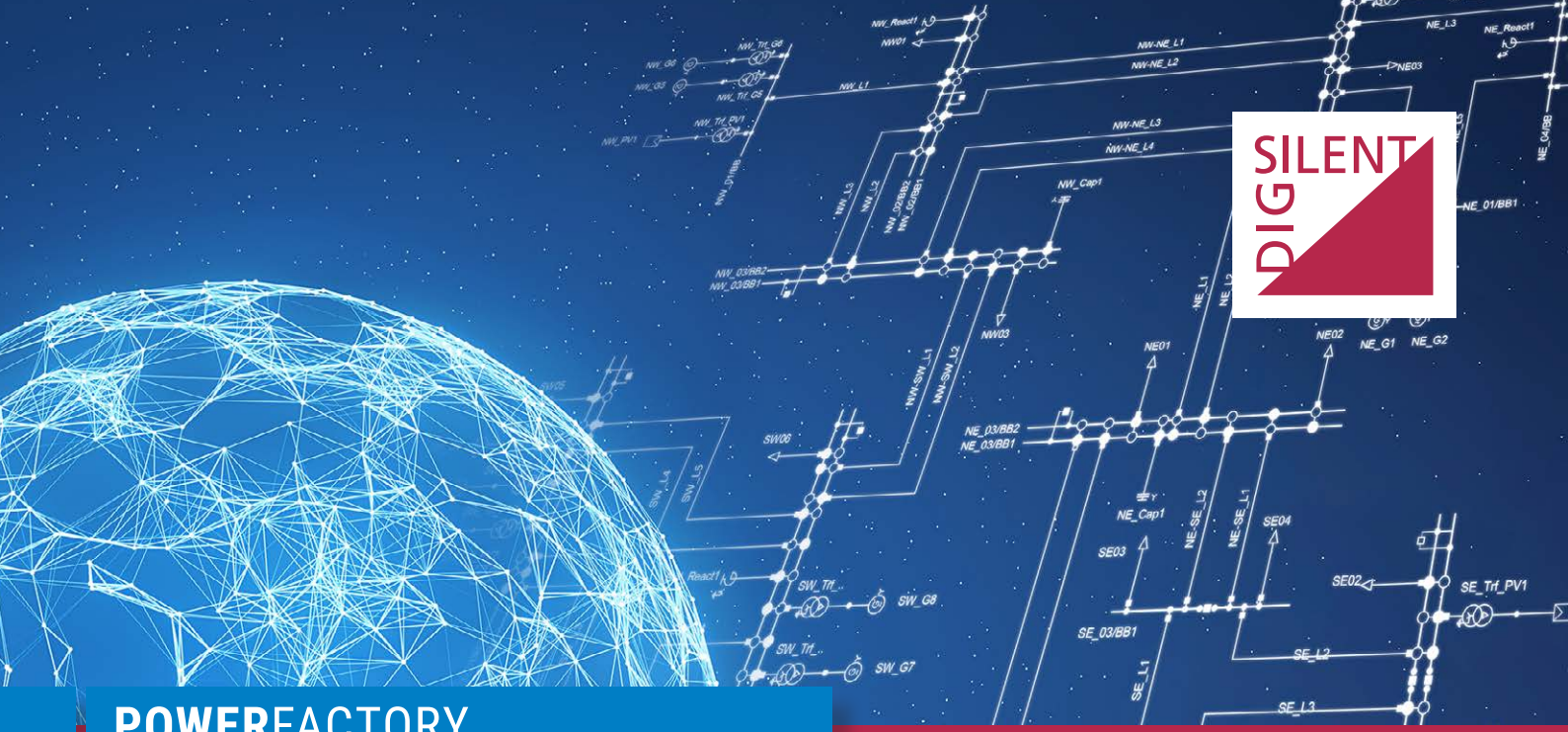

POWERFACTORY

PowerFactory 2021

Technical Reference

Neutral Earthing Reactor/Conductor

ElmNec

PF2021

POWER SYSTEM SOLUTIONS

MADE IN GERMANY

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Revision 1

Contents

1 General Description

Grounding transformers are transformer banks whose purpose is to provide a ground for an otherwise ungrounded system [1]. For example, a power system supplied from a delta-delta or wye-delta step-down transformer bank will not be grounded and it will not supply enough current to a single line-to-ground fault short circuit to allow protective relays to reliably trip the circuit. Ungrounded systems are referenced to ground only through the stray capacitances of lines and bus bars to ground, and may experience large transient over-voltages during system disturbances. Furthermore, on occurrence of a single line-to-ground short circuit, each unfaulted terminal will experience the full line-to-line voltage imposed between that terminal and ground. As a result, insulation requirements are more stringent on ungrounded systems. To alleviate these problems, such systems may be converted to grounded systems by the addition of an auxiliary transformer called a grounding transformer.

Two configurations are normally used for grounding transformers: grounded zigzag and grounded star-delta. These are shown in Figure 1.1.

