Symphony Plus
Total plant automation for the power and water industries
What defines great performance? Dependable power delivery, rapid response to load swings, asset availability, efficient energy production, reliable operations, repeatable design, secure networks and data, reduced carbon footprint, extended service life, on-time and on-budget project delivery, regulatory compliance and plant optimization to name but a few.

Great performance is achieved when all the plant’s objectives are consistently met, competitive advantages maintained, and profitable growth sustained.

What is at the heart of every plant’s great performance? The answer is clear: an automation system that integrates all areas of the plant for each individual in a simple, scalable, seamless and secure manner.
Introducing Symphony Plus
Total plant automation for the power and water industries

Symphony™ Plus represents the new generation of ABB’s widely acclaimed Symphony family of distributed control systems (DCS) – the most widely used DCS in the power generation and water industries. In all, there are more than 6,000 Symphony DCS installations in operation all over the world, with more than 4,000 in power and water applications.

For more than 30 years, ABB has evolved the Symphony family, ensuring that each new generation enhances its predecessors and is backwardly compatible with them - all in accordance with our long-held policy of ‘Evolution without obsolescence.’ With Symphony Plus, ABB is taking the Symphony success story to the next level. Like its predecessors, Symphony Plus is designed to meet the requirements of plant owners in all geographic markets and for all types of power generation and water plants. It meets the performance objectives of various users – in operations, maintenance, engineering, IT and management. And it targets the key focus areas of the power and water industries - plant productivity, energy efficiency, operation security, plant safety and cost of ownership.

Symphony Plus - simple, scalable, seamless and secure

<table>
<thead>
<tr>
<th>Simple</th>
<th>Scalable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple system architecture serves the power and water industries’ diverse plant fleet.</td>
<td>Scalable control platform to automate all areas within the plant.</td>
</tr>
<tr>
<td>Simple workflow automation to engineer, configure, secure, commission and maintain the entire system.</td>
<td>Scalable and flexible system architecture to support small, large and multi-system configurations.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Seamless</th>
<th>Secure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seamless integration of all plant devices and systems - automation and electrical, business and maintenance.</td>
<td>Secure and reliable control environment to prevent unauthorized access.</td>
</tr>
<tr>
<td>Seamless and incremental integration of new products, technologies and functionality.</td>
<td>Secures previous investments in control system assets and intellectual property.</td>
</tr>
</tbody>
</table>
Simple, scalable, seamless and secure
A simple and flexible system architecture supports the power and water industries’ diverse portfolio
Inherent system security ensures plant integrity and confidentiality

Transforming data into actionable business decisions sustains profitable growth

Complete plant information drives effective operations

Seamless life cycle management protects capital and intellectual investments

A unified engineering workbench simplifies design and maintenance

A single control and I/O platform achieves total plant automation

Comprehensive electrical and device integration improves plant visibility
Complete plant information drives effective operations

Operator effectiveness is fundamental to plant performance. With fewer plant operators, a generational shift in the operator workforce, and increasing complexity of plant operations, this is becoming ever more challenging, but not insurmountable. Symphony Plus, with its intuitive, easy-to-use human machine interface (HMI), leads operators to greater awareness, faster response and better decisions.

**Designed for high performance**
S+ Operations is a Windows-based, Web-enabled human machine interface providing outstanding information integration and user navigation within a standard Windows environment. Based on industry standards, S+ Operations provides users with detailed, well-arranged process overview displays to present better situation awareness and recognition of abnormal conditions.

Direct access navigation to information-rich control faceplates, superior trending capabilities according to VDI/VDE 3699 Part 4, EEMUA 191-based alarm and events, and a comprehensive range of reports simplify operator interaction for more reliable control.

**Integrated operations**
S+ Operations provides users with a broader view of the plant by integrating data from all plant areas and systems, including turbine control, electrical balance of plant, and remote SCADA systems. Through its open architecture, S+ Operations seamlessly consolidates and rationalizes plant data to improve operator response to changing conditions, resulting in improved plant safety and uptime.

