One Vision
MicroSCADA X

Delivering a powerful, modern and efficient experience.

- Making you a reliable energy supplier
- Easy to handle
- Scalable and expandable
- Future proof investment
MicroSCADA X 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 crews and provide outstanding service to your customers with a single system.
Unified
A user centric product designed from the core for a modern and adaptive experience. MicroSCADA X allows you to take full control of your operations and systems with intuitive navigation and data handling within a single user interface.

Available
The browser based user interface provides seamless access from the control room to mobile devices. This system availability enables faster and more accurate utilization of system data as well as faster reaction to situations in the network.

Simplified
With MicroSCADA X, we aimed to deliver a product solution that gives you full control and simplifies interaction with your power networks.

Secure
From its initial conceptual design until its final deployment, MicroSCADA X supports the latest international cyber security standards to keep your networks, primary equipment, periodic operations and people safe and secure.
Making you a reliable energy supplier
Top 8 MicroSCADA X facts

MicroSCADA X optimizes your operations through rich functionality and features that enable significant efficiency gains, safer running and optimized scheduling of equipment.

1. Leading functionality
MicroSCADA X 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 online 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. Energy efficiency
Energy efficiency is important from both economical and environmental perspectives. MicroSCADA X 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. Volt-VAr Management 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.

3. 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 X 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.

4. Dependable operational safety
MicroSCADA X 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 X 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 X’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 X, ensure the safe and correct operation of your electrical network.
5. Network analysis & visualization for situational awareness

Using MicroSCADA X, 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 the possibility of focusing into 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 or generation can be planned and informed in advance.

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

6. Extensive reporting facilities

MicroSCADA X provides extensive reporting facilities for operational and measurement statistics to be used in numeral functions.

The following reports are available:
- Outage reports covering faults, maintenance outages and also reclosing trips. Various statistics and indices, such as SAIDI, SAIFI, CAIDI and CAIFI(*) can be created. Both MicroSCADA X and company-specific reporting tools can be used. The retrieval of customer-specific outage histories, and individual customer outage reports can be automatically generated. For a complete view of the network condition and service quality, reports for example, frequent fault locations and device failures, can be integrated into the company’s business system (ERP) or utilized in a data warehouse.
- Measurement reports that present currents, voltages and active and reactive power in both numerical and graphical formats 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 effortlessly collects, archives and enables the observer to visualize and analyse the primary process data in the form of graphs, trends and numerical reports.

(*) More details in technology summary

7. 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 X 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 X 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 X 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.

8. Optimal Investments and asset management

MicroSCADA X supports versatile asset management in SCADA/DMS system. When planning maintenance activities and component replacements, detailed data in the relational database can be utilized. MicroSCADA X 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. The network planning functionality helps to plan future network expansions, by making investments according to the technical requirements of the whole planning period.

Once network construction 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 X 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 X also facilitates support for maintenance and condition data collection in the field.

The Historian provides powerful tools for data analysis, trending and reporting that enables optimized utilization of the electrical power.
Reliable and relevant information is the basis of correct and fast decision making, as well as of safe operations. The MicroSCADA X 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 X provide refined fault data and suggest corrective actions.

With its maintenance-free, real-time database, specifically designed for SCADA/DMS applications, MicroSCADA X 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 X supports a redundant architecture to enhance availability and to increase the reliability of the system. MicroSCADA X 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 X 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 X 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.

A large number of cyber security features that protect systems from abuse or vandalism are built into the MicroSCADA X 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 X - 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 X 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.
Easy to handle

MicroSCADA X

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
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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 decluttering 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 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 X 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.
Scalable and expandable
Today’s investment for tomorrow

The modular MicroSCADA X 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 X 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 X 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 X. 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 X 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 X is available pre-installed and tested at the ABB factory on solid state industry-grade PCs. This MicroSCADA X SYS600C does not contain any moving or otherwise vulnerable parts. In SCADA applications, MicroSCADA X 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 X 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 X system at any time without adding new software. All extensions can be executed online. 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
Utilize your system’s present and future potential

With MicroSCADA X, 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 X.

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 X 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 intercenter 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 X together with open interfaces, enables flexible integration of DMS functionality. The DMS functionality can be easily integrated and used together with other SCADA systems. Integration with external GIS/ NIS system can be based on standards file formats (like DXF, DWG, SHP) or CIM model based interfaces.

Benefit from new technologies
MicroSCADA X user interface (UI) uses HTML5 allowing you to benefit from the latest technologies and components. With this new UI, mobile devices with different operating systems can easily be utilized. While in the back end, standard Windows servers and industry grade PCs can be used, standard interfaces and communication solutions are also supported. In this age of numerous data points, the system capacity can be increased, storage technology with high availability can be used and communication protocols can be appropriately added. These features are especially useful when you have to increase system functionality or interfaces or when the controlled network is growing. Additionally, remote access and mobile technologies (e.g. GPRS) let you control your power network anywhere anytime.
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 X systems, from substation automation to SCADA DMS systems, all over the world. The functionality and performance of MicroSCADA X 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 X 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 X 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 X system. Our training courses include extensive hands-on sessions and well-documented exercises. Also, an off-line MicroSCADA X 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.

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**Power distribution monitoring**

- Process displays with network coloring, zooming, panning and de-cluttering
- Geographical network presentation with background maps
- - dynamic diagrams for detailed network views
- 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), AADI (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 modeling and connectivity analysis including manually controlled switches, line cuts and temporary earthing
- Network topology and tracing functions (upstream and downstream) with 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 restorations
- 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
- Volt-Var Management to reduce losses and keep voltages automatically in defined limits
- Demand reduction by lowering voltage level during peak power hours

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**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

**Cyber security**

To answer to requirements from IEC 62351, IEEE 1688, 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

**Network planning and documentation**

- 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, IEC 61850-7-4, Modbus TCP/IP, ANSI X3.28, IEC 61850-7-411, RFC3576, RFC3577, IEC 62439, etc.
- Open Interfaces: OPC, OPC-UA, DCOM, OPC-UA programming interfaces for application and communication extensions
- Integration with Office applications, web servers/XML and CIM Model-based IEC 61968/61970

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