Substation automation products

MicroSCADA Pro
Efficient and reliable power distribution management for process industries
Top-7 reasons to choose MicroSCADA Pro for managing your plant’s power distribution

Designed and optimized for managing electrical power systems, MicroSCADA Pro offers industrial plants an ideal solution to meet today’s ever-growing challenges with regard to rising costs, better productivity, higher energy efficiency and sustainability. Having a dedicated system for the task has definite advantages. Here are some of the highlights in brief.

1. The electrical energy management functionality gives you full and continuous control of the power distribution to secure an uninterrupted power supply and distribution. It saves you from unscheduled downtime in your production processes and keeps them up and running.

2. Right timing and proactivity are musts in running an electrical energy network. MicroSCADA Pro’s electrical energy system information management produces correct and relevant information, for example, about the state of the components and energy use patterns. It also schedules electricity consumption for off-peak hours and the plant’s own generation for peak hours, when the price of purchased electricity is at its highest. All these lead to cost savings.

3. MicroSCADA Pro integrates versatile asset management support, enabling you to proactively extend the lifecycle of the power distribution network and its components. Its load forecasting function helps you optimize your energy production, purchasing and selling, as well as electrical network configuration. Other asset management benefits include improved energy efficiency through lower reactive power flow and remote support provided by ABB.

4. High reliability and availability are written all over MicroSCADA Pro. It can be delivered pre-installed in the factory in a robust and compact industrial computer that withstands even the harshest and most demanding environments. The redundant architecture boosts system availability further.

5. MicroSCADA Pro enables seamless integration with other systems through a wide range of protocols and interfaces. It allows you to easily connect and interface with devices, systems and additional applications according to your needs.

6. The modular solution is scalable and expandable, in order to meet your future needs. Existing systems can be re-used in upgrades and extensions. An existing MicroSCADA Pro system can be easily upgraded to the latest version of MicroSCADA Pro.

7. MicroSCADA Pro is easy to use, anywhere, at any time, thanks to standard user interface technology. A familiar user environment ensures safe and error-free operation. The system can be accessed from local and remote workplaces and also from mobile devices.
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 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), 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

**Network planning and documentation**
- Versatile network data management and analysis for asset management
- 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
- 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
- Event logging and reporting
- 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, IEC 60870-5-101/103/104, IEC 61107, DNP 3.0 TCP/serial, Modbus TCP/RTU, LON, SPA, ANSI X3.28, 135/P214, P570/1, ADLP180, etc.
- Slave protocols: IEC 60870-5-101/104, DNP 3.0 TCP/serial, Modbus RTU, RP570/1, ADLP180, F4F, etc.
- Ethernet redundancy according to IEC 62439/PRP
- Open interfaces: OPC, ODBC, Application programming interfaces for application and communication extensions
- Integration with Office applications
- Web services/XML
- Data concentration and signal grouping
- GPS time synchronization

**Fault management**
- Uploading and analysis of disturbance record files
- 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 reclosings
- Efficient reconfiguration support for minimizing power losses

**Network analysis and operational planning**
- Rapid network analysis
  - real-time load flow calculation based on measured or estimated values for motors and generators
  - 1-, 2- and 3-phase fault current calculation
  - protection analysis including selectivity calculation
- 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
Electrical energy is a significant raw material in many process industries. It can account for up to one-third of a plant’s variable costs, thus making up a big part of the total cost of the end product. The continuously rising electrical energy price provides yet another good reason to improve energy efficiency through better control of the electrical process.

Complete control and coordination
MicroSCADA Pro plays an important role in various power management applications, such as reactive power control, load shedding and emergency load shedding. It coordinates and sends commands to the connected IEDs (intelligent electronic devices) to adjust the parameter settings under disturbance situations or to optimize the electrical system behavior. It also enables you to monitor power losses and identify their causes.

Switch order management the intelligent way
The 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 affected production process. Through its operation planning functionality, MicroSCADA Pro allows both automatic and manual switch orders, for instance, to open and close switching devices in the distribution network. You can create switch order documents with user-defined actions based on company-specific templates.

The switching planning takes the technical constraints of the electrical network into account, such as voltage drop, disconnector breaking capacity and load level for each feeder. Furthermore, it eliminates damage to the primary equipment and the electrical network during maintenance outages by ensuring correct relay protection operation at all times.

