

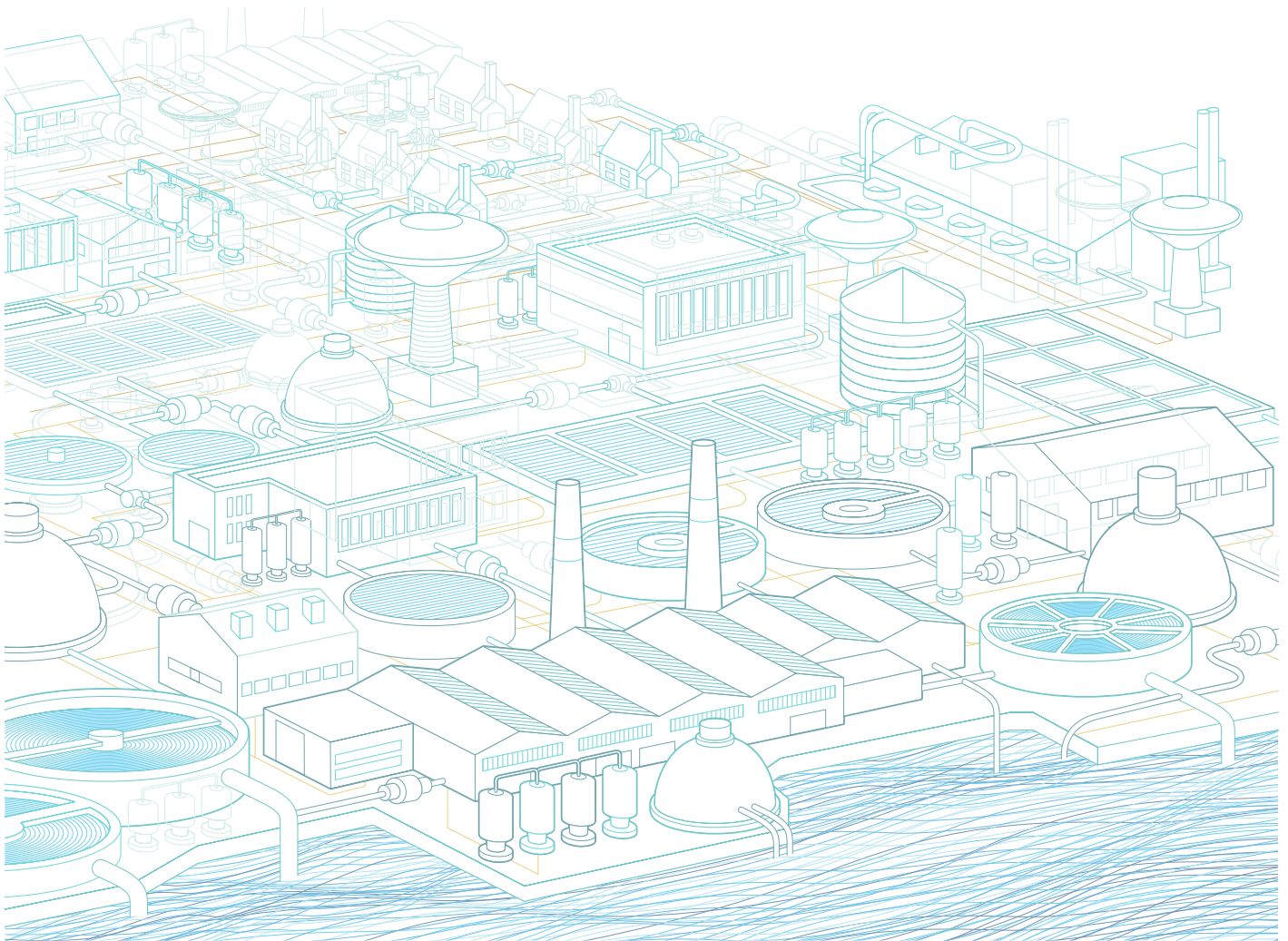


PLC water brochure

## AC500 PLC

The ideal solution for water  
Flexibility, reliability & efficiency

# Preface



## 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 meet 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 sewage 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, the old water supply facilities and systems are now unable to meet growing consumer demand.

ABB fully understand customer needs. With our successful implementation of the global water treatment project experience, we can help improve and upgrade the local water treatment efficiency and protect your Investment and jointly overcome the water crisis.

## Challenges in Automation Systems

### Flexibility

Systems optimization to upgrade the existing water treatment plant, and maintain its compatibility and ensure scalability for a future requirements.

### Reliability

Water is one of the most important resources to sustain our lives. Automated system must be very reliable to ensure water quality is always good and correct for safe consumption. System stability is important even in the event of a failure, systems should have own monitoring diagnostic for problem solving functions ensure continuous supply.

### Efficiency

In the water treatment industry, automation is the prerequisite for the effective functioning of the system. A fully automated system also includes information management and its communication to service external systems such as remote control and monitoring.



# The ideal solution for water

## Flexibility, reliability and efficiency



ABB has nearly half a century experience in equipping thousands of water treatment facilities. It supplies products and systems for any type of application in the water cycle. Below are just a few examples, visit our website for more information.

### Urban water distribution

ABB supplied motors, drives, control switchgear and instrumentation to MWA (Metropolitan Waterworks Authority) in Bangkok, which provides tap water to 11 million people. MWA owns and operates one of the world's biggest water treatment plants and more than 30 pumping stations. Electricity costs amounted to almost 50 percent of MWA's production cost. The equipment supplied by ABB helps MWA to achieve energy savings of more than \$10 000/month for a pumping station.

