NETCON PQA

Comprehensive and versatile measurement analysis system

Convenient Web access to power quality, energy and other technical measurement data

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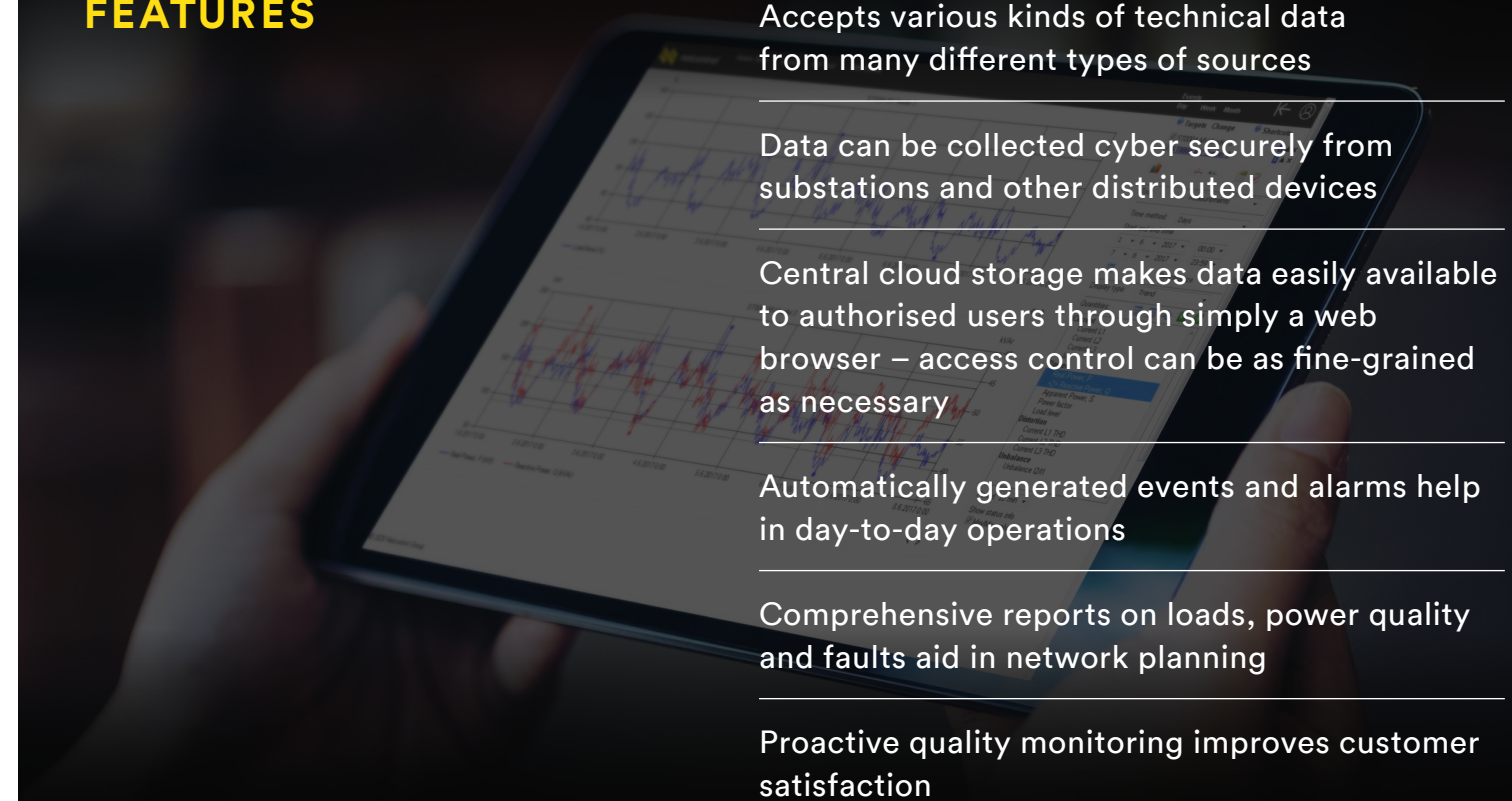
Comprehensive and versatile measurement analysis system