Direct and seamless cross-navigation between operation displays and engineering documentation provides users with the ability to easily troubleshoot any control loop or process area.

**Improved operator competence**
S+ Operations, in conjunction with ABB power and water simulator offerings, supports advanced training and the proficiency enhancement of operators. By training on the exact operator environment (graphic and control logic), plant operators learn to master the process and improve decision making in a safe and realistic virtual plant environment.

**Alarm management**
S+ Operations advanced alarm management functions provide all necessary instruments for efficient and stringent alarm management. The EEMUA 191-compliant alarm analysis tools help users categorize occurring alarms, while the integrated alarm management system keeps operators focused.

**Flexible, scalable, fault-tolerant design**
S+ Operations unique architecture provides flexible and scalable configurations for small, medium and large power or water applications. S+ Operations provides server-less, server-based and remote thin client solutions. Moving from a serverless to server-based architecture provides the flexibility to adapt to evolving needs.

A high degree of node redundancy, with multiple servers operating in parallel and synchronized in real time, delivers multiple degrees of fault tolerance, making S+ Operations a solution suitable for the most demanding and mission-critical applications.
To achieve a sustainable competitive advantage, utilities must quickly adapt to changing process and business conditions. This makes the timely collection, transformation and distribution of reliable information a significant issue. Each individual has unique requirements and viewing preferences for information. In S+ Operations, historical, process and business data is collected from different sources and stored securely. Transforming data into meaningful information, S+ Operations presents pertinent, easy-to-understand information to all levels of the organization.

**Intuitive presentation**

S+ Operations desktop displays give managers concise, enterprise-wide information in familiar Microsoft Office formats. A discrete tag ticker, continuously showing key performance indicators (KPI), can be supplemented with a trend display when more information is required. These displays seamlessly present both real-time and historical trend data, alarms and events.

**Flexible reports**

S+ Operations’ reports are easily adapted to the specific requirements of a plant, including freely customized reports. For efficient power or water plant monitoring, S+ Operations includes ready-made templates for:

- Instantaneous value reports
- Sequence-of-events (SOE) reports
- Alarm messages, status messages, operator interventions
- Filtering by priority, plant area, etc
- Operation reports (shift, daily, monthly, yearly)
- Status reports (plant snapshots)
- Trip reports
- Maintenance reports

Versatile scheduling options, which provide automatic triggers for key actions, support all plant personnel with both standard procedures and exception handling.

**Performance monitoring**

S+ Operations assesses the performance of power or water plants. Comparing actual performance to expected performance at the current load, ambient conditions and operation mode, S+ Operations monitors short and long-term equipment degradation. Performance summary displays and detailed plant component displays show how current operating conditions affect the plant heat rate and plant fuel costs.

**Streamlined maintenance**

Asset performance alarms make operators aware of degrading performance. S+ Operations’ integration with maintenance management systems (CMMS), such as SAP PM, allows for easy communication with and navigation to asset-specific maintenance activities. These features reduce the plant’s support costs by moving toward condition-based maintenance and streamlining operation and maintenance work interactions.

Specialized and highly functional interfaces for application development and integration make even the most demanding tasks as simple as possible. Strong reporting features with scheduling are easy to configure using standard Microsoft Excel functions.
A unified engineering workbench simplifies design and maintenance

Short time to production is the key measure for engineering efficiency. Symphony Plus provides a world-class integrated engineering environment.

S+ Engineering offers all the functionality necessary to engineer, configure, administrate, secure, commission and maintain any Symphony Plus component - from field and electrical devices to control, I/O, operator workplace and gateway configuration.

