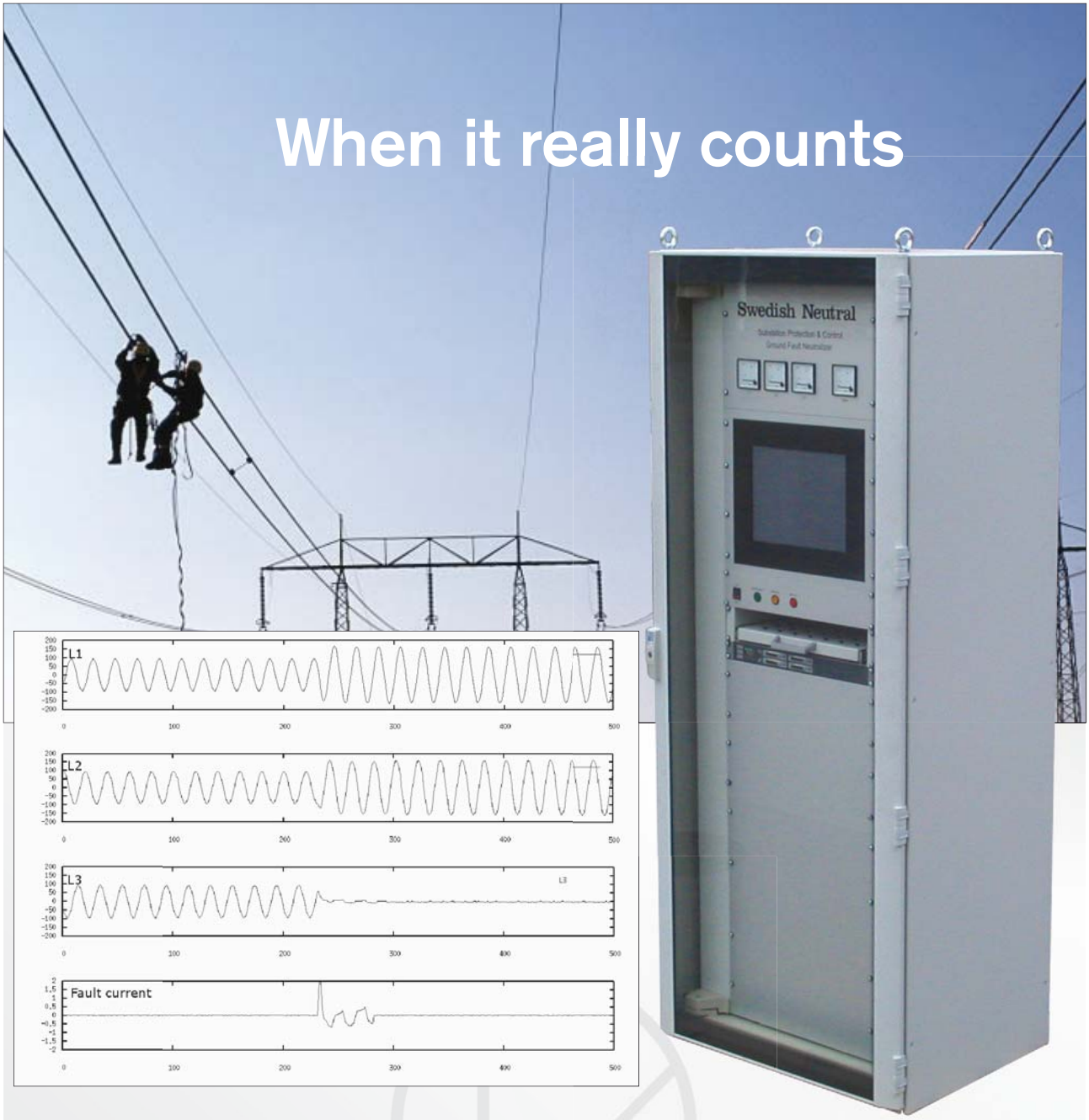
Ground Fault Neutralizer



Smart Grid protection for cable- and overhead lines

- **Ultra fast**
- **No feeder tripping**

Swedish Neutral
Premium Power Protection

The RCC Ground Fault Neutralizer - a novel Smart Grid Protection

Introduction The RCC Ground Fault Neutralizer, developed by Swedish Neutral, is a novel protection scheme for fast earth fault protection in medium and high voltage networks. Instead of tripping the faulty feeder, the Ground Fault Neutralizer cancels out the fault current by injection of an anti-phase current into the neutral. This interception is very fast and has no impact on the convey of payload over the faulty feeder – single phase-to-ground faults can be handled without customer outage.

Resonance Grounding The Ground Fault Neutralizer works in resonant grounded networks. Resonance grounding by Petersen coils has been used in Scandinavian and other European countries like Germany, Switzerland etc for some eighty years. The excellent properties of this grounding concept are mirrored by very low outage rates. Recently also EdF in France and ENEL in Italy have introduced resonance grounding as their standard grounding concept for medium voltage grids. First reports show a substantial improvement in power supply quality.

Resonance grounding is mainly used in overhead networks were most of the faults are single phase-to-ground and often of transient nature. The Petersen coil chokes the fault current below the level of self-extinction (< 35A). By this action all transient faults can be cleared without feeder tripping. However sustained faults on overhead lines and cable faults so far could not be cleared. Instead it was necessary to trip the feeder, in order to minimize the risk for fire and personal hazards due to the remaining fault current.

Ground Fault Neutralizer The RCC Ground Fault Neutralizer now provides fast and complete compensation of all remaining earth-fault currents – both fundamental and harmonics. RCC stands for Residual Current Compensation. Utilising modern computer and power electronics, fault current and voltage injection are cancelled out completely. This is beneficial especially in industry- and urban cable grids were almost all faults start single phase-to-ground (cable screen). If not properly compensated, a re-striking cable fault quickly develops into a multi-phase or cross-country fault with subsequent long term outages.

Also with respect to personal safety and fire prevention the Ground Fault Neutralizer offers premium protection. A fault interception in less than three cycles in praxis can never be reached by traditional protection schemes working on breakers.

Cost-Benefit Cost-benefit studies indicate resonance grounding combined with residual current compensation to be one of the most cost efficient supply quality investments. Outage-rates will drop substantially. The non-tripping fault handling also allow for full life cycle usage of grid assets, without jeopardizing power supply quality.

Implementation The Ground Fault Neutralizer is connected to the neutral of the supplying power transformer (Y-winding) or a separate grounding transformer (Z-winding). A complete GFN-system is composed of an arc suppression coil, a cabinet for power electronics and the GFN control cabinet. Beside the controls for the residual current compensation the GFN also provides automatic retuning for the arc suppression coil and a new twin scheme fault locating with superior detection capabilities. Distance-to-fault information can easily be obtained by feeder looping.

References Swedish Neutral has experiences from previous conversions to resonance grounding in Australia, New Zealand and Brazil. To start with, we can offer you a dedicated feasibility study for your grid.

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