

Short-Circuit ANSI Comparison Case # 1

Comparison of Short-Circuit Results against Hand Calculations based on Application Engineering Information

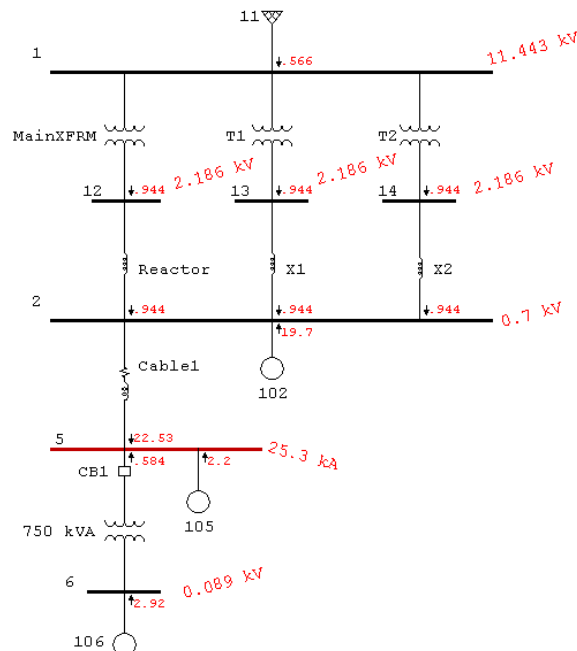
Excerpts from Validation Cases and Comparison Results (TCS-SC-005)

Highlights

- Comparison of ETAP 3-phase Short-Circuit results against hand calculations. The test case is based on a published power system from “Short-Circuit Current Calculations for industrial and Commercial Power Systems,” published by General Electric, Section III, “Examples of AC Short-Circuit”.
- Comparison of Momentary Short-circuit currents.
- Comparison of MF based on separate R&X networks per ANSI standards.
- Calculation of %V away from the faulted bus.

System Description

Typical industrial system with 5 MVA transformers, reactors, cables and induction motors. The available MVAsc rating of the utility is 250. X/R = 15. There is a lumped 19,900 HP of induction motor load at 2.4 kV and 800 HP at 0.480 kV.





Comparison of Results

The following tables of comparison show the differences between ETAP Results and those published in the General Electric document. Please notice that the maximum deviation in the results is about 1 %.

<u>For a fault at Bus # 5</u>	<u>Momentary Duty</u>			<u>Interrupting Duty</u>		
	Hand Calc	ETAP.	% Diff	Hand Calc	ETAP.	% Diff
Mom. Symm. Current (kA)	25.264	25.264	0.0	18.947	18.947	0.0
X/R (separate R&X networks)	4.106	4.100	0.1	5.578	5.600	0.4
MF (separate R&X networks)	1.197	1.197	0.0	-	-	0.0
I _{asy} (separate R/X networks)	30.243	30.243	0.0	-	-	0.0
MF (ANSI method)	1.600	1.600	0.0	-	-	
Contribution from Bus 2 (kA)	22.526	22.526	0.0	17.272	17.271	0.0
X/R from Bus 2	3.265	3.300	1.0	4.421	4.400	0.5
%V of Bus 2	29.155	29.160	0.0	22.354	22.350	0.0

Table 5: Comparison of ETAP SC 3-phase results against hand calculation results based on the Application Engineering document.

Reference

1. "Short-Circuit Current Calculations for industrial and Commercial Power Systems," General Electric, *Section III, Examples of AC Short-Circuit.*
2. ETAP Short Circuit ANSI V&V Documents, Case Number TCS-SC-005.