

Grid Automation Products

MicroSCADA Pro

for network control and
distribution management

Power and productivity
for a better world™



MicroSCADA Pro

Top 8 – the facts that make you a reliable energy supplier

MicroSCADA Pro keeps you in control of your power distribution system anywhere, anytime. It provides versatile SCADA functionality and modern Distribution Management System (DMS) functionality tightly integrated in the same system. You can control your process, manage your field crew and provide outstanding service to your customers with a single system.

1. Leading functionality

MicroSCADA Pro provides all the functionality that is expected from a modern SCADA/DMS system. This functionality is based on advanced and proven algorithms, for instance for fault location, as well as for restoration and network reconfiguration. The traditional SCADA functionality, such as on-line network monitoring data, is complemented with an advanced DMS network database. This enables new real-time applications for improved network monitoring and outage management. You can instantaneously determine fault location along the feeder and present the exact fault location on a geographical map.

2. Network analysis and visualization for situational awareness

Using MicroSCADA Pro, the operator can monitor the network state and related measurements, and then perform the control

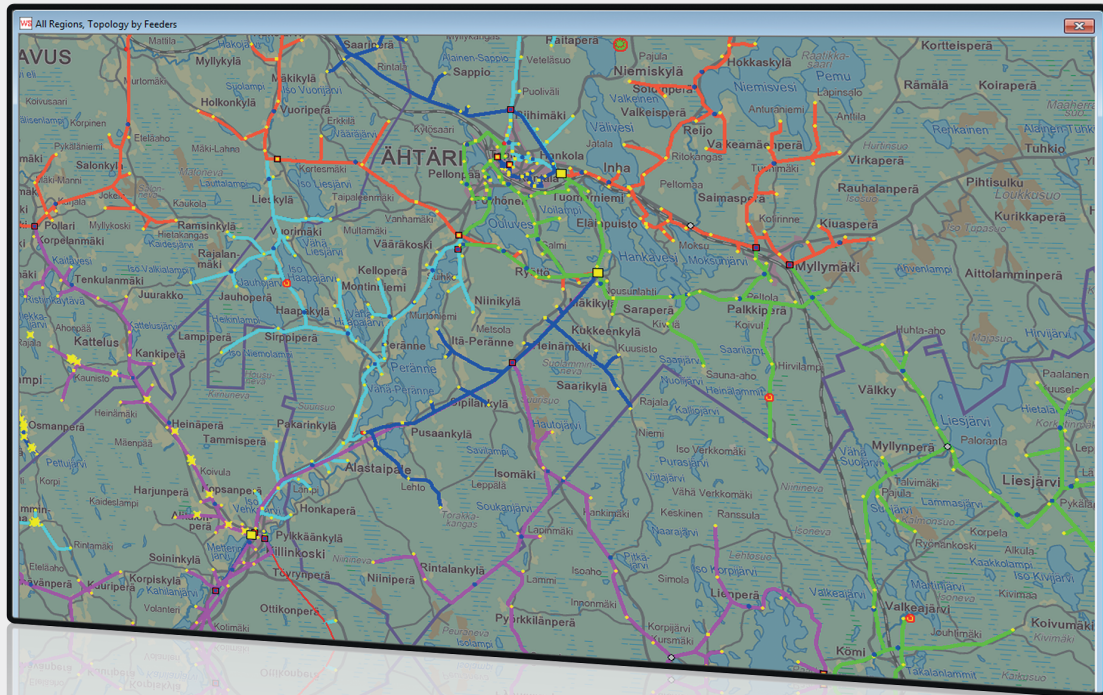
actions needed. Versatile process displays, lists and application tools for network tracing, locating components and reporting provide the necessary information for different users. Dynamic line coloring delivers information about topological connectivity, powered/un-powered network sections and about overloaded lines and voltage drops.

The entire network can be viewed on detailed geographical maps in raster and vector formats, as well as in a schematic diagram. Zooming, panning and de-cluttering enable a clear overview and allow users to focus on a specific area to obtain detailed information. The functions are at hand via process displays, maps and schematic network views. In geographical views, several map layers can be used to provide the details needed. The system automatically selects the correct map layer in accordance with the current zoom level.

With network analysis and calculations based on state estimation of the distribution network, you can utilize the full network capacity even in extreme situations. Network effects caused by distributed generation can be analyzed and corrective actions planned and simulated. This can already be done in the network planning phase or alternatively during the real-time operation. Also short-term forecasts of generation can be used so that operational changes and controls for load

MicroSCADA Pro extends traditional SCADA functionalities by providing geographically based network views and advanced distribution management functions over the entire distribution network.





With the world map view of MicroSCADA Pro, detailed consumer information is just a few clicks away.

or generation can be planned and informed in advance.

MicroSCADA Pro can also provide relay and fuse protection analysis in real-time situation or with simulated relay settings and simulated network states.

3. Dependable operational safety

MicroSCADA Pro prevents simultaneous operation of primary equipment. It reserves the device, and verifies whether the selected object can be operated, before executing the command. Additionally, interlocking schemes prevent dangerous operations that might otherwise damage primary equipment. Only authorized users can override interlocking and other locked operations.

Common safety procedures require that any mechanical or electrical equipment can be locked out and tagged out before being worked on. Responsible for meeting safety requirements, rules and regulations, MicroSCADA Pro includes a lock-out/tag-out function. The lock-out/tag-out function ensures that control of objects in the application or other operations are properly secured prior to and during, for example, maintenance or servicing work. An application

object in tag-out state can easily be identified on the HMI by the intuitive tag-out display symbol.

MicroSCADA Pro's dynamic network coloring function provides the operator with quick access to information about the powered, un-powered and earthed parts of the network. Alarming objects are also visualized. The network coloring, combined with object control simulation of MicroSCADA Pro, ensure the safe and correct operation of your electrical network.

4. Operational efficiency while keeping the network safe

The intelligent switch order management function supports planning, simulation, execution and reporting of scheduled maintenance outage operations. The intelligent algorithms automatically optimize the switching sequence to minimize the number of affected customers. Through its operation planning functionality, MicroSCADA Pro allows planning of switch controls for both remote and manual switching devices in the distribution network or performing other freely definable actions during the outage. Switch order documents with user-defined actions can be created based on company-specific Microsoft Word templates. The switching planning takes the

technical constraints of the network into account, such as voltage drop and load level for each line section. Furthermore, it eliminates damage to primary equipment and the network during maintenance outages by ensuring correct relay protection operation at all times.

