Fault Level at an LV Bus by the MVA Method

Three-phase fault level and fault current at a bus fed through a transformer and cable from a grid of known fault level, with motor contribution, by the MVA method.

Method: MVA method of short-circuit calculation

Input parameters

Unit system: SI

Parameter	Value	Unit
Fault level of the supply at the transformer primary	500.00	MVA
Transformer rating	2.0000	MVA
Transformer impedance	6.2500	%
Bus voltage (line to line)	415.00	V
Impedance of the cable or busduct to the bus (0 = none)	0.002000	Ω
Running motors at the bus (total kVA, 0 = none)	0	kVA
Motor subtransient reactance From the motor maker; used only when motors are entered.	20.000	%
Voltage factor c (IEC 60909) 1.1 for the maximum fault current used to rate breakers and busbars (1.05 is allowed on LV systems with a +6 % voltage tolerance); 1.0 gives the plain MVA method.	1.1000	

Calculated results

Parameter	Value	Unit
Fault level at the bus	24.519	MVA
Symmetrical fault current at the bus	34.111	kA
Fault level from the supply path alone	24.519	MVA
Motor contribution to the fault current	0	kA

Notes for this case

- Impedances are added as magnitudes (no X/R angle), which gives a slightly lower current than a phasor sum when the X/R ratios differ; final equipment ratings need an IEC 60909 or IEEE study with X/R and peak current.

Formula and method

$$\frac{1}{S_{net}} = \frac{1}{S_g} + \frac{z_t}{S_t} + \frac{Z_c}{U^2}$$

$$S_f = c\left(S_{net} + \frac{S_m}{x_m}\right)$$

$$I_f = \frac{S_f}{\sqrt{3}\,U}, \quad I_m = \frac{c\,S_m/x_m}{\sqrt{3}\,U}$$

Variables

S_g	fault level of the supply	VA
S_t	transformer rating	VA
z_t	transformer impedance	-
U	bus voltage	V
Z_c	cable or busduct impedance	Ω

S_m	running motors at the bus	VA
x_m	motor subtransient reactance	-
C	voltage factor (IEC 60909)	-
S_f	fault level at the bus	VA
I_f	fault current	A
S_{net}	fault level from the supply path (the output is multiplied by c)	VA
I_m	motor contribution	A

Method and standards

The MVA method: each component's short-circuit MVA is its rating divided by its per-unit impedance, or U²/Z for a cable. Series elements combine as reciprocals; motors feeding the fault add in parallel. Impedances are combined as magnitudes. A magnitude sum is never smaller than the phasor sum, so when the X/R ratios of grid, transformer and cable differ the current comes out somewhat low, not high. The result is multiplied by the voltage factor c of IEC 60909 (c_max = 1.1 for the maximum fault current), as a short-circuit study would apply it to the equivalent source.

Assumptions and limits

- Symmetrical three-phase fault; voltage factor c applied to all sources; no X/R angle.
- Motor contribution is the initial subtransient value.

References

• MVA method of short-circuit calculation

Report details

Report reference	FCC-56CX-BFRV (the same inputs always give the same reference)
Generated	17 November 2026, 19:44 UTC
Calculator	Fault Level at an LV Bus by the MVA Method
Method last reviewed	12 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	6 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/electrical/protection/fault-level-mva-method

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.