FEATURES



- Accepts various kinds of technical data from many different types of sources
- Data can be collected cyber securely from substations and other distributed devices
- Central cloud storage makes data easily available to authorised users through simply a web browser – access control can be as fine-grained as necessary
- Automatically generated events and alarms help in day-to-day operations
- Comprehensive reports on loads, power quality and faults aid in network planning
- Proactive quality monitoring improves customer satisfaction

Central storage and analysis of all your measurement data

Netcon PQA is a tool for collecting and analysing measurement data on power quality and energy. The data may be from primary and secondary substations, industrial networks and/or household energy and power quality meters. Virtually any other kind of technical data are also supported, however.

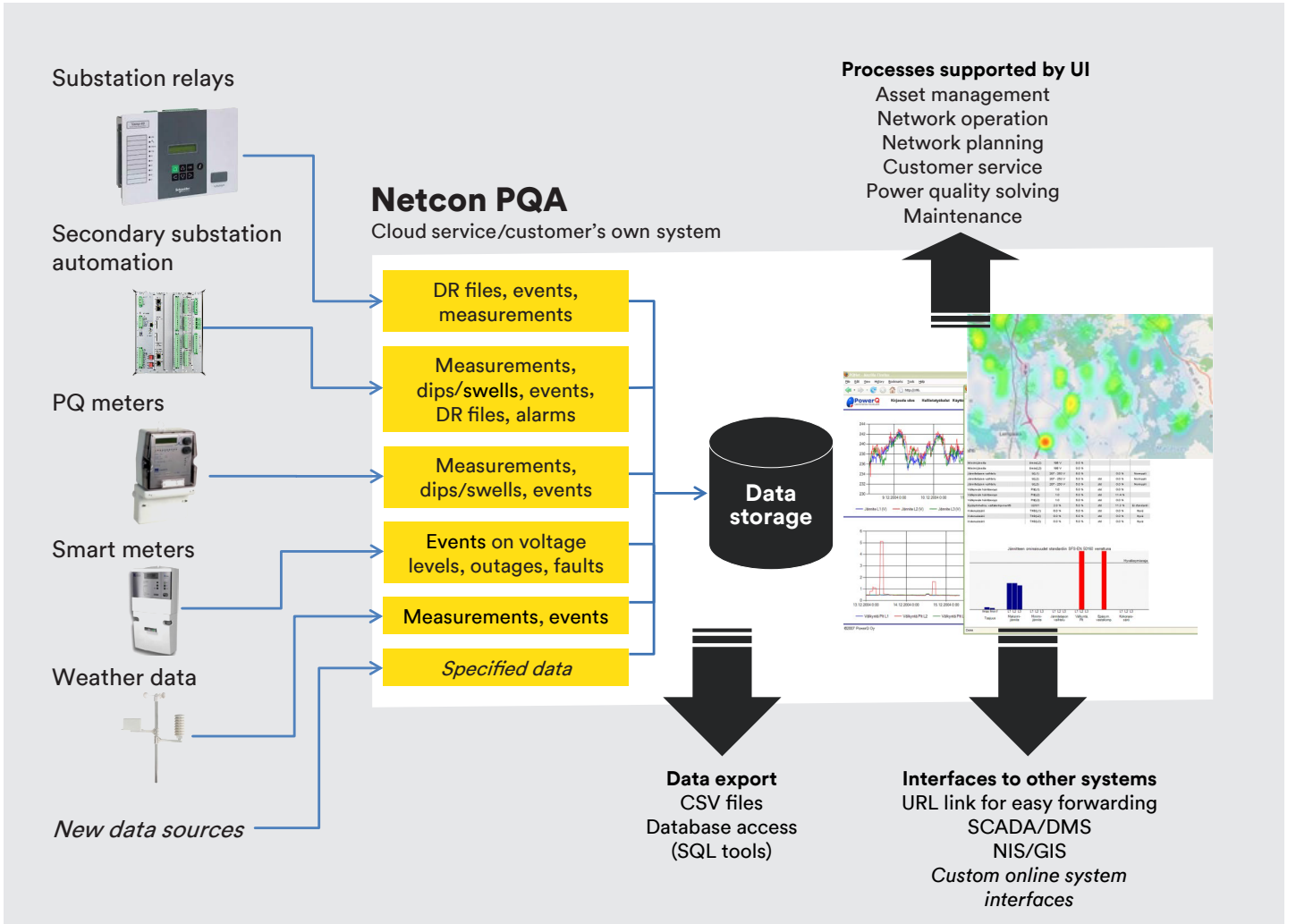
DIFFERENT WAYS OF USING PQA

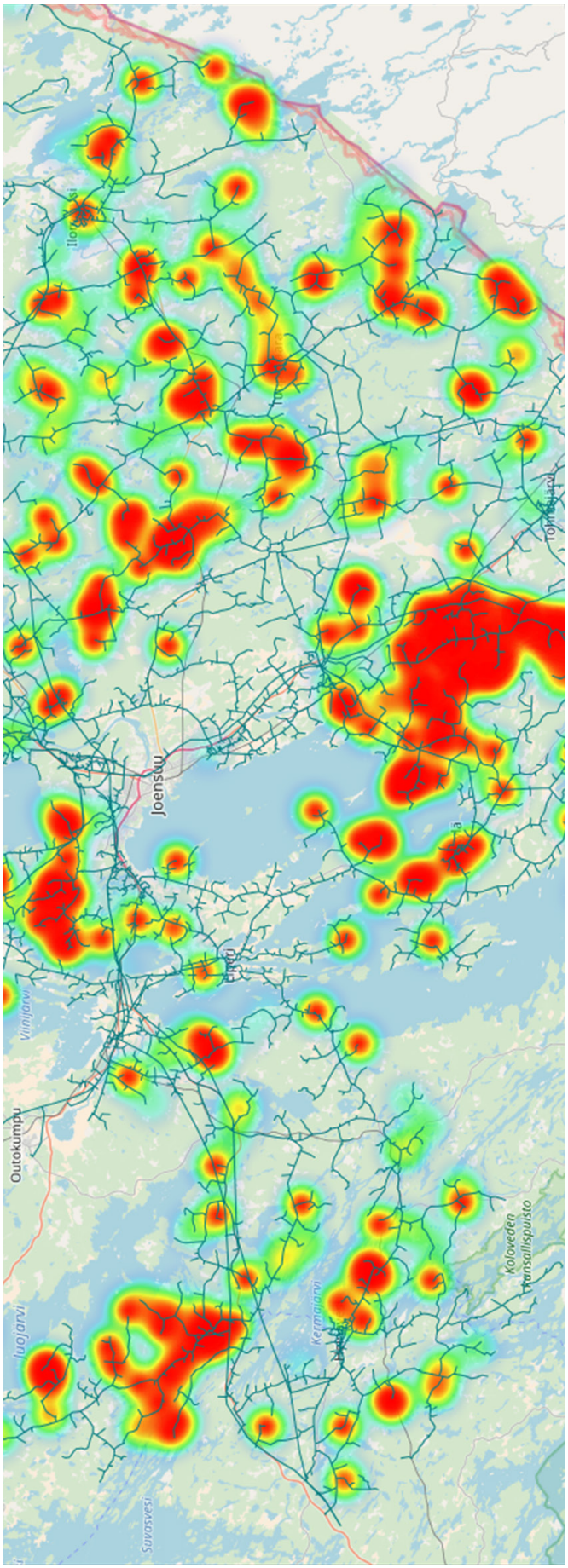
Netcon PQA can be used either as a cloud service running on Netcontrol's server or installed in-house. It can also be interfaced with other systems, such as a SCADA or a DMS, and used from them.