S+ Engineering supports efficient engineering thanks to seamless tool integration, powerful workflow automation, and comprehensive bulk import/export functions. Integrated version control, version comparison and rollback framework offer progress tracking and significantly reduce commissioning time. Using intelligent bulk interfaces, S+ Engineering allows for full control of engineering data consistency in each phase of the project life cycle.

Changes in the runtime environment are deployed smoothly and securely. The strict separation of engineering and runtime enables offline engineering, makes the engineering workflow flexible, and integrates externally delivered lots without process interruption.

S+ Engineering allows for easy reuse and upgrade of previous generation Symphony control applications. In addition, the extensive reuse concept of S+ Engineering allows users to optimize plant design with field-proven solutions based on ABB’s in-depth experience in the power and water industries.

During commissioning, S+ Engineering’s multi-user and remote access capabilities are critical to on-time delivery. Especially during hot commissioning and project finalization, the ability of the engineer to commission and de-bug from loop level down to controller base functionalities ensures timely and on-budget startup.

All relevant documents are kept current with the strict forward documentation within S+ Engineering. In addition S+ Engineering audit trail allows for easy certification of any control application. For example, project documentation in accordance with VGB requirements can be generated by the specific documentation features of S+ Engineering.
ABB embedded intellectual know-how optimizes system design

Based on more than 125 years of power and water expertise and application innovation, ABB’s embedded intellectual know-how will optimize performance, improve reliability, enhance efficiency and minimize environmental impact throughout the plant’s life cycle.

ABB’s comprehensive expertise has been successfully deployed in thousands of demanding applications in the power generation and water industries. From water treatment to water transfer, renewable power to fossil fuels, and from simple cycle to combined cycle power plants, ABB is the leading expert in the power and water industries.

For each plant type, we combine in-depth process knowledge with extensive electrical and automation know-how to provide a best-in-class solution, including:

**Boiler protection / Burner management systems**
Our boiler protection and burner management system solutions are dedicated to ensuring boiler furnace safety and fuel shutdown. Strictly complying with industry standards and governing agencies, ABB works with customers to improve boiler safety, particularly during the most hazardous operating phases of startup and low-load operation. Integration of ABB flame scanners and detectors with Symphony Plus leads to an optimized boiler control solution.

**Turbine control**
ABB draws on more than 40 years of experience with turbine control systems and an installed base of some 2,000 installations to deliver best-in-class turbine control solutions. Our field-proven software applications and turbine-specific I/O modules can be combined to meet special customer requirements. We develop and supply complete solutions for instrumentation, open-loop and closed-loop control, including electrical equipment for steam, gas, and hydropower turbines.

**Electrical balance of plant**
ABB has the advanced technologies and engineering expertise to deliver turnkey system integration of electrical balance of plant (EBoP) for power and water plants. Through our portfolio of power products, systems and application knowledge, we assist our customers to build and maintain cost-effective solutions safely and efficiently.

**Water technologies**
ABB has been active in the water industry for more than 40 years and has extensive experience in a number of applications such as desalination (reverse osmosis, multi-stage flash and multiple-effect distillation), water transfer, wastewater pumping, seawater intake, irrigation and district cooling. We combine in-house technology with process know-how to develop complete and integrated solutions.

**Plant optimization**
ABB provides a suite of plant optimization solutions that enable power and water plants to run at maximum efficiency while balancing the trade-off between revenues, life cycle costs and emissions. ABB’s OPTIMAX® optimization suite consists of decision-support tools that continuously assess plant conditions and provide root cause analysis in case of deviations. OPTIMAX advanced process control (APC) solutions reduce emissions by optimizing combustion, shortening boiler startup times and improving coordinated boiler-turbine control and unit frequency response.
A single control and I/O platform achieves total plant automation

A comprehensive suite of standards-based control hardware and software meets the requirements for total plant control. S+ Control is complemented with a full line of I/O interfaces to meet all plant requirements.

