

# CASE STUDY

## Netcon 100 prevents network failure

**Finnish DNO's investment into Netcon 100 smart RTUs shows its potential as one of the RTUs detects a fault ultimately traced to a malfunctioning overhead disconnector**



Distribution network operator Tampereen Sähköverkko Oy supplies the City of Tampere, Finland, along with the surrounding rural areas. They manage a 22 kV network consisting of 70% underground cables and 30% overhead lines.



For the last few years, Netcontrol has supplied Tampereen Sähköverkko with the Netcon 100, a smart substation controller RTU. This is a modular product: the customer can select from various interface cards to build up the desired RTU functionality.

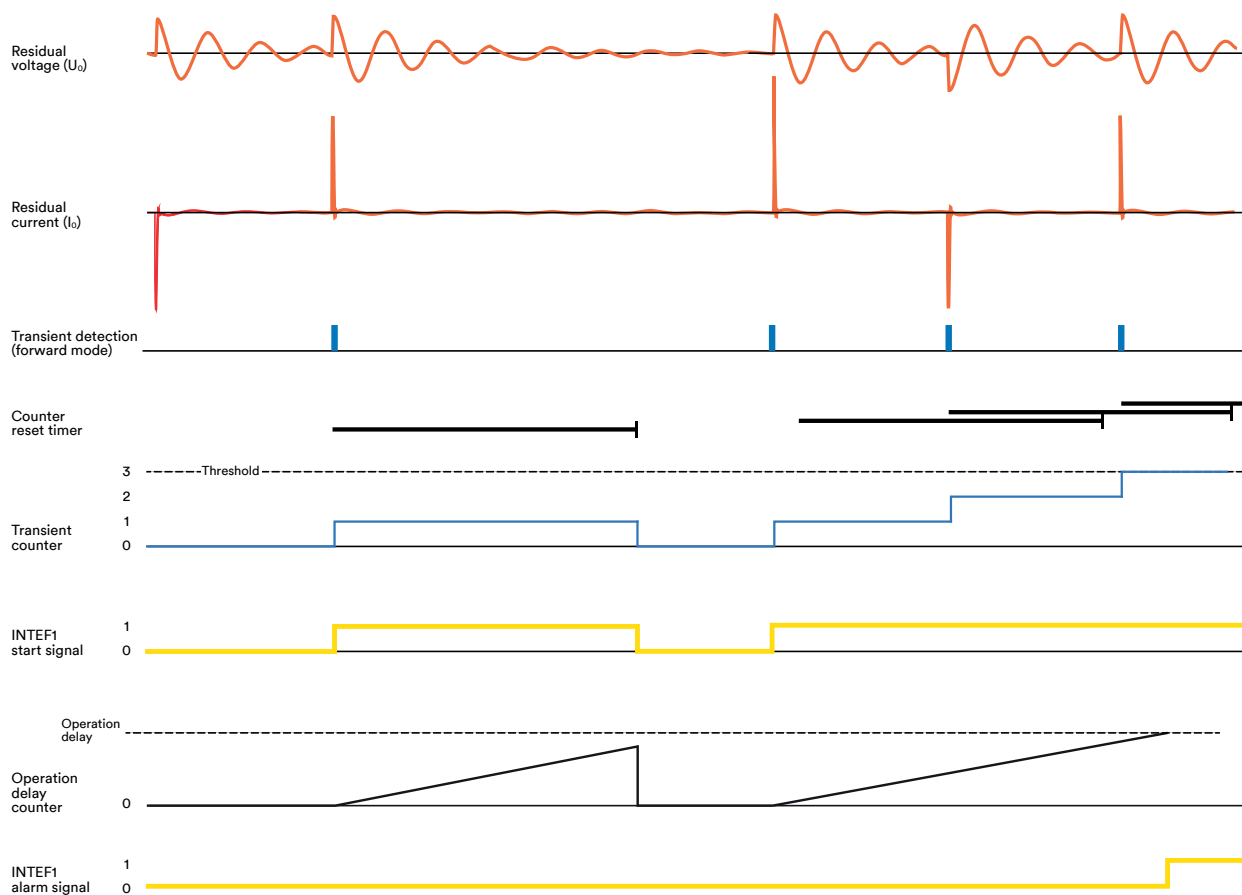
Tampereen Sähköverkkoy use the Netcon 100 for monitoring and controlling their substations. They have added the FDM112 fault detection card to monitor electrical faults in their network. Thanks to its high sampling rate, the FDM card can even detect transient (incipient) faults, and it also provides information on power quality in the network.

In a recent incident, the Netcon 100 at a compact substation (above, left) detected a number of intermittent faults over a period of time and raised

an alarm to the Tampereen Sähköverkko engineers that an abnormality had developed in their network, one that was likely to develop into a permanent fault. Once aware of the alarm, System Expert Juha Järvensivu started looking for possible causes and discovered that an overhead disconnector (above, right) had a “lazy phase”, making insufficient contact on one of the phases. Left unattended, this would have resulted in a more serious fault in the network.

The FDM card on the Netcon 100 is connected to voltage and current sensors. Typically, Rogowski coils are used for the current measurement and capacitive voltage dividers for the voltage. The card can provide fault protection for feeder circuits as well as automatic sectionalising of the network, and since the fault impedance is measured, network operators can determine the distance to the fault.





Transient detection is based on advanced signal processing of synchronous residual current ( $I_o$ ) and residual voltage ( $U_o$ ) samples by the Netcon 100 RTU. Users configure the  $I_o$  and  $U_o$  thresholds and values calculated from the synchronous samples are then compared against the thresholds.

When the thresholds are exceeded and the configured directional condition is met (the detection is bi-directional), the detection algorithm increments the transient counter by 1.

An alarm signal is activated and sent to the SCADA/DMS when the set number of transients are detected within an interval shorter than the configured counter reset delay and when the operation delay has elapsed from the first peak.



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