WIDE VARIETY OF DATA

Netcon PQA is an open database for technical measurements. Though mainly designed for power quality and energy data from electrical networks, it can handle almost any kind of technical measurement data:

- Energy, power, voltage and current measurements
- Power quality measurements
- Event and alarms data such as interruptions and voltage sags
- Disturbance recordings
- Weather data
- Other data from any interval and in any quantity.





Outages shown as a heat map, based on smart meter data.

Supported meter and data types

- Protection relays
  - VAMP 255 and later protection relays (measurements, disturbance recordings, events, sags/swells, outages)
  - ABB relays (COM600 FTP transfer, disturbance recordings)
- Secondary substation automation
  - Netcon 100
  - Schneider Electric WIMO 6CP10
  - Landis+Gyr / Power Sense
- Power quality meters
  - Electrix power quality guard
  - Memobox
- Smart meters
  - Landis&Gyr Smart meters (IEC 61968-9)
- Weather data
  - e.g. the open data available from the Finnish Meteorological Institute

CONVENIENT WEB ACCESS TO DATA

PQA has a standard Web page as its user interface: all authorised users can easily access, through their Web browsers, those specific data sets to which they have been given permission.

The data and analyses can easily be forwarded to other parties by means of simple URL links. The raw data can also be exported as CSV files or through SQL database tools.

Dedicated smart metering functionality

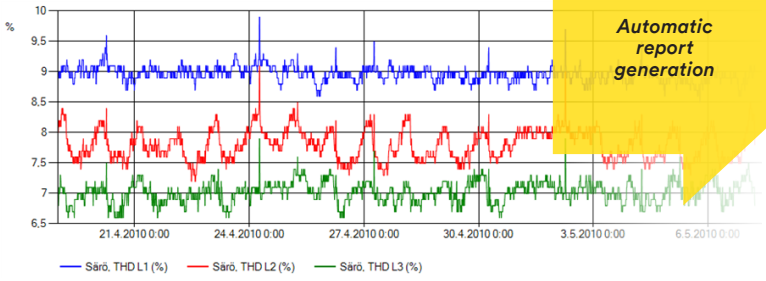
Netcon PQA also has a smart meter functionality for the data (event type, duration, value) that smart meters typically save for events such as over- or undervoltage, power cuts and zere faults. The PQA functionality can be used:

- to aid customer service with individual end customers
- to obtain mass analyses for parts of the grid to help in network planning.

This functionality can be used independently of the main Netcon PQA system.

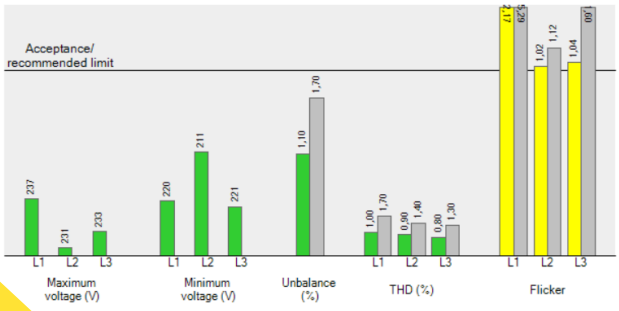
“You cannot control what you don’t monitor”

To be helpful, all the collected data must be sifted through. Netcon PQA therefore has powerful tools that help you statistically analyse the data and generate reports. For more immediate operational needs, the system provides functions for automatic data monitoring, including the ability to raise alarms.



