

Running a Short Circuit Analysis

The purpose of this tutorial is to introduce the Short-Circuit Analysis module of ETAP, and provide instructions on how to run ANSI and IEC short-circuit calculations. In addition, there will be a brief look at study case editors and the Alert View function. For this section of the tutorial you should select "Example Project (ANSI)" option when starting ETAP Demo.

ew (Short-Circuit Analysis)		-		
		Su	ib2A	
	Utility		* .063 kA	.014 kA → °
	Main Bus CB1□ J2.86 kA	30.277 KV	-> Cable22	< Cable23
CB2 -	CB10	2.9 kA	Bus7	Bus6
	Gen1			CB26 _ 1,1561
Fuse1	S1 2	S	ub22	Sub23
T2	N Y mul		*.262 kA CB2	.043 kA
12.305			\bigcirc	(B)
Sub2A	Sub2B	Sub 3	LUMP2	Net1
[†] .043 kA [†] .063 kA	[†] .014 kA [†] .05 kA	1.03 kA	26.41	
	CB24 CB6	СВ9		
		SPST1		
{{ Sub2	A-N		±	
Syn1	Mtr2	- <u> </u>	AP1 CB22	us1
Syn1 Motor, 1250 HP Load Model = Centr. Comp		Sub3 Net	СВ23	
Inertia = 0.799 MW-Sec/MVA				
			DC System	

Results of the Short Circuit Analysis

Running Short Circuit Analysis

From the Mode toolbar, select the short circuit mode by clicking on the Short-Circuit Analysis button.





toolbar you can select the name of the output report as one already defined or "Prompt." If "Prompt" is selected then prior to running the Short Circuit Analysis you will be prompted to enter a report name.

From the Study Case toolbar, click the Edit Study Case button. This will open the Short Circuit Study Case editor, allowing you to change calculation criteria and options. From the Info page, choose a bus or multiple buses to be faulted. Click all buses except Sub 3 and select ~Fault>> to place them in the Don't Fault category. Sub 3 should now appear alone in the Fault category. Click OK when finished.

Study Case	Cable	
Edit Study Case	Short Circuit Study Case	×
Note: The faulted bus, Sub3, will be	Info Standard Arc Flash Adjustment Alert Study Case ID ANSI Duty Report Motor Cr Motor Cr Motor Cr	Equip. Cable & OL Heater Include Impedance for: MV Motors LV Motors
line, indicating that it will be faulted.	Contribution Level 3 3 Contribution Level 3 Contribution Level 3 Contribution Level 9 Contribution Low 9 Contribution Level 9 Contribut	Don't Fault
© Helpful Tips You can also assign a bus to fault by right-clicking on a bus on the one-line and selecting Fault or Don't Fault.	MV Buse: LV Buses Study Remarks Second line of remarks for "ANSI Duty" study case.	S Bus2 LVBus Main Bus MCC1 Sub2A Sub2A Sub2B Sub3 Swgr ♥
	ANSI Duty	Help OK Cancel

- You can now run a short circuit (duty) study by clicking on the Run 3-Phase Device Duty button on the ANSI Short Circuit toolbar. If Prompt was selected as the output report in the Study Case toolbar, you will be prompted to enter a name for your output report.
- There are four other types of studies besides the 3-Phase ANSI that can be performed under the ANSI standard setting. In addition, three studies according to the IEC set of standards can be performed. The ANSI methods are the default for short circuit studies, but this can be changed in the Standard page of the Short Circuit Study Case editor.

Short Circuit Study	Case	×
Info Standard Arc	Flash Adjustment Alert	
Standard	Prefault Voltage	
◯ IEC	● Fixed 102	⊙ Nominal kV ○ Base kV
 ANSI 	◯ Vmag X Nominal kV (from	n Bus Editor)



Run 3-Phase Device Duty (ANSI C37)

Run 3-Phase, LG, LL, LLG (1/2 Cycle)

Run 3-Phase, LG, LL, LLG (30 Cycle)

Run Arc-Flash (IEEE 1584/NFPA70E)

Run 3-Phase, LG, LL, LLG (1.5 - 4 Cycle)

Run 3-Phase (30 Cycle)

Display Options

Report Manager

Alert View

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duty

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Viewing the Results

- The results of the Device Duty Short Circuit calculation are displayed on the one-line. Changing the settings in the short circuit Display Options can modify the results displayed and their format on the one-line.
- Note that breaker CB9 and CB18 are now colored magenta. This flag means that the device capabilities have been exceeded in some way. Click the Alert View button on the ANSI Short Circuit toolbar to view the flagged devices (please note that the alert function is disabled in the Demo).

Short Circ	uit Analysis	Alert View - O	utput Report:	SC-Duty	
Study Case:	ANSI Duty		Data	a Revision:	Base
Configuration:	Normal			Date:	02-13-2007
		Crit	ical		
Device ID	Туре	Condition	Rating/Limit	Operating	% Operating
		Mar	ginal		
Device ID	Туре	Condition	Rating/Limit	Operating	% Operating
CB18 CB9	HV CB HV CB	Interrupting Interrupting	33.462 kA 33.462 kA	31.191 31.191	93.2 93.2

To view the output report click on Report Manager from the Short Circuit toolbar, and go to the Result page and select Short Circuit Report.