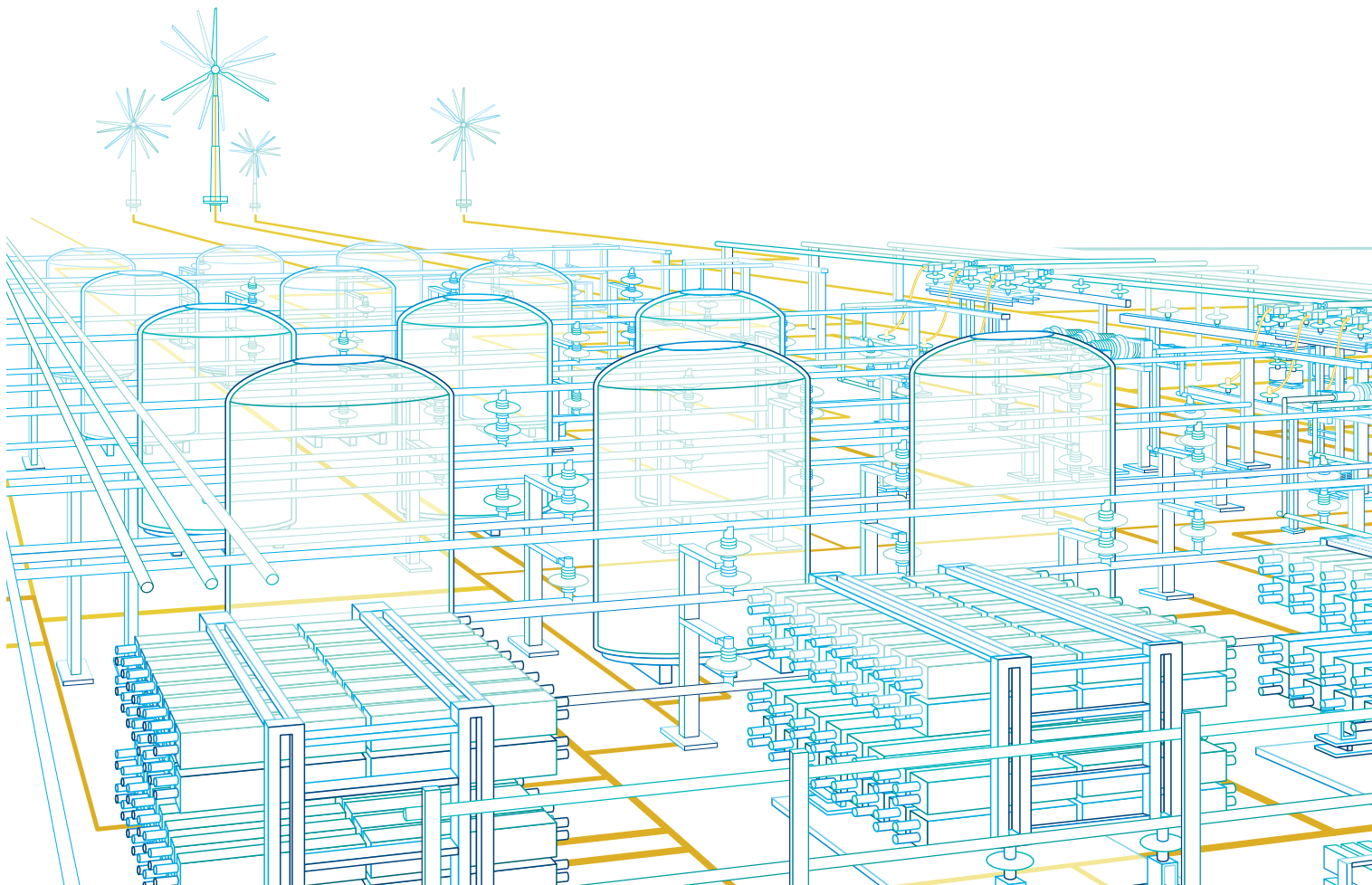
5. Outages from hours to minutes

The advanced distribution management functionality reduces outage time from hours to minutes. The system retrieves registered data about fault currents or impedance from protection and control IEDs. It also utilizes data provided by Feeder Terminal Units (FTU) and fault indicators. This data together with the network model is used to calculate the fault location, which is instantaneously shown in the network view. Then, restoration support provides the operator with a list of recommended actions, such as reconfiguration of the entire network to minimize the outage area. This allows for fault isolation and fast and safe network restoration. Restoration can also be executed completely automatically.

In a fault situation, the GPS-based field crew management enables the operator to quickly find the nearest service crew. With the help of the integrated geographical map, the operator can guide the crew to the fault location, where necessary manual switching operations can be performed to isolate the fault. Or the crew can access the system via mobile communications or hand-held computers, which further simplifies the entire process.

With the advanced fault management functionality, you can provide excellent service to your customers. Your MicroSCADA Pro system helps you locate the customer calling in and allows you to immediately inform the customer about the fault and its expected repair time.

Integration of an Automatic Meter Infrastructure (AMI) system into MicroSCADA Pro offers the possibility to use the communication and smart meter infrastructure created, mainly for energy metering, to also remotely monitor the low voltage networks. This function enables spontaneous alarms



to be received regarding network faults and voltage violations. It can also read measurement values from the energy meters. Alarms from several customer meters can be combined, and faults in the low-voltage network can be located.

MicroSCADA Pro also features a Trouble Call Management function that stores and presents any type of customer contact. The function provides also customers with information about network disturbances and collects information about

the faults, such as the nature and location of the fault. In situations when automation is not providing the data, the customer calls can be used to infer the protection device (e.g. fuse or recloser) that has operated.



6. Extensive reporting facilities

MicroSCADA Pro provides extensive facilities for operational and measurement reporting. This enables fast and efficient reporting of operational statistics and outages to the utility's own management and external parties, such as authorities and media.

The following reports are available:

Outage reports covering faults, maintenance outages and also reclosing trips. Based on the data stored in a relational database, various statistics and indices, such as SAIDI, SAIFI, CAIDI and CAIFI *) can be created. Both MicroSCADA Pro and company-specific reporting tools can be used. The detailed storage of outage information even allows the retrieval of customer-specific outage histories, which can significantly improve customer service. Individual customer outage reports can be automatically generated if requested by the authorities. To achieve a complete view of the network condition and service quality for action planning, these reports (including, for example, frequent fault locations and device failures) can be integrated into the company's business system (ERP) or utilized in a data warehouse implementation.

*) See more details in the technology summary.

Measurement reports that present currents, voltages and active and reactive power in both numerical and graphical formats. The reports can contain, for instance, five-minute or hourly average values.