Energy metering shows consumption
Protection and control IEDs offer energy metering functionality. Additionally, separate energy meters installed in the process can measure energy consumption. The data is stored in the MicroSCADA Pro database, allowing you to optimize the production process and make it more energy efficient.
Having relevant and correct information at the right time is the key to carrying out the right actions in your electrical energy network. MicroSCADA Pro’s information management functionality offers many advanced tools for the demanding task.

Reports tailored to your needs
MicroSCADA Pro provides extensive facilities for reporting active and reactive power to summarize the electrical energy consumption and the energy efficiency of the production process. Developed for managing information within electrical energy systems, MicroSCADA Pro provides correct and relevant information to the plant’s operational management in all situations. The template-based reports can be tailored to each customer’s specific needs.

Additional analysis tools are available for evaluating the energy use patterns of all processes and thus identifying areas for improvement. The tools enable major cost savings in all industries, and especially in very energy-intensive processes.

Opportunities for cost reduction are greatest when both electricity consumption and prices vary over time, which is common in the process industries and in an open electricity market environment. The analysis tools clearly indicate the cost of electricity and provide support to schedule electricity consumption for off-peak hours. They enable coordination of electricity purchases and sales with the plant’s own generation capacity, scheduling this generation for peak hours to provide additional cost savings.

Monitoring reveals the condition of components
The intelligent protection and control IEDs provide valuable information about the condition of components, such as transformers, and the whole electrical system. The data is presented for the user and maintenance personnel via the MicroSCADA Pro user interface. For instance, transformer temperatures can be directly shown on the process display together with other related values such as power, cosφ, etc.

Faults easily analyzed and managed
Easy access to an event list and disturbance information allows you to analyze different types of faults. Advanced event logging and analysis, including filtering, will help you find exactly the information you need, for instance, to optimize the selectivity scheme of your protection equipment.

With accurate time synchronization and time-tagging of events in the protection and control IEDs, MicroSCADA Pro creates a strong basis for accurate disturbance analysis. You can utilize this data for analyzing the process behavior and taking corrective measures in the primary equipment. In electrical energy systems, MicroSCADA Pro allows you to directly access parameter settings and efficiently handle disturbance information.

The dynamic busbar coloring function provides you with quick access to information for instance about the powered, un-powered and earthed parts of the busbar as well as voltage drops. Also, alarming objects are visualized. The busbar coloring combined with object control simulation of MicroSCADA Pro ensures safe and correct operation of your primary equipment.
A system featuring versatile asset management support enables you to extend the lifecycle of your power distribution network and its components. It all adds up to lower maintenance costs and allows you to make the most of your assets.

**Asset management for the whole life cycle**

MicroSCADA Pro integrates versatile asset management support during the whole network life cycle. It collects and receives relevant data from protection and control IEDs as well as detailed maintenance and component data, which is stored in the real-time database. All the reports and data can be used when planning maintenance activities and component replacements – also proactively.

The network planning functionality helps you plan future electrical power system 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 power network construction according to the selected plan has started, the network model can be moved to the real-time database of your electrical power distribution system. You can also start with the network database for off-line network planning and add an online electrical power distribution system later using your existing network database.

**Time to buy or sell electrical energy?**

MicroSCADA Pro’s load forecasting function helps you optimize your energy production, purchasing and selling, as well as electrical network configuration. Knowing power production and consumption in real time makes it possible to control the plant-wide energy demand and achieve a balance between production and consumption. Additionally, the network reconfiguration function helps you find the optimum state of the electrical network to minimize production losses.

**More energy efficiency through less reactive power**

One way to improve energy efficiency is to reduce the reactive power flow in the power distribution system. Electrical utilities often apply expensive sanctions if the agreed limits concerning reactive power are not followed, for example, if a plant feeds reactive power to the distribution system of the supplying power utility, or uses more power than has been agreed upon.

MicroSCADA Pro’s reactive power control functionality monitors and keeps the reactive power flow within pre-defined limits in a selected point in the plant distribution network.

Measurement reports present currents, voltages, and active and reactive power in both numerical and graphical formats as, for instance, five-minute or hourly average values. However, with MicroSCADA Pro, it is possible to design special applications for even better power control. Such applications let you set boundaries for the permitted amount of reactive power while MicroSCADA Pro continuously monitors the levels, allowing you to take necessary actions in time.

**Remote support also available**

If you need support running the MicroSCADA Pro system, ABB specialists can access it through a remote connection and provide you with help in analyzing the network behavior. The remote connection is always set up based on your security requirements and keeping cyber security in mind.

