

Short-Circuit ANSI Comparison Case # 1

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

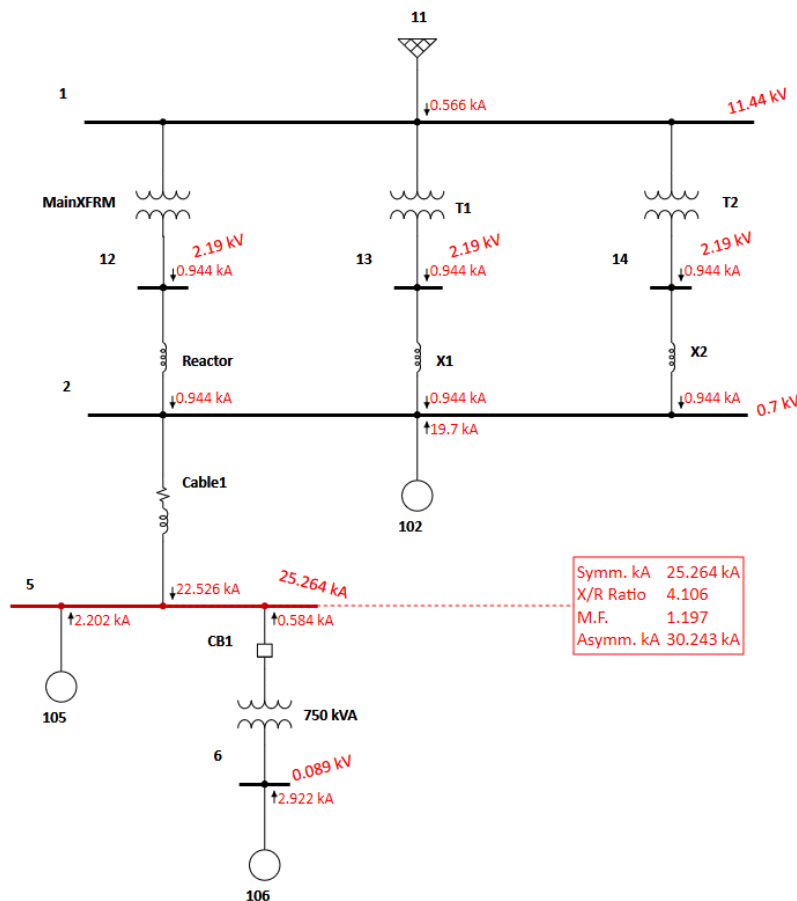
Excerpts from Validation Cases and Comparison Results (TCS-SC-005)

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” [1].
- 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 utility rating is 250 MVA_{sc} with an of X/R = 15. There is 19,900 HP of lumped induction motor load at 2.4 kV and 800 HP at 0.480 kV. This document is an excerpt from TCS-SC-005 [2]



Comparison of Results

The following tables of comparison show the differences between ETAP Results and those published in the General Electric document. Please note that the maximum deviation in the results is about 0.01 %.

<u>For a fault at Bus #5</u>	<u>Momentary Duty</u>			<u>Interrupting Duty</u>		
	Hand Calc	ETAP	% Diff.	Hand Calc	ETAP	% Diff.
Symm. Current (kA)	25.3	25.3	0.0	18.9	18.9	0.0
X/R (separate R&X networks)	4.1	4.1	0.0	5.6	5.6	0.0
MF (separate R&X networks)	1.2	1.2	0.0	-	-	0.0
I _{asy} (separate R&X networks)	30.2	30.2	0.0	-	-	0.0
Contribution from Bus 2 (kA)	22.5	22.5	0.0	17.3	17.3	0.0
X/R from Bus 2	3.3	3.3	0.0	4.4	4.4	0.0
%V of Bus 2	29.2	29.2	0.0	22.4	22.4	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.