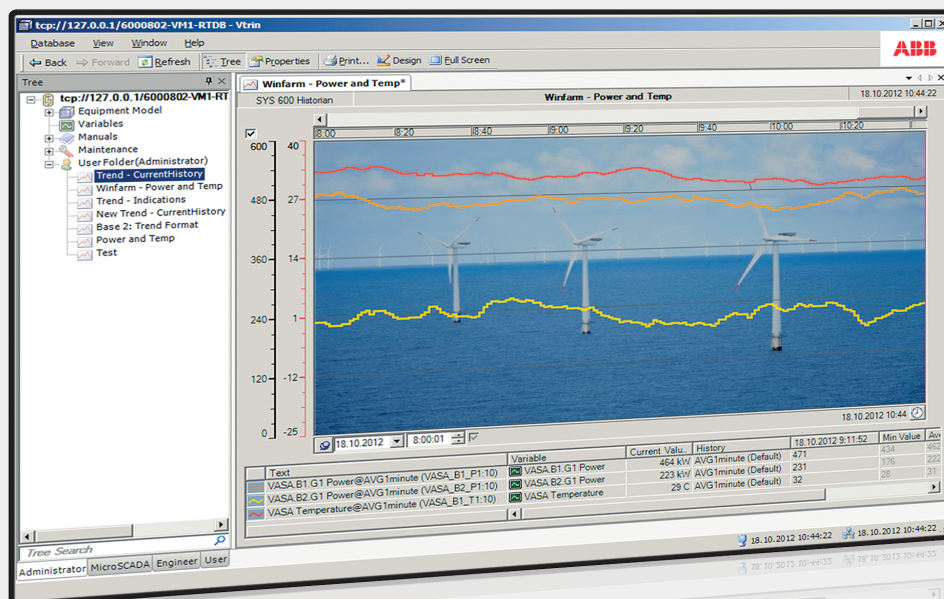
Energy reports in both numerical and graphical formats containing active and reactive energy data with yearly, monthly, weekly, daily and hourly statistics based on three-minute average values.

Customized reports are easily produced using the flexible Historian that can store all process data for long periods and refine the data into meaningful information. This gives a clear view of the situation in the primary process and allows for optimized utilization of the power and primary equipment. Reports and statistics are easily produced. The information is visualized in the form of various graphs, trends and numerical reports. The numerical reports can utilize embedded Microsoft Excel which provides commonly known tools for further data refinement.

7. Optimal investments and asset management

MicroSCADA Pro integrates versatile asset management support in the SCADA/DMS system. The detailed maintenance

The Historian provides powerful tools for data analysis, trending and reporting that enables optimized utilization of the electrical power.



and component data in the relational database can be utilized when planning maintenance activities and component replacements. MicroSCADA Pro supports service, planning, execution and inspection work using user-defined work definitions. Each task can be planned for geographical areas, and progress of work can be followed on maps. Component condition data and executed maintenance tasks are recorded directly in the field.

The network planning functionality helps you plan future network expansions. You can utilize your existing assets in the optimum way and make investments according to the technical requirements of the whole planning period to minimize the cost of investment and costs from power losses. When network construction according to the selected plan has started, the network model can be moved to the relational database in the SCADA/DMS system. With the help of reliability analysis the investments for distribution automation can be optimized.

You can also start with the network database for off-line network planning and add an on-line SCADA/DMS system later using your existing network database.

MicroSCADA Pro also provides operators with information

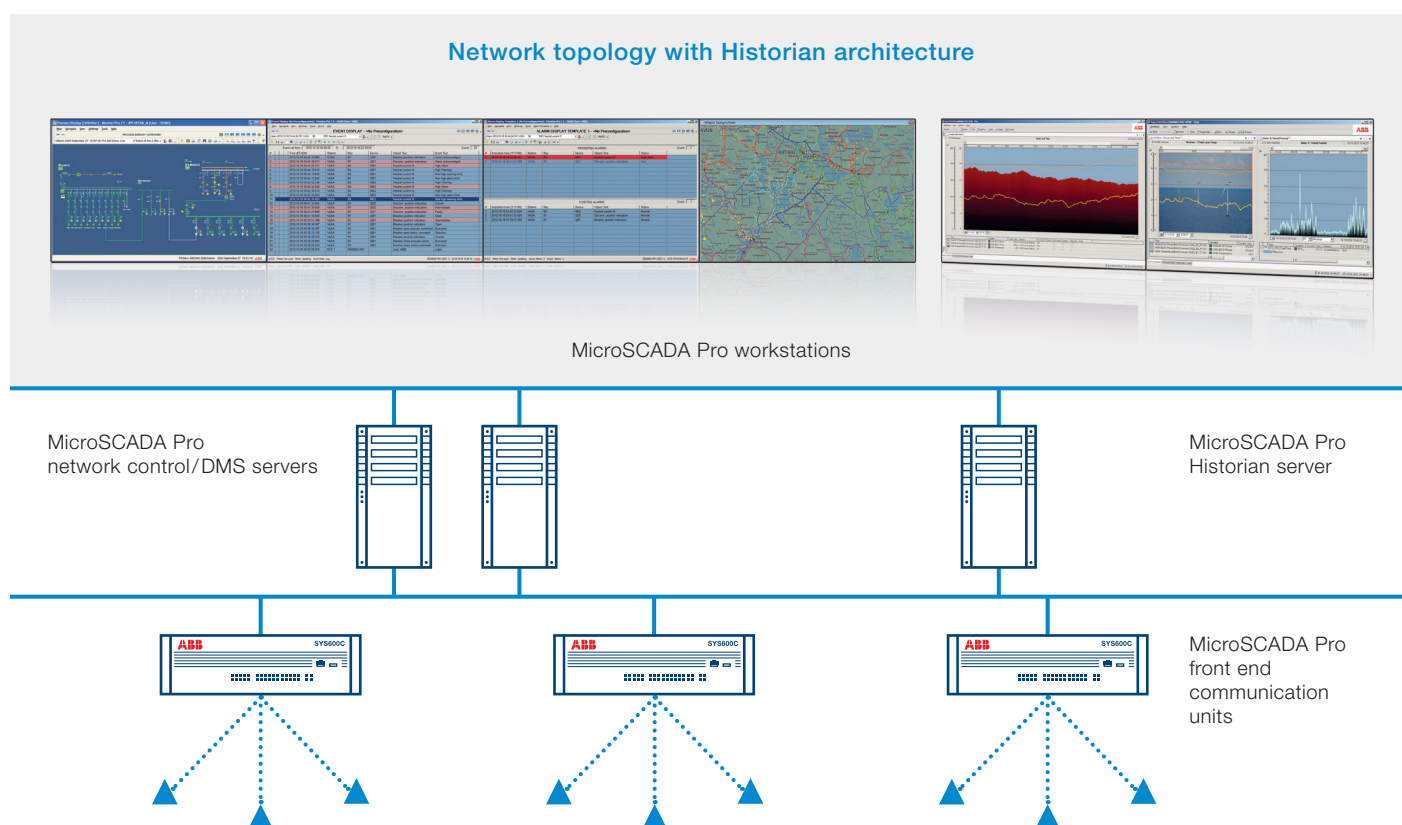
and alarms when your power distribution network equipment requires maintenance. This supports pro-active maintenance and decreases the life cycle costs of your power distribution network. For example, when a circuit breaker reaches its maximum number of operations, an alarm informs the operator that the breaker requires maintenance. MicroSCADA Pro also facilitates support for maintenance and condition data collection in the field.

