Symphony Plus
The total automation solution for water and wastewater
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Population growth, rapid urbanization and increases in industrial production all demand for more water. How can we manage this precious resource?

Clean water for everyone
As the population continues to grow, the world is facing a crisis of water resources: we need to ensure that drinking water continuously meets the needs of population growth. At the same time sewage treatment capacity needs to be improved to prevent pollution on the ecological environment.

Under the premise to provide users with high-quality drinking water and effective wastewater treatment, we also face many challenges, such as high energy consumption, changing climate conditions and restrictions of various laws and regulations. In addition to that, aging water supply facilities and systems are now unable to meets growing consumer demand.

ABB fully understands your needs. With our successful implementation of global water projects, we can help improve and upgrade your local supply, collection, treatment and distribution efficiency and protect your investment. Jointly, we can overcome the water crisis.

ABB’s technologies are supporting the supply and demand of water, ensuring we can obtain and use water efficiently while reducing environmental impact. For nearly 50 years, ABB has equipped thousands of water plants and networks, providing products, systems and services in over 100 countries worldwide. ABB provides expertise and solutions for all activities related to the water life cycle, from water and optimization intake to water recycling.

ABB serves all key water processes, such as:

Distribution networks
Using network management solutions for real-time monitoring and control of distributed water systems, including asset management applications and optimization.

Industrial treatment and recycling
Providing electrical and automation products and systems, and turnkey projects with an electrical and mechanical scope for industrial water, wastewater treatment and re-use/recycling applications.

Pumping
Providing wide range of products and systems covering electrical, automation and instrumentation equipment for municipal water and wastewater treatment and re-use/recycling applications. ABB also provides engineered systems for aforementioned product ranges including plant optimization as well as comprehensive services, ranging from energy efficiency services to lifecycle support.
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Irrigation networks
Using integrated solutions, from hydrant control to network automation, to completely manage water and energy resources in agricultural applications. ABB delivers a full range of products, systems and services including network control solutions using wireless control.

Municipal treatment
Providing wide range of products covering electrical, automation and instrumentation equipment for municipal water and wastewater treatment and re-use/recycling applications. ABB also provides engineered system for aforementioned product ranges including plant optimization as well as comprehensive services, ranging from energy efficiency services to lifecycle support.

Desalination plants
Providing a wide range of products, stand alone automation and optimization systems and Integrated Instrumentation, Controls, and Electrical (ICE) solutions covering both electrical and automation for RO (Reverse Osmosis), MSF (Multi-Stage Flash) and MED (Multiple-Effect-Distillation) plants, and engineered systems.

To better meet the global demand of water, ABB introduces Symphony™ Plus, its total automation system for the water industry that makes every drop of water count, through the exploitation of solutions to manage the water cycle and finding ways for increasing performance of water plants and distribution and transfer networks. Our total automation platform improves productivity and energy efficiency as well as enhances operational security, safety and lowers the cost of ownership.

Symphony Plus’s proven system architecture has been specifically designed to match the more distributed automation required for water applications, in some cases being characterized by a much larger number of smaller, modular units thus providing plant operators with an essential tool for achieving sustainable and profitable growth.
Symphony Plus is the new generation of ABB’s widely acclaimed Symphony family of control systems – the world’s most widely used automation system in the water and power industries.
In all, there are more than 6,000 Symphony and Symphony Plus installations in operation all over the world, more than 4,000 of which are in water and power applications.

No other automation platform has such a long field record and large installed base in water and power applications as Symphony. 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 ABB’s long-held policy of ‘Evolution without obsolescence.’ With Symphony Plus, ABB opens a new era of total plant automation that is simple, scalable, seamless and secure.

Simple
Symphony Plus is easily adapted to meet the broad spectrum of water applications such as desalination, pumping stations, water distribution and water and wastewater treatment.

Scalable
Symphony Plus’ unique system architecture provides flexible and scalable configurations, from the small and server-less to large, multi-site multi-server distributed SCADA architectures.

Seamless
Symphony Plus enables the seamless integration of field devices, process and PLC automation, electrical and SCADA, and business and maintenance systems.

Secure
Symphony Plus provides users with a secure and reliable control environment with built-in security features that prevent unauthorized control system access.
Operator effectiveness is fundamental to a water facility’s overall performance. With fewer operators, a generational shift in the operator workforce, and increasing complexity of water operations (and networks), 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 ultimately to better decisions.

Integrated operations
Symphony Plus’s secure and powerful ergonomic HMI, S+ Operations, provides users with a broad view of the water operation by integrating all areas and systems throughout the network. S+ Operations combines advanced technology in a scalable serverless or client-server, distributed environment. The flexible architecture and functions allow Symphony Plus to easily adapt to the requirements of small applications to large, multi-site distributed SCADA architectures.