**S+ Control and I/O delivers powerful, versatile and scalable solutions**
- Easy design of complex control strategies using an extensive library of pre-defined control algorithms and S+ Engineering graphical design tools
- Flexible DIN rail mounting for use in a wide range of installations
- Provides predictable and risk-free porting of previously installed control execution environment
- Comprehensive I/O capability including HART and fieldbus devices support, intrinsically safe I/O options, and SIL-rated I/O modules
- Sequence of events (SOE) products provide for one millisecond timestamp resolution across the entire Symphony Plus system

**S+ Turbine provides an integrated solution for the turbine island**
- Provides a single DCS solution for all turbine types, OEMs and sizes
- Fully integrated turbine control components provide greater exchange of process and diagnostic data
- Comprehensive family of dedicated turbine I/O modules including SIL 3 overspeed protection, valve actuator interface, auto synchronization, and condition monitoring
- Analyst software to monitor and protect rotating machinery assets

**Complete Safety Instrumented System (SIS) solution protects boiler and plant**
- TÜV certified safety system includes SIL 3 rated field instruments, controllers, I/O modules, valve positioners and actuators
- Delivered and supported in accordance with the strictest standards, including IEC 61508, IEC 61511, EN 954, NFPA 85 and NFPA 72
- Includes a wide range of field-proven safety application libraries such as burner management and boiler protection (BMS)
- TÜV certified ABB Safety Execution Centers engineer and deliver SIS compliant systems
Symphony Plus’ secure and open architecture supports complete and seamless integration of a wide variety of devices and systems, providing a single window into the entire plant. Complete integration of systems, intelligent devices and fieldbus technology reduces installation costs and enhances maintenance capabilities.

**Electrical integration extends control room operations to electrical systems**
- Control and supervision of motor control centers, switchgear, transformers, excitation systems and protective relays
- Use of open standard protocols such as IEC 61850 and Modbus TCP allows for easy integration of electrical devices with control and operations
- Single window access to process and electrical overview displays, alarm and events, trend data and reports improves operation reliability

**Device integration**
- Major fieldbuses are fully supported, including PROFIBUS DP (up to DP-V2 level) and HART
- Device management functions simplify configuration, installation, operation and maintenance of all field devices
- Provides greater visibility to device information including extended process variables and diagnostic data
- Reduces installation costs and enhances maintenance capabilities

**Combustion instruments optimize the combustion process to reduce harmful emissions**
- Combustion instruments ensure the safety of the combustion processes, increase efficiency and reduce emissions
- Patented non-extractive monitoring instruments provide reliable and accurate real-time measurement of unburned carbon in ash
- Broad selection of flame scanners and flame analysis for all fuel and firing types enable compliance with emission standards and codes

**Asset management**
- Automatic monitoring of assets at all plant levels, from field devices to plant equipment and systems
- Plant-wide adoption of proactive and predictive maintenance strategies
- Consistent reporting of plant asset health
- Reduces time to repair through optimized work processes
Inherent system security ensures plant integrity and confidentiality

ABB understands the need to maintain a secure and reliable control environment with minimal expenditure of time and effort. ABB actively participates on several major control system security standards committees including FERC, NERC, ISA, IEC and ISO. These committees provide security guidance in the form of system documentation and guidelines for every phase of the product and project development process. With this in mind, Symphony Plus has been designed with inherent security features.

Users and user roles
The Symphony Plus security model is based on IEC 62351-8. It defines the rights and roles of a user or user groups in the Symphony Plus system with definable granularity.

Authorization
Symphony Plus security features control a user’s authority to perform various operations on TAGs. Authority parameters include:
- The user’s credentials
- The log-in
- The user-desired operation

Access control
Basic access to the system is controlled according to the user’s credentials entered during logon or log-over. Restrictions may be placed on password length, complexity, age and reuse.

Log-over
The log-over function enables a fast and temporary switch between users in a running workplace. The log-over changes the rights and user roles but keeps an open view of the process by retaining the workplace and its present contents, supporting automatic revert to the previous user.