8. Energy efficiency

Energy efficiency is important from both economical and environmental perspectives. MicroSCADA Pro power and loss reports give guidance for network improvements to reduce losses. Additionally, the network reconfiguration function helps you find the optimum open switch configuration to minimize power losses in radial networks and looped construction.

Voltage and VAR Optimization (VVO) reduces energy losses in distribution networks by optimally using capacitors and distributed generation reactive output settings. In the same time network voltages are automatically kept in defined limits using tap changers and voltage regulators. Also demand and energy can be reduced by lowering voltage level during peak power hours.

The Historian server is tightly integrated within the MicroSCADA Pro network control system. It stores and updates hundreds of values in its real-time database.



Reliable power process management – in any situation

Reliable and relevant information is the basis of correct and fast decision making, as well as of safe operations. The MicroSCADA Pro SCADA/DMS system efficiently utilizes and refines data from the process, enabling you to access important information. Advanced data categorization and prioritization ensure that your operators receive the right amount of relevant information in all situations. In addition, the intelligent applications in MicroSCADA Pro provide refined fault data and suggest corrective actions.

With its maintenance-free, real-time database, specifically designed for SCADA/DMS applications, MicroSCADA Pro enables smooth system operation even in extremely demanding conditions. You can change the configuration of the database and the changes will be implemented instantaneously during full operation.

Full redundancy

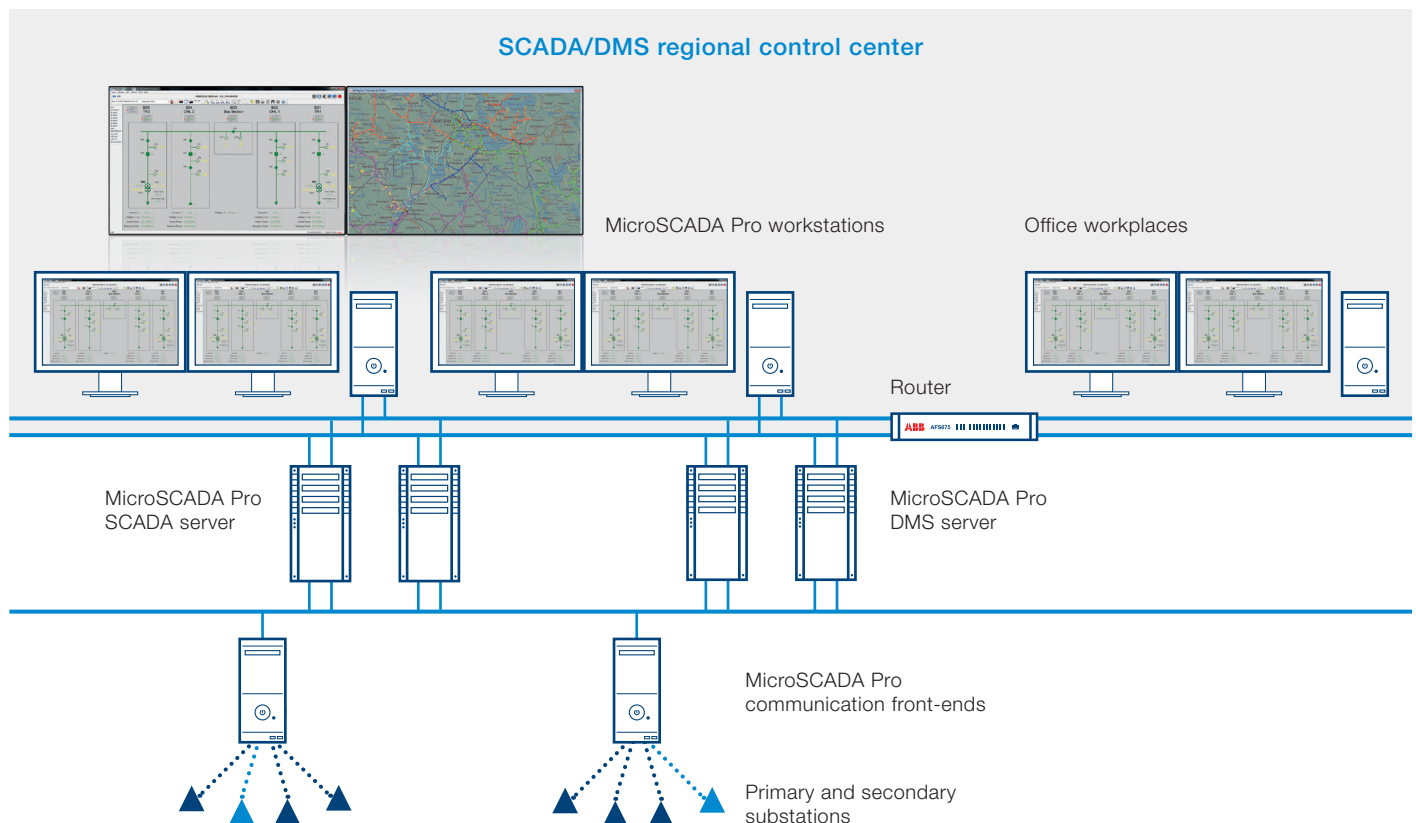
Constant system availability in spite of any device failure is vital. Therefore, MicroSCADA Pro supports a redundant architecture to enhance availability and to increase the reliability of the system.

MicroSCADA Pro can work in a redundant mode with two separate computers, one hosting the main application and the other one hosting the back-up application. All data is simultaneously updated in both computers and if the main computer fails, the back-ups will take over. This redundancy concept can be also applied in distributed and hierarchical systems to ensure redundancy at all levels from communication frontend computers to all upper-level computers.