Through integration of standard communication protocols such as OPC, Modbus TCP, DNP 3.0, IEC 870-5-101/013/104, and IEC 61850, S+ Operations can easily integrate both locally and geographically distributed devices including Process Control Units, Remote Terminal Units (RTU), Programmable Logic Controllers (PLC), and Intelligent Electronic Devices (IED).

Designed for high performance
S+ Operations is a Windows-based, web enabled HMI 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 to abnormal conditions anywhere throughout the water facility. Context-sensitive aspect menus allow operators and engineers to share information and navigate intuitively. With user-specific information presentation, easy navigation to data, and alarm management based on EEMUA 191 guidelines, S+ Operations delivers reliable and consistent operations.

To support monitoring and control at remote units, Symphony Plus includes a variety of touch screen or keypad graphical display based control panels.

Advanced alarm management
S+ Operations’ advanced integrated alarm management system improves the operators’ capability to detect and respond to abnormal situations, increasing their success rate in returning to a normal mode of operations. Based on S+ Operations’ integrated information management module, the EEMUA 191 and ISA SP 18.2-compliant alarm analysis and alarm management module can be used to analyze trends or abnormal situations based on process messages. The system offers an extensive array of analysis possibilities such as message filters in alarm/event list and frequency statistics for defined time ranges. This can lead to a higher incidence of control room operators detecting an abnormal situation prior to alarms even occurring.

S+ Operations supports the implementation of high performance alarm management strategies offering features such as alarm grouping, filtering, shelving, hiding and suppressing (inhibiting). Color identification of different message priorities gives the operator a clear condition-based overview. Groups are organized and viewed in hierarchical structures.
**Integrated information management from all sources**

S+ Operations is designed to integrate information from anywhere in the enterprise on cross-site and cross-plant information platforms. ABB’s advanced technology provides seamless integration from third-party devices, controllers and systems. What’s more, S+ Operations is able to incorporate historical data to provide users with a valuable perspective of the trends affecting their operations and businesses.

S+ Operations provides the possibility to view real-time data and historical information simultaneously in one display. Additionally, data can be accessed from multiple history servers, aggregating analog as well as digital trend data. The practical advantages are obvious when looking at trend curve values: users are able to overlay information over time without having to move from a real-time system to a separate historian. Standard report templates are easily adapted to specific requirements, including freely customized reports. S+ Operations includes ready-made templates for:

- Instantaneous value reports
- Alarm messages, status messages, operator interventions
- Filtering by priority, area, etc.
- Operation reports (shift, daily, monthly, year)
- Status report (snapshots)
- Trip reports
- Maintenance reports

S+ Operations’ integrated information management gives operations and plant management extraordinary clarity as well as leading edge data resolution and calculation speed. This supports well-founded, real-time business decision making that leads to process efficiency, business profitability and a competitive edge.

**Performance monitoring**

Optimizing assets requires information that is accurate, timely, and actionable. Having this information leads to better decisions: whether to start or stop a process, replace equipment, or to perform preventive maintenance. To assist with this, Symphony Plus optimization tools, such as ABB’s Optimax Membrane Performance, are only one click away in S+ Operations.

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

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**EEMUA 191 and ISA SP 18.2-based alarm analysis**

**Advanced HMI system**
Reverse osmosis: OPTIMAX® membrane performance
Membrane-based technologies such as reverse osmosis (RO) are increasingly used in desalination, water and wastewater treatment applications. Improved membrane designs contribute to decreased operational costs and thus drive the use of membrane technology. In order to achieve optimal operation, membrane units have to operate at the highest efficiency point to keep productivity levels and performance at their maximum. One of the key operating problems in membrane-based systems is fouling and other types of membrane blockage. Fouling and blockage lead to a reduction in productivity and performance and potentially increases energy consumption since pumps need to operate at higher speed - where applicable - to compensate the production loss. In order to improve energy efficient operation of RO systems and to ensure maximum productivity, Symphony Plus includes an online tool that supports:

- Online performance monitoring by estimating current membrane fouling status, by predicting future membrane fouling status and by displaying the due date for next membrane chemical cleaning or flushing with product water
- Optimization of RO process operation by not only displaying the current optimal process conditions (flow and pressure set-points) but also predicting future optimal process conditions
- Simulation of the RO process by running what-if scenarios, capturing the fouling phenomena; therefore, it uses optimizer results, forming a key element to achieve optimal operation of RO systems
- Scheduling of loads across all trains.

Solutions for smart water networks
Water networks worldwide are aging, maintenance costs are increasing, and water utilities find it harder to maintain operational efficiency. Real-time alerts can save the utility time, money and human effort.

To help utilities deal with the ongoing challenges of managing and monitoring the network, Symphony Plus integrates TaKaDu monitoring solutions with its system offerings. The TaKaDu software-as-a-service (SaaS) solution can detect and geolocate in real time water network faults, leaks, bursts, network breaches, faulty meters, and other inefficiencies. The solution is based on sophisticated cloud-based data analysis and requires no network changes, no additional devices or capital expenditure. It leverages multiple data sources including inputs from network operations, online sensor based flow and pressure data and other external influencers such as weather and calendar events. This data can all be securely accessed over the Internet.