ANSI 3-Phase SC Report Manager 🛛 🛛 🔀													
	TAP Report - SC-Duty	/ Short-Circuit Re	port										×
Lomplete Input Result Summary	View Help	8 /8+	S & 40 125%	10									
Short-Circuit Report	ntract: OTL12345678 gimes: Operation Tech name: EXAMPLE is info is printed on every ond line of remarks for " 3-phase fault at bus: \$ Prefault voltage = 4.2	nolog y, Inc. routput report, 1st re ANSI Duty" study c Sub 3 243	Stu emark line. (120 charact ase. = 10200 = 10200	dy Case: ers)	· ANSI Du	ty k∛ (4.1	60 kV)		SI R. Ci	N: I evision: I onfig.: 1	ETAP-OTI ∃ase ∛ormal	[
SC-Duty			- 102.00	, ,, 010.	ase (4.100)	KV)							
Path	Contribution			1/2 Cycle			1.5 to 4 Cycle						
	From Bus ID	To B ID	us % V From Bus	kA Real	k A Imaginary	lmag. /Real	k A Symm. Magnitude	% V From Bus	kA Real	k A Imaginary	Imag. /Real	k A Symm. Magnitude	
C. 12 TAP 333 Demotexample Anton	Sub 3	Total	0.00	0.779	-26.155	33.6	26.167	0.00	0.713	-25.802	36.2	25.812	
Help OK Cancel	Sub3 Swgr Bus1 #T1~	Sub 3 Sub 3 Sub 3	0.31 0.00 86.62	0.149 0.000 0.630	-0.765 0.000 -25.390	5.1 999.9 40.3	0.779 0.000 25.398	0.18 0.00 86.54	0.085 0.000 0.629	-0.436 0.000 -25.367	5.1 999.9 40.3	0.444 0.000 25.375	
	LVBus	Sub3 Swgr	10.67	0.044	-0.183	4.2	0.188	5.94	0.022	-0.102	4.7	0.105	
	MCC1	Sub3 Swgr	12.09	0.031	-0.231	7.4	0.233	5.23	0.014	-0.099	7.0	0.100	
	Bus2	Busl	0.00	0.000	0.000	4.8 999.9	0.000	0.00	0.049	0.000	4.8 999.9	0.000	
	# Main Bus	T1	87.78	0.071	-2.901	41.1	2.902	87.70	0.071	-2.904	41.0	2.905	



Modifying Alert View settings

To view or modify the Alert settings, open the Short Circuit Study Case editor to the Alert page. Check the Marginal box and change the limit to 70%. Also, click the Auto Display button and then click OK. When the Marginal box is checked, all devices that have been exceeded by this limit, but remain under 100% rating will appear in the Alert View in the Marginal category. Devices that have been exceeded by 100% of rating will always be flagged, and will appear in the Critical category of the Alert View.



Now run the same short circuit study again by following the procedure used above. Note that once the calculation has been completed, the Alert View window will automatically open, as per the change made to the Alert page in the Short Circuit Study Case editor. Notice that other protective device conditions appear in the Marginal Alert View. Note that the short circuit results do not change

that the short encart results do not change.	💻 Short Circuit Analysis Alert View - Output Report: SC-Duty 💦 🔲 🔀
rdy View (Short-Circuit Analysis)	Study Case: ANSIDuty Data Revision: Base
Utility	Critical Critical Condition Rating/Limit Operating % Operating
CB1 2.86 kA 30.217 kV	
CB10 +2.9 kA Gen1	
Fuse1 🛔 S1 🕺	Marginal
$1 1 T2 \qquad (7) \qquad 1 1$	Device ID Type Condition Rating/Limit Operating % Operating
12.352 kV 12.352 kV CB11 CB2 CB4 CB5 CB80 Sub2A Sub2B CB4 CB5 CB80	CB18 HV CB C&L rms 58 kA 43.037 74.2 CB18 HV CB C&L Crest 97.2 kA 71.173 73.2 CB18 HV CB Interrupting 33.462 kA 31.191 93.2 CB9 HV CB C&L rms 58 kA 43.037 74.2 CB9 HV CB C&L rms 58 kA 43.037 74.2
1.043 kA ¹ .063 kA 1.014 kA 1.05 kA 11.03 kA CB21 CB12 CB24 CB6 CB9 12.566 kN SPST1 7	CB9 HV CB Interrupting 33.462 kA 31.191 93.2
Sub2A-N	-1 CB22)
Syn1 Motor, 1250 HP Load Model = Centr. Comp Inertia = 0.799 MW-Sec/MVA	CB23)
	DC System

The Alert function of the Short Circuit and Load Flow modules of ETAP is a convenient way to size protective devices at your facility.