The system availability can be further enhanced through redundancy in communication. MicroSCADA Pro supports redundant IEC 80870-5-101/104 communication and the Parallel Redundancy Protocol (IEC 62439/PRP). Using redundant communication improves the fault tolerance and reliability of the communication system. It also enables maintenance of the system during operation.

MicroSCADA Pro offers facilities for communication diagnostic and troubleshooting purposes. All data transmitted on the communication line is recorded and can be displayed for problem analysis. This is useful especially in system testing and when building-up new projects.

SCADA/DMS regional control center for monitoring large or medium distribution networks: The system consists of separate redundant DMS and SCADA system servers with connections to primary and secondary substations as well as remote controlled switches.



System self-supervision

System self-supervision enables the system to always ensure the correct information for safe and fast operations. In addition to process data, it facilitates status information about the system, system components and connected process devices (RTUs and substation automation systems), as well as the communication network status. The modular structure and multiple parallel processes in MicroSCADA Pro ensure that the parts vital to the system are available even if there are failures in other applications. It further features parallel execution queues with defined priorities to perform all critical tasks instantly.

Cyber security

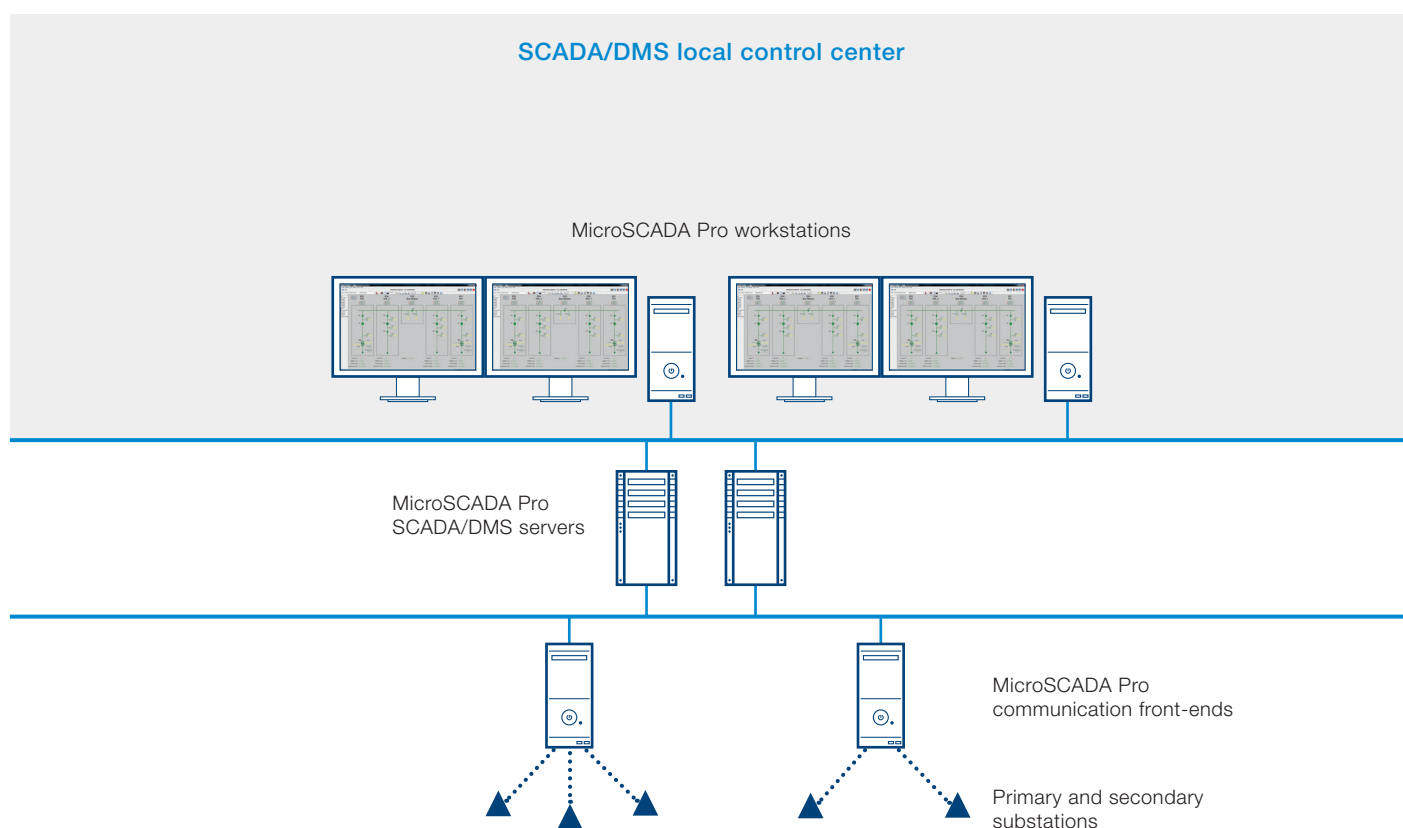
A large number of cyber security features that protect systems from abuse or vandalism are built into the MicroSCADA Pro portfolio. Features include, for example:

- user authentication and areas of responsibility (AOR)
- central account management (CAM)
- flexible user authorization
- session expiration
- communication encryption
- event and user activity logging
- reporting

MicroSCADA Pro-based systems can also be equipped with industry-standard malware and intrusion protection solutions, like virus protection and application whitelisting. Cyber security is considered during the whole lifecycle of products starting from the requirements and development phases and throughout the operation phase. New cyber security features are designed to meet and exceed requirements from standards such as IEC 62351, IEEE 1686 and NERC-C.

MicroSCADA Pro meets the stringent security needs of SCADA/DMS systems and at the same time permits information to be shared between departments and individuals within the company. Modern security technologies, such as commercial firewalls ensure continuous system security and prohibit malicious attacks and unauthorized access. For instance, the report database, which needs to be accessed by a large number of people, can be placed outside the SCADA/DMS network and protected by a firewall.

SCADA/DMS local control center for monitoring small distribution networks: The system consists of redundant, integrated SCADA/DMS system servers with connections to primary and secondary substations as well as remote controlled switches.



Easy to handle

MicroSCADA Pro's user-friendly concept helps you increase the productivity and quality of your operations over the entire life cycle of the system.

Comfortable in operation

Visual comfort is further enhanced by intuitive and consistent icons with selectable and pre-defined color schemes. This makes it easy to master the overall harmony of the various information displays in your interface, and get familiar with the system quickly. You can also easily translate your application into your preferred language using translation tools, and furthermore, the system can be operated in several languages simultaneously.