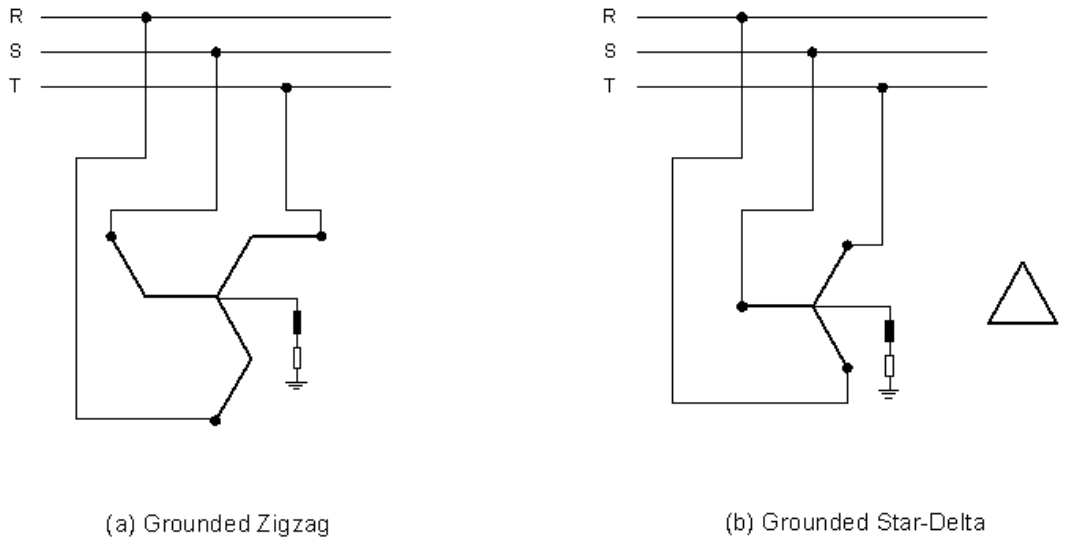
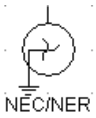


Figure 1.1: Grounding transformer connections

2 Grounding Element in *PowerFactory*

The grounding element in *PowerFactory* is called NEC/NER (Neutral Earthing Conductor/Neutral Earthing Reactor), and is represented by the symbol



The dialogue box of NEC/NER is shown in Figure 2.1.

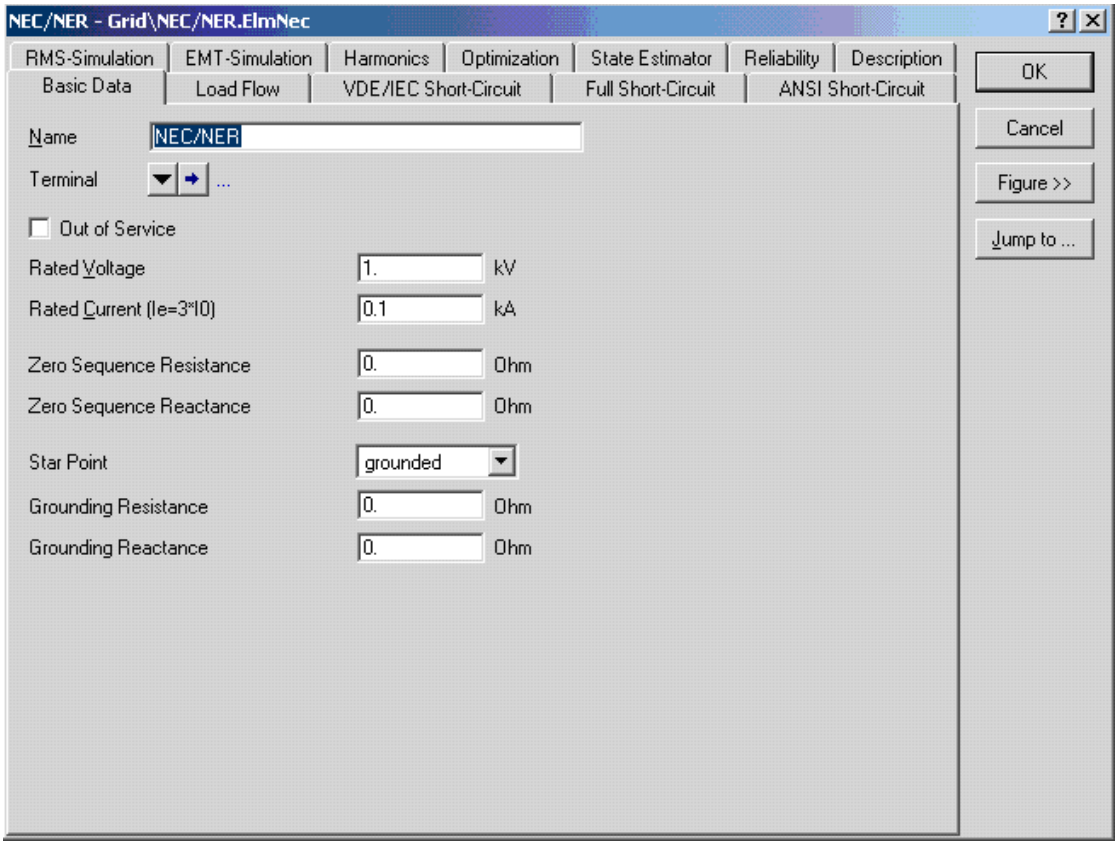


Figure 2.1: Dialogue box of Grounding transformer

NEC/NER does not have a type. The input parameters that need to be specified are: rated voltage, rated current, zero sequence and grounding resistances and reactances. The star point can be either grounded or compensated.

The zero-sequence model used for loadflow is depicted in Figure 2.2

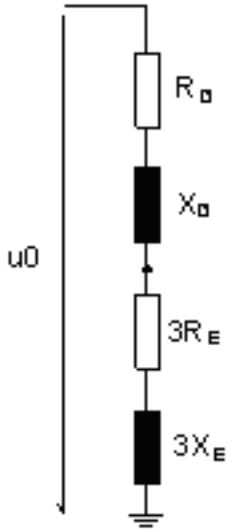


Figure 2.2: Grounding transformer model in *PowerFactory*

The grounding transformer is open-circuited in the positive and negative sequence circuits.

3 References

[1] C. W. Brice. Fundamentals of Electric Power Systems, 2002.

List of Figures