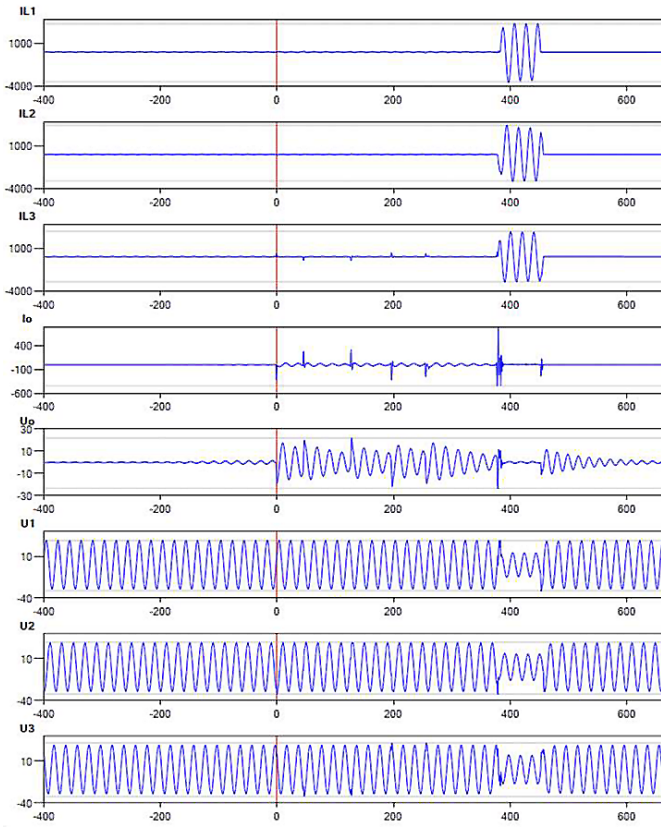
Time series of phase-specific total harmonic distortions.

Automatic report generation



Quantities defined in the standard EN 50160

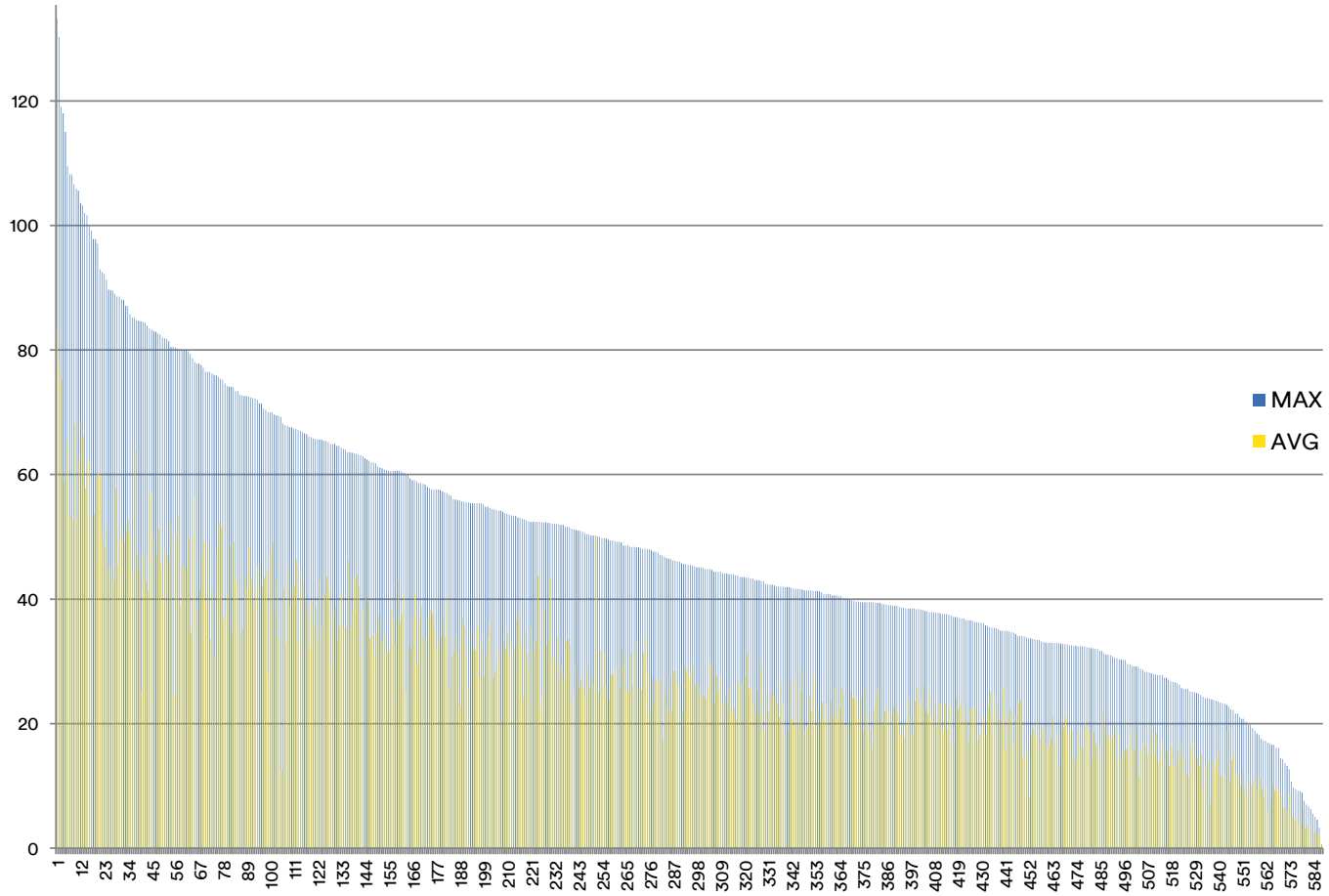
Quantity	ID	Limit value /recommmendation	Measurement result	Fulfills EN 50160 (Yes/No)
Maximum voltage	Umax(L1)	253 V	237 V	Yes
Maximum voltage	Umax(L2)	253 V	231 V	Yes
Maximum voltage	Umax(L2)	253 V	233 V	Yes
Minimum voltage	Umin(L1)	196 V	220 V	Yes
Minimum voltage	Umin(L2)	196 V	211 V	Yes
Minimum voltage	Umin(L2)	196 V	221 V	Yes
Voltage level variation	U(L1)	207 - 253 V	227 - 233 V	Yes
Voltage level variation	U(L2)	207 - 253 V		Yes