All for engineering

MicroSCADA Pro provides modern, ready-to-use engineering facilities for system integrators, consisting of a complete engineering tool set, and libraries that include control dialogs and symbols for process objects. These speed up, for instance, the configuration of busbar and network coloring. You can copy/paste objects in the display builder to efficiently create substation single line diagrams, and drag and drop objects

to automatically generate the process connections at the same time. This functionality also enables easy system extensions later on.

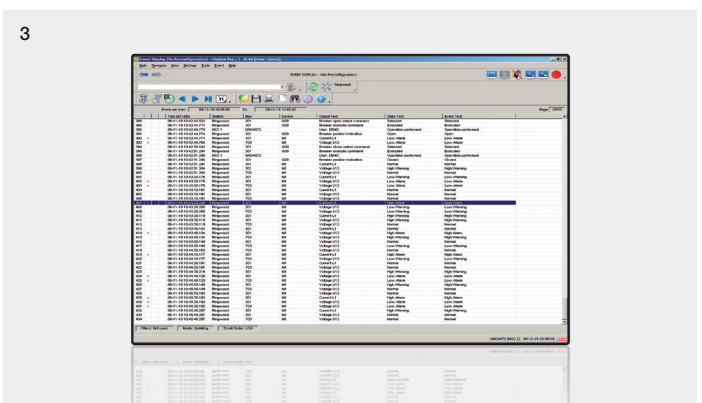
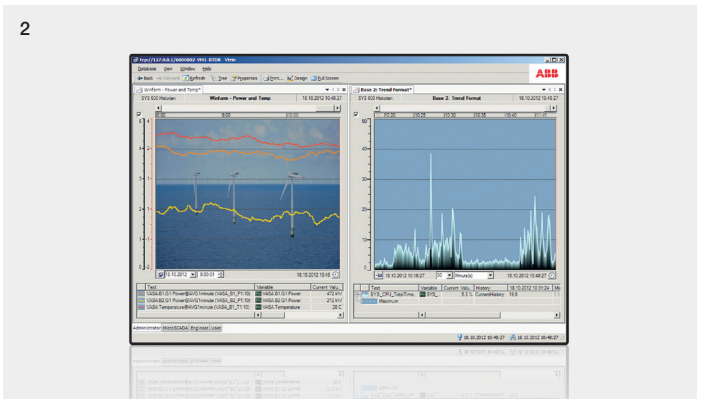
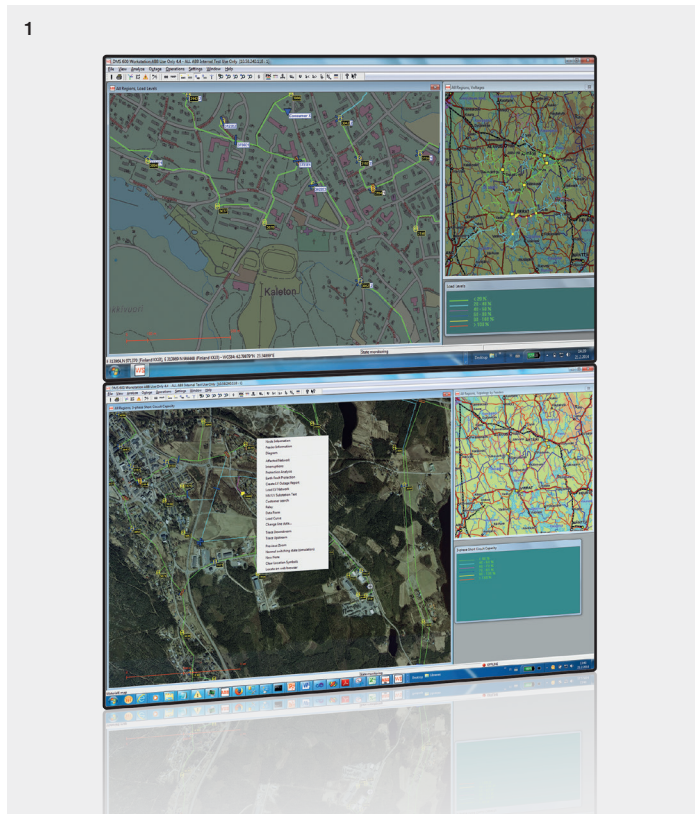
Data mirroring for hierarchical systems

A unique data mirroring functionality allows process data to be mirrored between different servers without the need for additional signal mapping. This functionality can be used for designing hierarchical systems at several levels. For instance, local SCADA/DMS systems can feed process data to regional control centers, which in turn can feed process data to one main control center covering all regions. Data mirroring can also be used to distribute processing capacity between several system servers to optimize the available computer processing capacity and its use.

Navigation

In a world map view, you can navigate along the network using efficient zoom, pan and de-cluttering functionalities to adjust the amount of information presented about different areas and objects in different situations. From the single line diagrams of substations you can easily trace feeders or

1 MicroSCADA Pro enables to view the entire network on detailed geographical maps in raster and vector formats, as well as in a schematic diagram. | **2** For greater ease-of-use, the trends display shows measured values as graphs or numerical tables. | **3** The alarm and event list gives full control of any event in the process. It features flexible column configuration and powerful filtering functions to ensure that right information is presented to the right user.



locate objects that need to be shown in the geographical view. Different colors can be used to illustrate different network voltage levels facilitating a clear overview of the network.

You can also open standardized control dialogs directly from the geographical view to make the necessary control actions safely with pre-defined interlocking. Tools for managing protection and control IEDs, and uploading disturbance recordings, can be activated from the MicroSCADA Pro system to make changes, for instance, in parameter settings or to evaluate disturbances on the substation level.