The water network monitoring solution delivers alerts, reports, and real-time views making network events easier and quicker to address.

Continuous network data are pre-processed, analyzed to detect anomalies, events are classified by their type and results are presented using web-based dashboards, available from S+ Operations via its "right-click" aspect links.
Demand for water is rising at three times the rate of population growth. ABB’s Symphony Plus automation solutions help provide more flexibility, reliability, and efficiency producing clean water while ABB’s electrical equipment reduce energy consumption. ABB’s instruments help to detect leaks and minimize chemical usage, reducing waste and improving quality at every step of the process.
Control of the entire water cycle

Symphony Plus includes a comprehensive suite of standards-based control hardware and software targeting the entire water cycle. The scalable platform meets your total automation needs with a range of controller options from distributed process control to supervisory control and data acquisition (SCADA) and logic control functions. Use of PROFIBUS, Modbus, and Ethernet device networks facilitate the integration of a plant’s various PLCs, IEDs, and intelligent field devices which tend to be distributed throughout the facility or network (e.g. integrating remote RTU devices with Symphony Plus controllers, plant operations, and higher level applications).

Process control
S+ Control’s HPC800 controller is the system’s high-performance, high-capacity process controller that is used to execute demanding process control applications that are both data and program intensive. Redundancy options are available at all levels of control, I/O, and communication, resulting in maximum flexibility and availability.

Logic Control
The SPC600 provides you with a powerful logic control offering with more memory than most competing products. More memory allows more functionality, more precise algorithms, more meaningful visualization, and more operating comfort – for even better individual customer solutions. For extreme conditions, the SPC600-XC provides for mounting in remote harsh environments, – even if installed in plain cabinets. Together, the HPC800 and SPC600 controller options combine for a formidable solution to meet the total automation needs of the water industry.

Flexible fast Ethernet plant network
The system features a high-performance, Fast Ethernet-based plant network that makes it particularly suitable for geographically distributed control applications required in water networks. Together with its scalable controller platform, Symphony Plus meets the water industry’s need for much larger number of smaller, modular units (e.g. geographically distributed RTU applications). Communications with remote control nodes can be realized in a variety of differing ways including use of WAN, LAN, or SMS wireless connections. Through these communication options, Symphony Plus provides for the controlling, monitoring, and troubleshooting of remote applications, irrespective of where the equipment is located by simple means of secure, remote connections.

Modular packaging
Symphony Plus controllers utilize DIN-rail form factor, standard 24 VDC power inputs, and a standard Ethernet network to make installation simple and flexible. This reduces the limits on cabinet space, size or layout, and provides a broader selection of commercial power supplies and network peripherals, thus lowering both installation and maintenance costs.
Motors and drives: choices for increased efficiency
Symphony Plus is supported by a wide range of ABB industrial motors and drives required for water industry applications. Motors and drives can drastically affect the long-term operational management of water facilities. This is especially true, considering the fact that pumping and aeration require larger amounts of electrical energy with the electrical energy being a major component of operational expenditures.

ABB is a world leading supplier of highly energy efficient motors with a full range of high efficiency as well as super premium efficiency motors. Using ABB motors will substantially contribute to make your operation more energy efficient.

ABB variable speed drives (VSDs) are used to control the motor speed of pumps with a typical 30 to 60 percent savings in energy consumption. The use of drives also reduces mechanical and electrical stress on pumps and aeration equipment components. Even pumps that operate at constant flow benefit from the soft-start and soft-stop functionality of a VSD, thereby placing less stress on the motor and pump.

VSD’s in combination with high efficiency motors does not only make water processes in all parts of the water cycle more efficient, but also help reduce maintenance costs.

Instrumentation: measurements reliability
Symphony Plus integrates ABB’s broad portfolio of instrumentation to help detect leaks and minimize chemical usage, reduce waste, and improve quality at every step of the water cycle. To control water, it is essential to adequately monitor all physical, chemical-physical and microbiological parameters. ABB meets these requirements with a wide range of instrumentation, including flow, pressure, level and temperature meters, recorders, controllers and on-line analyzers for parameters like pH, conductivity, turbidity, dissolved oxygen, residual chorine, ammonia, nitrate, fluoride, phosphate, chloride and silica.

Highest precision in flow measurement is available, for example when dosing chloride or other chemicals, measuring flow rate of wastewater or detecting leaks in drinking water infrastructure. Flow measurement products featuring self diagnostics and process information make it easy to control any water process, increase profits and save costs.

ABB industrial drive modules include everything needed for reliable and efficient pump control in water and wastewater applications.

Innovative flow measurement products to control the entire water cycle process, increase profits and save costs.
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