Part of a disturbance recording from an earth fault.

The insights gained through data analysis can create value by helping distribution network operators both in their day-to-day network operations and in their long term network planning. With the help of PQA, network operators can:

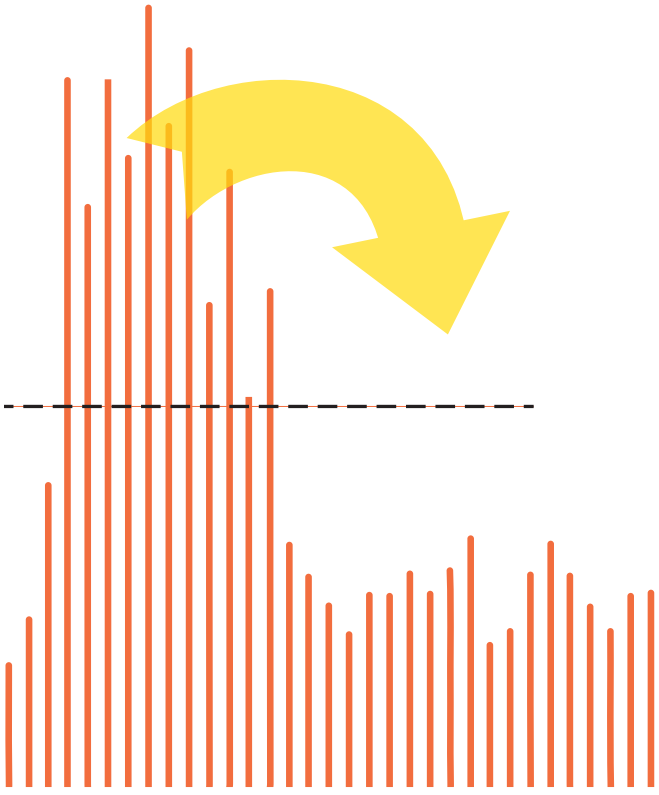
- **Minimise the impact of faults.** Disturbance recordings (left) make the analysis of faults faster and more accurate. They also help evaluate protection settings.
- **Anticipate faults.** The number of generated disturbance recordings may also help predict an impending fault.
- **Deal with customer complaints.** Real data, combined with an effective customer process, can increase customer satisfaction.
- **Streamline customer billing** and a**uthority reporting** because the data are already there.
- **Optimise network capacity** by, for example, dealing with excessive apparent power, which today is an increasing problem.
- **Lengthen component life cycle** by e.g. curtailing harmonics, which shorten the lifetime of components.



