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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								
Bus3	11.000	1	100.0	0.0								
LT Panel A	0.400	1	100.0	0.0	0.680	0.414	0.170	0.104				
LT Panel A2	0.400	1	100.0	0.0	0.680	0.414	0.170	0.104				
Main Bus	11.000	1	100.0	0.0								
Total Number of Buses: 5					1.360	0.829	0.340	0.207	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
Main Bus	11.000	Swing	1	100.0	0.0					
						0.900	0.000			

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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
Cable1	11NALS3	300	328.1	0.0	1	75	0.037756	0.026640	
Cable #2	11NALS3	300	328.1	0.0	1	75	0.037756	0.026640	

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

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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	2.000	11.000	0.400	12.50	45.00	0	0	0	0	0	12.5000	Dyn	0.000
T3	3-Phase	1.500	11.000	0.400	12.50	45.00	0	0	0	0	0	12.5000	Dyn	0.000

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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	LT Panel A	13.89	624.85	625.00	
T3	2W XFMR	Bus3	LT Panel A2	18.51	833.13	833.33	
Cable1	Cable	Main Bus	Bus1	1.02	0.72	1.25	
Cable #2	Cable	Main Bus	Bus3	1.02	0.72	1.25	

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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	99.987	0.0	0.000	0.000	0.000	0.000	Main Bus	-0.839	-0.575	53.4	82.5		
								LT Panel A	0.839	0.575	53.4	82.5		
Bus3	11.000	99.987	0.0	0.000	0.000	0.000	0.000	Main Bus	-0.836	-0.596	53.9	81.4		
								LT Panel A2	0.836	0.596	53.9	81.4		
LT Panel A	0.400	96.413	-3.1	0.000	0.000	0.838	0.511	Bus1	-0.838	-0.511	1469.1	85.4		
LT Panel A2	0.400	95.115	-4.1	0.000	0.000	0.834	0.508	Bus3	-0.834	-0.508	1481.7	85.4		
* Main Bus	11.000	100.000	0.0	1.675	1.171	0.000	0.000	Bus1	0.840	0.575	53.4	82.5		
								Bus3	0.836	0.596	53.9	81.4		

* 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

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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										1.018	82.5	53.4	
Bus3	11.000			0.000							1.026	81.4	53.9	
LT Panel A	0.400	2500.0	0.680	0.414	0.158	0.096					0.981	85.4	1469.1	58.8
LT Panel A2	0.400	2500.0	0.680	0.414	0.154	0.094					0.976	85.4	1481.7	59.3
Main Bus	11.000	600.0									2.044	82.0	107.3	17.9

* 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).

Branch Loading Summary Report

CKT / Branch		Busway / Cable & Reactor			Transformer				
ID	Type	Ampacity (Amp)	Loading Amp	%	Capability (MVA)	Loading (input)		Loading (output)	
						MVA	%	MVA	%
Cable1	Cable	413.90	53.42	12.91					
Cable #2	Cable	413.90	53.88	13.02					
T1	Transformer				2.000	1.018	50.9	0.981	49.1
T3	Transformer				1.500	1.026	68.4	0.976	65.1

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

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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	
Cable #2	-0.836	-0.596	0.836	0.596	0.1	0.1	100.0	100.0	0.01
Cable1	-0.839	-0.575	0.840	0.575	0.1	0.1	100.0	100.0	0.01
T1	0.839	0.575	-0.838	-0.511	1.4	64.7	100.0	96.4	3.57
T3	0.836	0.596	-0.834	-0.508	2.0	87.8	100.0	95.1	4.87
					3.6	152.7			

* This Transmission Line includes Series Capacitor.

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Alert Summary Report

% Alert Settings

	<u>Critical</u>	<u>Marginal</u>
<u>Loading</u>		
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
<u>Bus Voltage</u>		
OverVoltage	105.0	102.0
UnderVoltage	95.0	98.0
<u>Generator Excitation</u>		
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
LVCB 1	LV CB	Overload	400.000	Amp	1469.139	367.3	3-Phase
LVCB 12	LV CB	Overload	250.000	Amp	744.290	297.7	3-Phase
LVCB 13	LV CB	Overload	250.000	Amp	372.145	148.9	3-Phase
LVCB 14	LV CB	Overload	250.000	Amp	372.145	148.9	3-Phase
LVCB 15	LV CB	Overload	400.000	Amp	1481.676	370.4	3-Phase
LVCB 3	LV CB	Overload	250.000	Amp	737.988	295.2	3-Phase
LVCB 5	LV CB	Overload	250.000	Amp	368.994	147.6	3-Phase
LVCB 7	LV CB	Overload	250.000	Amp	368.994	147.6	3-Phase

Marginal Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
LT Panel A	Bus	Under Voltage	0.400	kV	0.386	96.4	3-Phase
LT Panel A2	Bus	Under Voltage	0.400	kV	0.380	95.1	3-Phase

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SUMMARY OF TOTAL GENERATION , LOADING & DEMAND

	MW	Mvar	MVA	% PF
Source (Swing Buses):	1.675	1.171	2.044	81.96 Lagging
Source (Non-Swing Buses):	0.000	0.000	0.000	
Total Demand:	1.675	1.171	2.044	81.96 Lagging
Total Motor Load:	1.360	0.829	1.593	85.40 Lagging
Total Static Load:	0.312	0.190	0.365	85.40 Lagging
Total Constant I Load:	0.000	0.000	0.000	
Total Generic Load:	0.000	0.000	0.000	
Apparent Losses:	0.004	0.153		
System Mismatch:	0.000	0.000		

Number of Iterations: 2