Alarms/events/trends

The views can be customized, sorted and filtered to meet the operators specific information needs enabling them to take the correct actions:

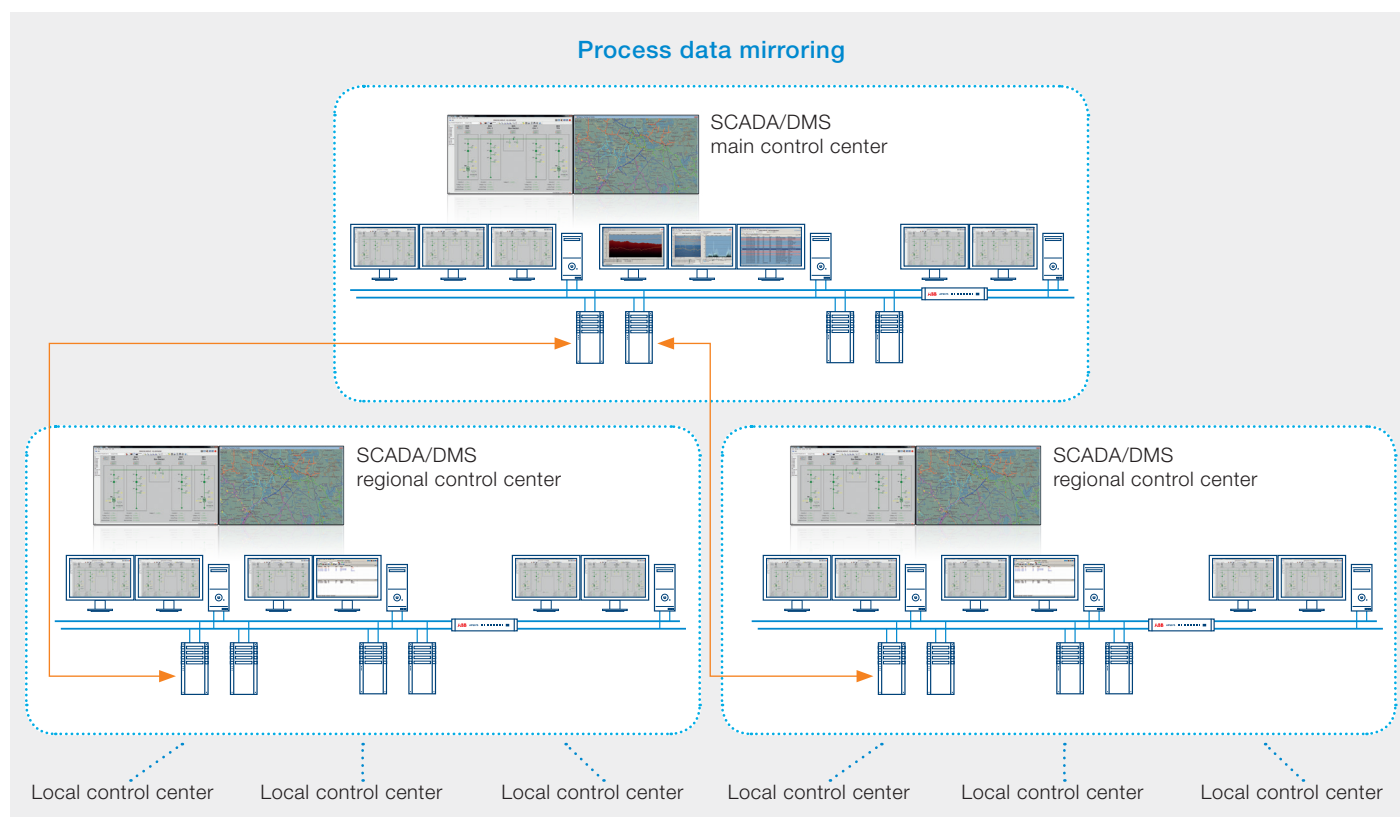
Alarm list displays the summary of the current alarm status of the supervised network, including information on alarm causes. The alarms can be classified, sorted and filtered

easily. Alarms can also be defined as summary alarms, for example alarms from a certain location or alarms having a similar functional background. Summary alarms can be additionally used in other summary alarms.

Event list supports the operator in making the right decisions and verifying that the actions taken have been successfully performed. You can also receive information about operations and activities carried out by other operators at different hierarchical levels. An operator can also add comments about events and locate the object that generated an event on the geographical map.

Trends display shows measured values as graphs or numerical tables. They can be easily created by pre-defining parameters such as measurements, time period and sampling frequency. The freely defined trends can be saved as pre-configured trends enabling you to open a certain trend picture very fast. You can use them, for instance, to analyze the root cause of a disturbance, or to make decisions on primary equipment maintenance or replacement.

Process data is mirrored between different control center levels and servers without any need for additional signal mapping.



Scalable and expandable

The modular MicroSCADA Pro is today's investment for tomorrow. its ability to adapt to your changing needs will always provide a path that takes you forward. Start with monitoring functionality, integrate additional functionality, such as control, reporting, redundancy and network topology, then plan system functionality upgrades in response to your future needs.

MicroSCADA Pro extends from substation automation to SCADA/DMS systems. By using the same software at all levels, you can reuse the substation level engineering and get the same look and feel for all your systems, which simplifies the daily work of your personnel.

A single system for multi-utilities

MicroSCADA Pro is optimized for managing the power process in utility and industrial environments. However, its generic SCADA services, like the extensive functionality for process displays, symbols and integration with various devices, allows other processes, such as oil and gas, water purification, irrigation and district heating systems to be managed by MicroSCADA Pro. This enables utilities in charge of several application areas to integrate them all into the same system.

Specially designed for the needs of industry, MicroSCADA Pro Pipeline library is a collection of pre-defined symbols and control logic for monitoring and controlling application areas

such as gas, oil, water, steam and district heating. With this library you have the ability to create an industry-specific man-machine interface, control dialogue and the database just for your needs. Pipeline library enables you to build your system effortlessly and effectively to ensure safe operations in your daily tasks.

MicroSCADA Pro is available pre-installed and tested at the ABB factory on solid state industry-grade PCs. This MicroSCADA Pro SYS600C does not contain any moving or otherwise vulnerable parts. In SCADA applications, MicroSCADA Pro SYS600C offers an excellent solid state frontend solution with support for hot standby configuration. The large number of master communication protocols enables easy connection to RTUs, gateways and other process interface units. Robust and compact, MicroSCADA Pro SYS600C is an ideal solution for harsh and demanding environments in different types of industries.

Easy upgrading

As it is open to system extensions, additional data points, substations and switching devices can easily be integrated into your existing MicroSCADA Pro system at any time without adding new software. All extensions can be executed on-line. Furthermore, solutions from compact to distributed systems are available. This means that your system server, databases, workstations, and communications front-ends can be installed either in single or multiple computers.



Future-proof investment

With MicroSCADA Pro, you can fully utilize your system's present and future potential. You get complete compatibility with earlier MicroSCADA versions so that any existing MicroSCADA system can be easily upgraded to the latest version of MicroSCADA Pro.

When this is done, all the system specific data and applications can be taken in use without re-engineering the application. In other words, your existing application will run as it is in the new product version, thus minimizing the commissioning time and testing.