600 secondary substations ranked according to maximum relative load (percentage of nominal load).

- **Deal with changes in network loads** as more and more electrical busses and cars are being charged and operated, causing load peaks and power quality problems; compensation for reactive power may likewise cause power quality issues; and distributed production such as wind and solar bring about their own complications.
- **Optimise the timing of maintenance.** For example, constant load measurement makes it possible to supply a secondary substation load from the low voltage side of another substation when its load is light, with no need for a separate load measurement.
- **Optimise the timing of investments.** A load analysis based on the cumulative distribution indicates if the transformer load is so heavy that a bigger transformer is needed or so light that the service life of current one can be extended. The latter saves money and may enable a DNO to spread its investments over a longer period.

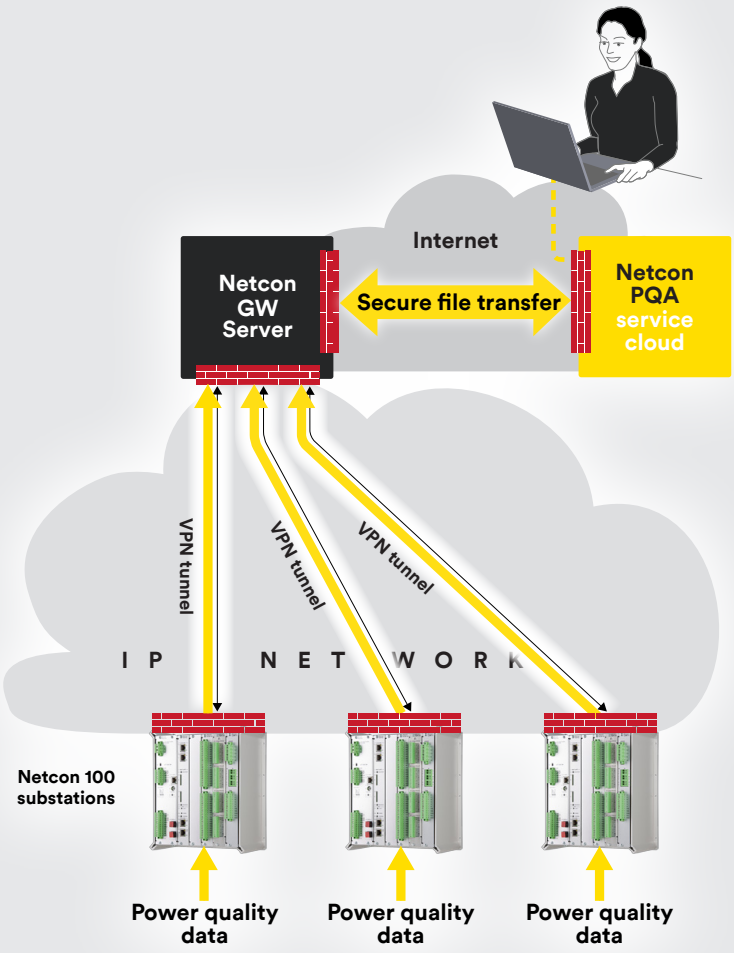
All the above boils down to the simple maxim, “You cannot control what you don’t monitor”.



Flattening out investment peaks.

PQA with Netcontrol's Netcon 100 substations

Netcontrol's All IP concept provides a tried and true solution for transferring the data from its feature-rich Netcon 100 secondary substation devices to the PQA server.