The remote support service also allows you to more flexibly organize maintenance operations.
Providing full and continuous control over the network, MicroSCADA Pro ensures uninterrupted power supply and distribution. It all results in an uninterrupted primary process and dependable operational safety.

Safety comes first
MicroSCADA Pro prevents simultaneous operations of primary electrical equipment. It reserves the device (circuit breaker) and verifies whether the selected object (circuit breaker or contactor) can be operated before executing the Open or Close command. Additionally, switchgear interlocking schemes prevent dangerous operations that might otherwise damage the electrical equipment. Only authorized operators can modify the interlocking schemes.

Common safety procedures require that all mechanical or electrical equipment must be locked out and tagged out before being worked on. MicroSCADA Pro’s lock-out/tag-out function meets all safety regulations. It ensures that control of objects in the application or other operations are properly secured prior to and during, for example, maintenance or service work. An application object in a tag-out state can easily be identified on the HMI by the intuitive tag-out display symbol.

Using MicroSCADA Pro minimizes the risk of personnel injuries when performing control actions of primary equipment, such as circuit breakers. MicroSCADA Pro also prevents operation of primary equipment during maintenance, thus ensuring safety. Notification of ongoing maintenance work can be shown on the system displays and in the control dialog to inform operators accordingly. Remote operation keeps the operator away from possible hazards related to chemicals, heat, dust, noise, moisture, moving parts, etc.

A robust and compact industrial computer
The compact system, SYS 600C provides proven MicroSCADA Pro functionality for real-time monitoring and control of electricity distribution. Robust and compact, it offers an ideal solution for harsh and demanding environments in industrial plants.

The computer has no rotating or moving parts such as hard disks or fans. It operates in a wide temperature range and withstands humidity, vibrations and shocks. It is type-tested according to IEEE 11613 and IEC 61850-3. The product can also be equipped with redundant power supplies to increase availability even further.

Redundancy ensures availability
Constant system availability is vital. MicroSCADA Pro supports redundant architecture to enhance availability and increase system reliability. It can work in a redundant mode with two separate servers, one hosting the main application and the other one hosting the back-up application. All data is simultaneously updated in both servers; if the main server fails, the back-up one will take over. This redundancy concept can be also applied in distributed and hierarchical systems to ensure redundancy at all levels from communication front-ends to all upper-level servers.

System availability can be further enhanced through redundancy in communication. MicroSCADA Pro supports redundant communication according to the Parallel Redundancy Protocol IEC 62439/PRP as defined in the IEC 61850 standard. Using redundant communication improves the fault tolerance and reliability of the communication system. It also enables maintenance of the system during operation.

Advanced system self-supervision
System self-supervision enables the system to always ensure correct information for safe and fast operation. In addition to process data, it facilitates status information about the system, system components and connected process devices (protection and control IEDs, PLCs, etc.), 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.

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
- flexible user authorization
- session expiration
- communication encryption
- event logging
- reporting

MicrosSCADA Pro-based systems can also be 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 industrial control systems and, at the same time, permits information to be shared between departments and individuals within the company. All users of the system have their own profile that specifies access rights and various user-specific preferences. This ensures that all operations are made with the proper knowledge and authority and that the user interface supports the task in question. Modern security technologies, such as commercial firewalls, ensure continuous system security and prohibit malicious attacks and unauthorized access.

Unique and flexible system architecture capability
A MicroSCADA Pro-based system can be built in a distributed and hierarchical architecture to form independent sub-systems which further improve availability. This solution also improves reliability as the system can be designed according to various performance and capacity needs. For example, communication front-ends can be installed in dedicated servers, separated from the main servers. The hierarchical architecture is based on a process data mirroring function that mirrors process data from one system to another. The process data is mirrored between different control center levels and servers without any need for additional signal mapping.

Support for a wide range of communication protocols
In process industries, there is often a need for dedicated systems for process automation and managing power distribution. These two systems must work independently from each other with their dedicated tasks, and yet they need to be tightly and seamlessly integrated to share data such as alarms and events. MicroSCADA Pro allows you to easily connect and interface with devices, systems and additional applications according to your needs.

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 protection and control IEDs and gateways, and for inter-center communication. Most of the supported communication protocols are available both in master and slave modes.

Open to integration
MicroSCADA Pro’s powerful interfaces enable efficient integration and mapping of any process data to parallel systems. You can, for instance, easily integrate process automation systems, 3rd-party systems and legacy systems through an OPC interface and still operate the network efficiently and safely.

For a different kind of reporting, MicroSCADA Pro offers also SQL export of any data from the database to, for example, Excel or your own reporting tools.

