

Project:	ETAP	Page:	1
Location:	12.6.0H	Date:	07-28-2017
Contract:		SN:	
Engineer:		Revision:	Base
Filename:	bgbg	Config.:	Normal
	Study Case: SC		

Electrical Transient Analyzer Program

Short-Circuit Analysis

IEC 60909 Standard 3-Phase, LG, LL, & LLG Fault Currents

	<u>Swing</u>	<u>V-Control</u>	<u>Load</u>	<u>Total</u>
Number of Buses:	1	0	1	2

	<u>XFMR2</u>	<u>XFMR3</u>	<u>Reactor</u>	<u>Line/Cable</u>	<u>Impedance</u>	<u>Tie PD</u>	<u>Total</u>
Number of Branches:	1	0	0	0	0	0	1

	<u>Synchronous Generator</u>	<u>Power Grid</u>	<u>Synchronous Motor</u>	<u>Induction Machines</u>	<u>Lumped Load</u>	<u>Total</u>
Number of Machines:	0	1	0	0	0	1

System Frequency:	50.00 Hz
Unit System:	English
Project Filename:	bgbg
Output Filename:	C:\2BELITAN Z DAN NGR P2B 2017\Untitled.SI2

Adjustments

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

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

Bus Input Data

Bus					Initial Voltage	
ID	Type	Nom. kV	Base kV	Sub-sys	%Mag.	Ang.
Bus1	SWNG	150.000	150.000	1	100.00	0.00
Bus2	Load	20.000	20.000	1	100.00	0.00
2 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.

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		60.000	150.000	20.000	13.58	45.00	0	0	0	0	0	13.5800	YNyn	0.000

2-Winding Transformer Grounding Input Data

Transformer	Rating			Grounding									
				Conn.	Primary				Secondary				
	ID	MVA	Prim. kV	Sec. kV	Type	Type	kV	Amp	Ohm	Type	kV	Amp	Ohm
T1	60.000	150.000	20.000	Y/Y	Solid				Resistor			962.3	12.00000

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Branch Connections

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA			
ID	Type	From Bus	To Bus	R	X	Z	Y
T1	2W XFMR	Bus1	Bus2	0.49	21.86	21.87	

Power Grid Input Data

Power Grid		Connected Bus		Rating		% Impedance 100 MVA Base			Grounding
ID		ID		MVASC	kV	R	X"	R/X"	Type
U1		Bus1		9269.522	150.000	0.06622	1.07677	0.06	Wye - Solid

Total Connected Power Grids (= 1): 9269.522 MVA

SHORT- CIRCUIT REPORT

Fault at bus: Bus1
Nominal kV = 150.000
Voltage c Factor = 1.10 (User-Defined)

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
Bus1	Total	0.00	35.678	0.00	92.86	98.81	38.903	38.903	7.28E-002	1.18E+000	1.53E-001	8.82E-001
Bus2	Bus1	0.00	0.000	0.00	92.86	98.81	0.000	0.000				
U1	Bus1	100.00	35.678	100.00	100.00	100.00	38.903	38.903	7.28E-002	1.18E+000	1.53E-001	8.82E-001
		3-Phase	L-G	L-L		L-L-G						
Initial Symmetrical Current (kA, rms)		:	35.678	38.903		30.898		38.710				
Peak Current (kA), Method C		:	92.583	100.951		80.179		100.449				
Breaking Current (kA, rms, symm)		:		38.903		30.898		38.710				
Steady State Current (kA, rms)		:	35.678	38.903		30.898		38.710				

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

Fault at bus: **Bus2**
Nominal kV = 20.000
Voltage c Factor = 1.10 (User-Defined)

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
Bus2	Total	0.00	13.773	0.00	168.85	176.48	1.053	1.053	5.59E-001	2.30E+001	9.01E+002	2.27E+001
Bus1	Bus2	94.86	13.773	99.94	99.97	100.03	1.053	1.053	5.59E-001	2.30E+001	9.01E+002	2.27E+001
		3-Phase	L-G	L-L		L-L-G						
Initial Symmetrical Current (kA, rms)		:	13.773	1.053	11.927		12.191					
Peak Current (kA), Method C		:	37.616	2.877	32.576		33.297					
Breaking Current (kA, rms, symm)		:		1.053	11.927		12.191					
Steady State Current (kA, rms)		:	13.773	1.053	11.927		12.191					

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

Short-Circuit Summary Report

3-Phase, LG, LL, LLG Fault Currents

Bus		3-Phase Fault			Line-to-Ground Fault				Line-to-Line Fault				*Line-to-Line-to-Ground			
ID	kV	I"k	ip	Ik	I"k	ip	Ib	Ik	I"k	ip	Ib	Ik	I"k	ip	Ib	Ik
Bus1	150.000	35.678	92.583	35.678	38.903	100.951	38.903	38.903	30.898	80.179	30.898	30.898	38.710	100.449	38.710	38.710
Bus2	20.000	13.773	37.616	13.773	1.053	2.877	1.053	1.053	11.927	32.576	11.927	11.927	12.191	33.297	12.191	12.191

All fault currents are in rms kA. Current ip is calculated using Method C.

* LLG fault current is the larger of the two faulted line currents.

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
Bus1	150.000	0.16389	2.66501	2.67004	0.16389	2.66501	2.67004	0.34432	1.98532	2.01496	0.00000	0.00000	0.00000
Bus2	20.000	0.02235	0.92197	0.92224	0.02235	0.92197	0.92224	36.02555	0.90989	36.03704	0.00000	0.00000	0.00000