Configuration change management
Symphony Plus supports configuration change management by defining each version area using three states of configuration data: design, release and running. These states can be archived and easily compared for differences. In addition, Symphony Plus maintains all used software and software versions for easy update management and comparison.

Audit trail
Symphony Plus maintains an audit trail of changes made to process settings and configurations. In addition, all system and security events are collected in the Symphony Plus event management system.

Archive
The system archive function supports permanent offline storage for historical data collected in property, message and report logs, as well as the operator workplace alarm and event message buffer, including audit trail messages. The archiving mechanism copies the contents of selected logs to a designated archive media.

System monitoring and diagnostics
Symphony Plus provides comprehensive diagnostic functions for determining the health of the system infrastructure - controllers, I/O modules, switches, routers, firewalls, etc. All events from these devices are collected, and alarms can be generated.

System hardening
System hardening can be deployed centrally from the administration console; this includes operating system hardening, application hardening, host firewall configuration, and antivirus. This applies to servers and workstations as well as supported network equipment.

Disaster recovery
Numerous features of Symphony Plus assist in the recovery of a system failure. Total and selective ‘backup and restores’ are possible through the system administration features. System nodes can be replaced easily by deploying all original software and configuration data in the new replacement node. Network equipment, such as routers and switches, can be backed up and loaded through the system administration features.

Patch and service pack management
ABB evaluates security updates from third-party software such as Microsoft, McAfee, Adobe and others with respect to relevance to, and compatibility with, Symphony Plus. All relevant updates are validated within seven days.
ABB recognizes that plant owners make a significant capital investment in their ABB control systems. Plant and corporate personnel build on that investment by enhancing control system components, tuning and refining control application code, and developing a workforce with the knowledge and resources to operate and maintain the plant and control system.

These elements combine to form a total investment that plant owners expect to preserve throughout the lifespan of their plants.

Evolution and investment protection has always been the cornerstone of ABB’s product life cycle strategy. ABB has a long and established history of developing new products in a way that allows customers to adopt them at their own pace, with minimum risk to operations and with maximum investment protection.

In practical terms, for ABB customers, this makes it possible to:
- Utilize existing Symphony control system hardware assets
- Continue to use their existing knowledge base without retraining
- Expand existing systems with new products that optimize the plant process and improve operational effectiveness
- Evolve to the latest control system technologies while retaining their most valuable controller and HMI application software and engineering tools
- Integrate new technologies specifically developed to fulfill power and water plant requirements

ABB’s ‘Evolution without obsolescence’ policy states that no product will be removed from active sale until a compatible, equivalent or superior product is available. The strategy of functional backward compatibility assures the control application can be ported without conversion to a new hardware platform.

Thanks to ABB’s life cycle policy, plant owners have the ability to extend the useful life of their systems and the profitability of their investments through evolution, avoiding the rip-and-replace approach. The advantage of evolution can be translated into a risk level at least three times lower, and total cost savings of up to 80 percent lower, than installing a new control system based on rip-and-replace.

ABB’s software management program, Automation Sentinel, is an important tool for getting the most value out of an ABB control system investment. This innovative program helps keep automation software up-to-date, and provides an incremental and cost-effective evolutionary path to the latest Symphony Plus software.

Through Automation Sentinel, customers can:
- Manage life cycle costs: Plan and budget their evolutionary path forward with predictable costs
- Get the most out of the installed system: Extended technical phone support and services
- Upgrade according to their own timetable

ABB’s life cycle commitment is supported by ABB aftermarket services. ABB can provide a DCS life cycle evaluation, plant efficiency audit, and process and safety improvement audits in order to improve the plant’s operational excellence. ABB has successfully and cost-effectively evolved power and water plant control systems for more than 30 years.
ABB has spent more than 125 years developing service and maintenance solutions that are geared specifically to the power and water industries. We offer a full portfolio of life cycle management services, from repairs and spare parts to Full Service® contracts and complete plant upgrades and equipment retrofits. ABB services are available for each phase of the plant life cycle, from first concept to decommissioning.