MicroSCADA Pro provides all the functionality needed for managing the plant’s power distribution. It helps to make significant savings in energy costs through optimization of your energy production, purchasing and selling. It also communicates with the plant’s control system to ensure that all necessary information about the power distribution process is available for the process control system operators.
MicroSCADA Pro is easy to expand and upgrade according to the changing needs in the plant. Existing systems can be re-used, which makes upgrades and extensions easy and efficient.

High system scalability
The MicroSCADA Pro system is highly scalable, and the same software can be used for low-end single systems up to fully fledged distributed monitoring and control systems. This means that your system server, databases, workstations and communication front-ends can be installed either in single or multiple computers.

Expandable with new functions on-line
Thanks to its modular structure, MicroSCADA Pro can be expanded with new functionalities as new requirements for electrical power distribution evolve. MicroSCADA Pro is open to system extensions, so additional data points and switching devices can easily be integrated into your existing system at any time without adding new software. Extensions can be executed on-line which will save time and money when expanding the system.

Easy upgrade to a new version
MicroSCADA Pro features complete backwards compatibility. Therefore any existing MicroSCADA Pro system can be easily upgraded to the latest version. This is possible due to the clear separation of the MicroSCADA Pro software from your system-specific application data.

In an upgrade, all the system-specific data and the application can be fully re-used without re-engineering. This means that your existing application will run as it is in the new product version. The re-use of the data minimizes the need for tests, which significantly shortens the engineering and commissioning time.
Advanced simulation and planning tools make it possible to analyze the state of the network, optimize its usage and achieve savings in maintenance costs.

A fast and visual overview of the network
MicroSCADA Pro provides you with a fast overview of the network with all its lines, switches, transformers, motors, substations, etc. with the zooming, panning and de-cluttering functions. It analyzes the network connectivity and shows the network status with dynamic line coloring. It colors looped networks including, for example, generator feeds, de-energized parts, feeding main transformers or feeders. Also, there is upstream and downstream tracing for current direction analysis.

Analyses reveal bottlenecks and problems
MicroSCADA Pro includes network analysis algorithms that work in both radial and meshed networks, and support distributed generation in medium and low voltage networks. Network analysis enables you to check the network state and find out the location of possible bottlenecks or problem areas. It includes load flow calculation in real time with the possibility to use measured real-time values for motors and generators.

In addition, simulated network switching states or planned network changes can be used to analyze fault situations or make worst-case analyses. Motors in the start-up state and the status of capacitors can be included in the studies. The results shown include numerical data for line sections and network coloring, including loading rates for cables and transformers.

1-, 2- and 3-phase short circuit currents can be calculated, and network and switchgear short circuit capacity can be checked with short circuit calculations. Also, operation of the protection scheme in any network situation can be checked. This includes checks on detection ability, short circuit capacity and protection selectivity.

Network reinforcement planning made easy
The network planning tool enables you to easily plan network changes and compare alternatives regarding technical acceptability, cost of losses and investment costs for new equipment. The created alternatives can be stored in the database to be reanalyzed or fine-tuned.

Each plan includes costs of investment and losses from the entire study period in net present value (NPV), a material report, network reliability indices SAIDI and SAIFI (or T-SAIDI and T-SAIFI) as well as an estimated reliability cost.
MicroSCADA Pro features standard user interface technology, making operation easy, safe and error-free.

A familiar user environment
The user interface and user interaction methods are based on de facto standard technology and solutions such as Microsoft Windows® user interface methodology and standard keyboard, graphics and mouse solutions. A familiar environment promotes safe, error-free and intuitive operations.

Tested for maximum usability
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. Integration of operational descriptions and instructions in the process display together with real-time process information adds to efficient and safe system operation.

You can easily translate your application into your preferred language using translation tools, and, furthermore, the system can be operated in several languages simultaneously.

The user interface has been tested in usability laboratories and at customer sites in order to ensure maximum usability. In this way the user interface supports the user in his tasks and allows the user to perform the task with high efficiency and effectiveness.

Accessible regardless of time or place
The system can be accessed from local and remote workplaces and also from mobile devices enabling system access regardless of time and place. This provides high flexibility for operators.

Learn to manage your system in any situation
ABB’s versatile standard course offering and fully customized training programs enable your engineers and operators to fully utilize the MicroSCADA Pro system. The training courses include extensive hands-on sessions and well-documented exercises. As a result, your personnel will be well prepared both for handling the system in daily operation, as well as for managing any type of disturbance situation.