CYBER-SECURE DATA TRANSFER

The measurement data from the Netcon 100 substations are first collected over secure VPN connections to one central location, such as the SCADA front end (in the figure, represented by the Netcon Gateway Server). This data transfer is kept logically distinct from all telecontrol traffic. From there, the data are securely forwarded to the PQA service cloud and stored in a database.

REQUIREMENTS

Hardware of Netcon 100 substations

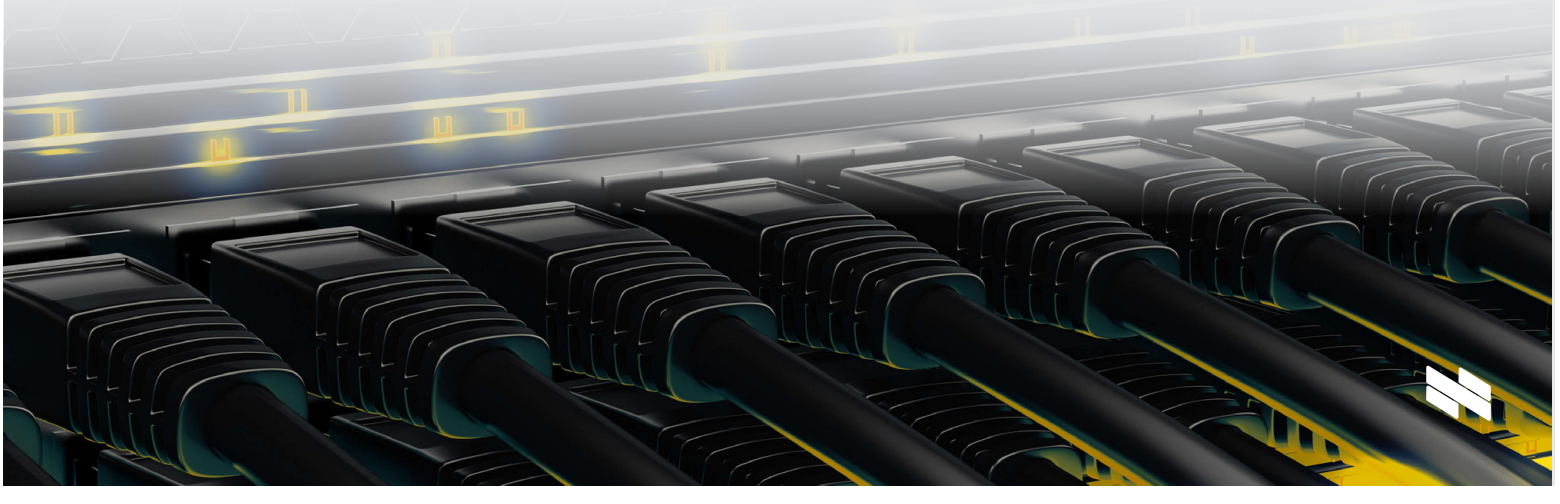
- For LV measurements and transformer monitoring: Netcon LVM111 low voltage monitoring module
- For MV quality measurements: Netcon FDM112 fault detection module + applicable sensors

Communication of Netcon 100 substations

- An IP connection to the master station: either a fixed Ethernet connection from the Netcon GW102 main processor module or a wireless 3G connection via a modem

Communications requirements on master station

- Netcon Gateway Server or other device with an OpenVPN-capable firewall to terminate the VPN connections from the Netcon 100s
- Internet connection for file transfer to the PQA services



Comprehensive and versatile measurement analysis system

KEY BENEFITS

- Single database, combines data from multiple device types and platforms: meters, RTUs, relays...
- Central storage allows different parties access to different or shared data sets.
- Monitoring of asset usage helps DNOs with asset replacement or deferment and life-cycle calculations.
- Load analysis on LV and MV sides facilitates network optimisation and balancing.
- Power quality analysis helps DNOs deal with customer complaints and asset management.
- Analysis of disturbance records from faults aids in risk-based management of assets.