- Concept
- Front-end engineering
- Detail engineering
- Equipment selection and procurement
- Construction
- Commissioning
- Startup
- Operation
- Decommissioning

**Project management**
ABB’s certified project managers take care of all relevant issues during an automation project – a competent partner for the entire ABB contribution.

**Asset management**
ABB provides life cycle assessments of critical plant equipment, including component reliability calculation analysis. Our assessments equip power generators with the information required to make cost-effective, long-term decisions on overall system operation and maintenance. ABB service contracts guarantee that our experts are only a phone call away.

**Environmental services**
ABB provides benchmark recycling solutions for defective parts and systems. In accordance with all applicable regulations and requirements, ABB takes care of the proper disposal or recycling of installed or returned parts.
Training
A skilled and efficient workforce is a plant's most valuable asset. We can increase workforce skill levels and knowledge so that a more productive response to system and process challenges is achieved. Our training programs for engineers, programmers, maintenance and operations personnel provide comprehensive and up-to-date technical expertise in products, processes and technology advances. Training is available on-site at ABB training facilities or locally at your plant.

Upgrades and retrofits
Our upgrade and retrofit programs focus on integrating all system and control components to provide operational improvements. ABB has the expertise to develop and deliver measurable results to your ABB products and systems.

Evolution
The ABB life cycle management model provides the framework for evolutionary services that maximize availability and performance throughout the life cycle of ABB equipment. The model enables ABB to provide optimal support to end users and a smooth transition to new software and equipment when a product reaches the end of its operating life. Throughout the product life cycle, ABB continues to provide solutions that expand the functionality and extend the life cycle of the equipment, while maintaining the customer's core investment.

Diagnosis and consulting
ABB experts have a profound knowledge of global best practices in a wide range of business and engineering operations. We develop and implement service solutions based on industry-specific technologies and competencies to help customers improve overall equipment effectiveness and return on investment.

Support and remote services
Advanced remote technology delivers higher service value and performance. ABB's portfolio of remote services provides assistance for a wide range of support needs, from telephone and Web support to direct and secure system interaction. ABB remote services offer real-time access to technical specialists globally, service experts 24 hours day, and direct connections to plants from ABB facilities for system and process diagnostics and checks.

Spare parts and repair services
ABB's global logistics network provides fast delivery of parts and repair services throughout the world, 24 hours a day, to ensure components are delivered efficiently and promptly to your site.

Troubleshooting
ABB engineers are trained and certified to provide expert knowledge for root cause analysis and troubleshooting to bring the plant quickly back to normal operation again.

Maintenance
Our local service teams are backed by global resources, with more than 10,000 professionals ready to provide a fast and efficient response to service needs. Our service professionals are trained and certified to help avoid downtime and get the plant online and in production as quickly as possible. We know that the key to providing world-class service is not only to respond quickly, but provide the best solutions.

Commissioning
We take care of all phases of commissioning, from I/O-check and plant startup to systems tuning and acceptance testing.

Installation
We prepare the schedule for delivery and installation in close cooperation with our project partners, and we plan and procure site facilities and provide complete installation.

Engineering
ABB engineers are skilled in control and process technologies and use well-proven tools for consistent and project-wide data storage that can be accessed on site or by remote.
Contact us

ABB Inc.
Power Generation
Wickliffe, Ohio, USA
Phone: +1 440 585 3087
Email: powergeneration@us.abb.com

ABB AG
Power Generation
Mannheim, Germany
Phone: +49 621 381 3000
Email: powergeneration@de.abb.com

ABB Pte. Ltd.
Power Generation
Singapore
Phone: +65 6776 5711
Email: powergeneration@sg.abb.com

www.abb.com/powergeneration