Extensive measurements and classification of PQ aspects in MV networks

The goal of grid operator Alliander is to obtain knowledge of the Power Quality in all parts of the network. Therefore continuous measurements must be performed on all MV bus-bars of HV/MV substations and on strategic points in the MV grid. From this data the quality in the LV network must be estimated. Incidental measurements in the LV network can help to obtain the experience needed for this estimation. This goal can only be reached when:

• the measurements can be performed at low costs;
• the data can be analysed uniformly;
• the data can be presented in an easy to understand way.

Three developments helped to cope with these challenges.

• The Power Quality monitoring could be simply programmed in the SASensor solution for substation automation, resulting in a cheap way of measuring.
• The classification of every PQ aspect in a range between A (very good) and F (very poor) results in an uniform way of evaluation.
• A new developed visualisation tool is able to present the data for various locations at various time points for a quick analysis.

The system is implemented in 10 substations in 2007. The first year was used to test the system on slow voltage variations, harmonics, asymmetry and frequency. Reliable measurements are obtained since the beginning of 2008. In 2009 the aspects dips and flicker will be implemented.

The results of the measurements show little problems with Power Quality. Only during disturbances some limits are violated. It is therefore necessary to include information in the measurement (flagging) which tells whether the data is correct or doubtful.

Due to the good performance of the system it will be extended towards all substations and many points in the MV grid, like measurements in intelligent MV/LV transformer stations. It is also possible to include measurements from the smart meters in the LV grid in future.