Open to integration

MicroSCADA Pro allows you to easily connect devices, systems and additional applications according to your needs.

Optimized and future-proof SCADA/DMS solutions are based on seamless device and system integration. The system supports an extensive range of standard and de facto standard communication protocols designed both for remote communication with process interface units, such as RTUs, gateways and substation automation systems, and for inter-center communication. MicroSCADA Pro also utilizes TCP/IP and COM/DCOM to provide maximum openness in terms of communication. Most of the supported communication protocols are available both in master and slave modes.

Standard interfaces allow external applications to be integrated. You can, for instance, easily integrate 3rd-party systems and legacy systems through OPC or OPC UA, and still operate the network efficiently and safely. Transfer of network data can be based on DXF/DWG files or using links between relational databases.

The modular structure of MicroSCADA Pro together with open interfaces, enables flexible integration of DMS functionality. The DMS functionality can be easily integrated and used together with other SCADA systems. In the same way, you can integrate and interface SCADA functionality with DMS functionality from other suppliers.

Benefit from new technologies

MicroSCADA Pro runs on both standard PC technology and industry grade PCs, allowing you to benefit from the latest PC technology and related equipment. You will gain increased processing capacity, storage technology with high availability, as well as new communication solutions.



These features are especially useful when you have to increase system capacity, when extending the network or increasing system availability. MicroSCADA Pro supports the latest Windows® operating systems, which allows easy integration with other applications and exchange of information. AutoCAD drawings, documentation, and Excel sheets can be attached to objects, opened and edited directly via MicroSCADA Pro displays, for instance via single line diagrams. Windows® component technology is available so that Office applications can be used to automatically generate switch order directives. Additionally, remote access and mobile technologies (e.g. GPRS) let you control your power network anywhere anytime.

Global experience at your service

ABB has a long track-record of innovative solutions for power systems. As a leading supplier of SCADA/DMS technologies we can offer global presence, application knowledge and local expertise to help you maximize the reliability of your power distribution network.

Thousands of systems

We have delivered thousands of MicroSCADA Pro systems, from substation automation to SCADA/DMS systems, all over the world. The functionality and performance of MicroSCADA Pro are verified in the ABB system verification laboratory together with protection and control IEDs and other system components. This together with close cooperation with our customers over the years has made MicroSCADA Pro a proven solution for any SCADA/DMS system, including complex hierarchical systems.

World-class support

ABB is committed to supporting your systems over their whole life cycle. Migration paths with the maximum reuse of your existing solutions are available.

More than 1,000 MicroSCADA Pro engineers in over 50 local engineering centers are prepared to serve and support you in your local language with local knowledge. Additionally, our versatile standard courses and fully customized training programs ensure that your engineers and operators can fully utilize their MicroSCADA Pro system. Our training courses include extensive hands-on sessions and well-documented exercises. Also, an off-line MicroSCADA Pro simulation system can be implemented according to your requirements or using a standard demonstration application. The simulation system allows you to simulate different types of network conditions and situations, for instance prior to network reconfiguration.

As a result, your personnel will be well prepared to both handle the system during daily operation, as well as to manage any type of disturbance situation.



Technology summary:

Power distribution monitoring

- Process displays with network coloring, zooming, panning and de-cluttering
- Geographical network presentation with background maps
 - versatile navigation capabilities
 - dynamic diagrams for detailed network view
- Event, alarm and blocking lists
- Trends
- Extensive reporting facilities
 - e.g. measurement, outage and energy reports
 - availability statistics and indices, such as SAIFI (System average interruption frequency index), CAIFI (Customer average interruption frequency index), SAIDI (System average interruption duration index) and CAIDI (Customer average interruption duration index)
- Historian for high-performance data logging, refinement, analysis and reporting
- Power-quality monitoring
- Language support including several simultaneous operator-specific languages

Fault management

- Real-time network status and outage information export to external systems using XML
- Manual/automatic fault isolation and restoration
- Network modelling and connectivity analysis including manually controlled switches, line cuts and temporary earthings
- Network topology and tracing functions (upstream and downstream) with unganged switch support and switch state simulations
- Quick and accurate fault location based on fault distance calculation and/or fault indicator data
- Outage reporting and statistics for fault and maintenance outages and reclosings
- Efficient reconfiguration support for minimizing power losses
- Customer information view and telephone answering system for trouble call management and customer service
- Field crew management with GPS (Global Positioning System) location

Network analysis and operational planning

- Rapid network analysis including unbalanced (phase-wise) load flow and fault current calculations and check of protection coordination
- Motor start-up analysis
- Accurate state estimation and load forecasting for network monitoring, operations planning and contingency analysis
- Advanced operation planning for scheduled outages
- Simulation of switching actions, fault situations and historical events
- Setting of relay parameters
- Voltage and VAR Optimization (VVO) to reduce losses and keep voltages automatically in defined limits
- Demand reduction by lowering voltage level during peak power hours

Network planning and documentation

- Versatile network data management and analysis for asset management
- Map printing function for overall network documentation and field crew support
- Creating and comparing alternative plans
 - technical constraints (e.g. line overloads and voltage drops)
 - cost of losses
 - investment cost
- Network reliability analysis
 - reliability indices
 - reliability cost

System platform and architecture

- System supervision
- High performance and availability
- Uploading and evaluation of disturbance record files
- Process data mirroring for hierarchical systems
- Redundant hot standby system capability
- Solutions from compact to distributed system design
- Remote workstations – also web-based
- Standard PC hardware and Microsoft Windows® operating systems

Cyber security

- To answer to requirements from IEC 62351, IEEE 1686, NERC-CIP and more
- User authentication, authorization and session expiration based on roles
- Central and local event logging and reporting
- Central account management
- Communication encryption such as DNP 3.0 Secure Authentication, VPN
- Malware and intrusion protection
- Product hardening, patch management and incident-handling processes

Communication and interfaces

- Solution libraries for efficient integration with protection and control IEDs
- Master protocols: IEC 61850 Ed1 and Ed2, IEC 60870-5-101/103/104, IEC 61107, LON, SPA, DNP 3.0 TCP/serial, Modbus TCP/RTU, ANSI X3.28, I35/P214, RP570/1, ADLP180, etc.
- Open interfaces: OPC, OPC UA, ODBC, Application programming interfaces for application and communication extensions
- Integration with Office applications, web services/XML and IEC 61968 with CIM model 13 Cutting

Contact us

ABB Oy

Grid Automation Products

P.O. Box 614

FI-65101 Vaasa, Finland

Tel. +358 10 22 11

www.abb.com/substationautomation