### Industrial water

ABB supplied PLC, drives, motors, transformers and control panels for the Ras Laffan Common Cooling Water Project, which supplies vital cooling water to Ras Laffan Industrial City, one of the world's fastest-growing industrial export locations. The cooling water system pumps 833,000 cubic meters of

cooling water an hour to the power plant, LNG trains and petrochemical facilities.

### Sewage

ABB supplied instrumentation, motors and drives for Singapore's Changi Water Reclamation Plant project, which is designed to meet Singapore's wastewater treatment needs through the 21st century. The new water reclamation plant will treat 528 million gallons of used water per day.

### Water treatment

ABB supplied motors, drives and instrumentation to Scottish Water, the fourth-largest water utility in the U.K. Scottish Water operates about 47,000 kilometers of water mains, 48,000 kilometers of sewers, 370 water-treatment works and 1800 wastewater treatment works.

### Desalination

ABB has supplied AC500 PLC systems to Middle East desalination plant. The reverse osmosis (RO) plant, which is scheduled to go on line in 2010, will produce approximately 100 million cubic meters of fresh water a year.

# High Availability solution for reliable water supplies

## Performance is the key

Most downtime is caused by either human error or device malfunction which could be avoided with the AC500 High Availability. Utilising dual CPUs and dual I/Os help reduce any risk of total system failure thus enhancing system availability.

If the retention of critical data and the avoidance of downtime are important to your application then ABB AC500 High Availability with dedicated large data storage solution is the ideal solution.

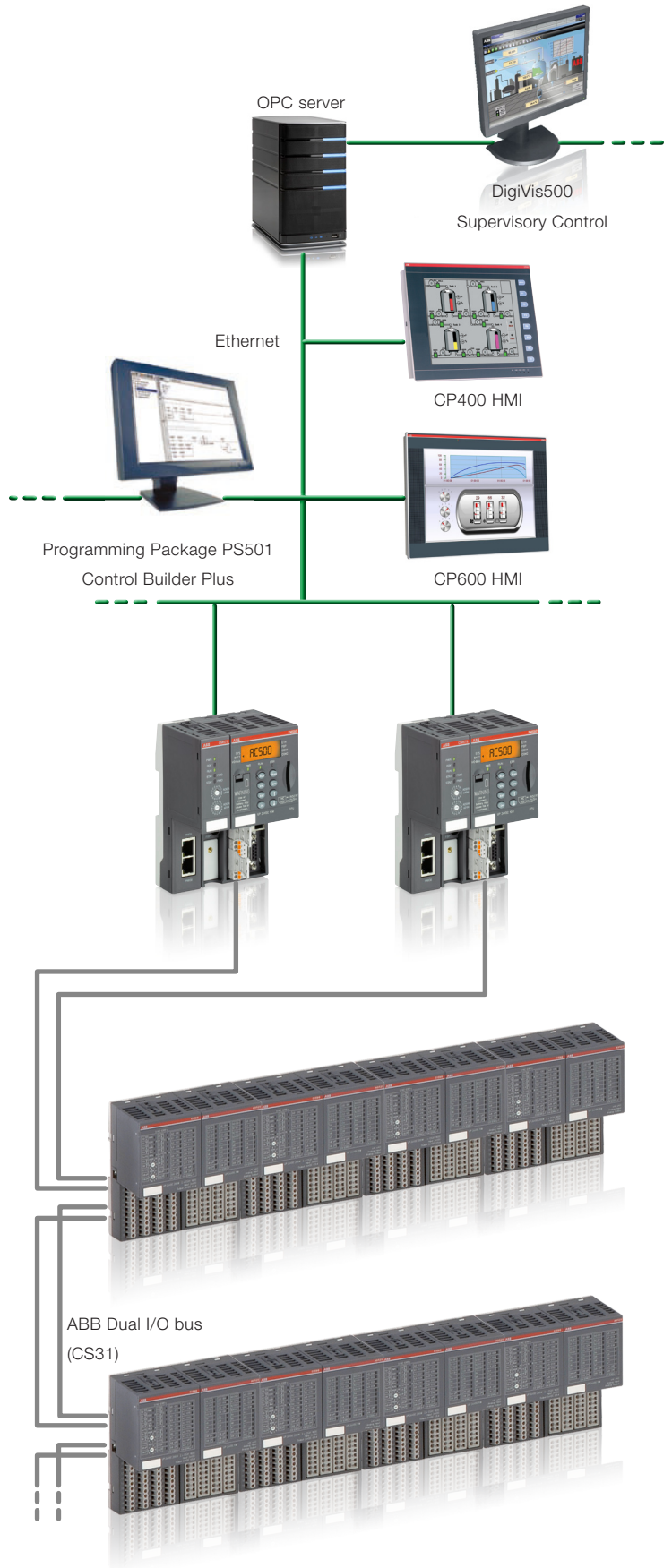
## What benefits can you expect from our AC500 High Availability solution?

- Greater resource usage with no downtime in Hardware/ Software failure with the dual CPUs and dual communication fieldbus CS31.
- Cost efficiency and easy system maintenance through the use of standard hardware.
- Only standard CPUs required, choose from PM573-ETH to PM592-ETH to achieve High Availability.



Singapore: Deep Tunnel Sewerage System project Is an efficient and cost-effective solution to meet Singapore's long-term needs for used water collection, treatment and disposal.

## High Availability - System overview







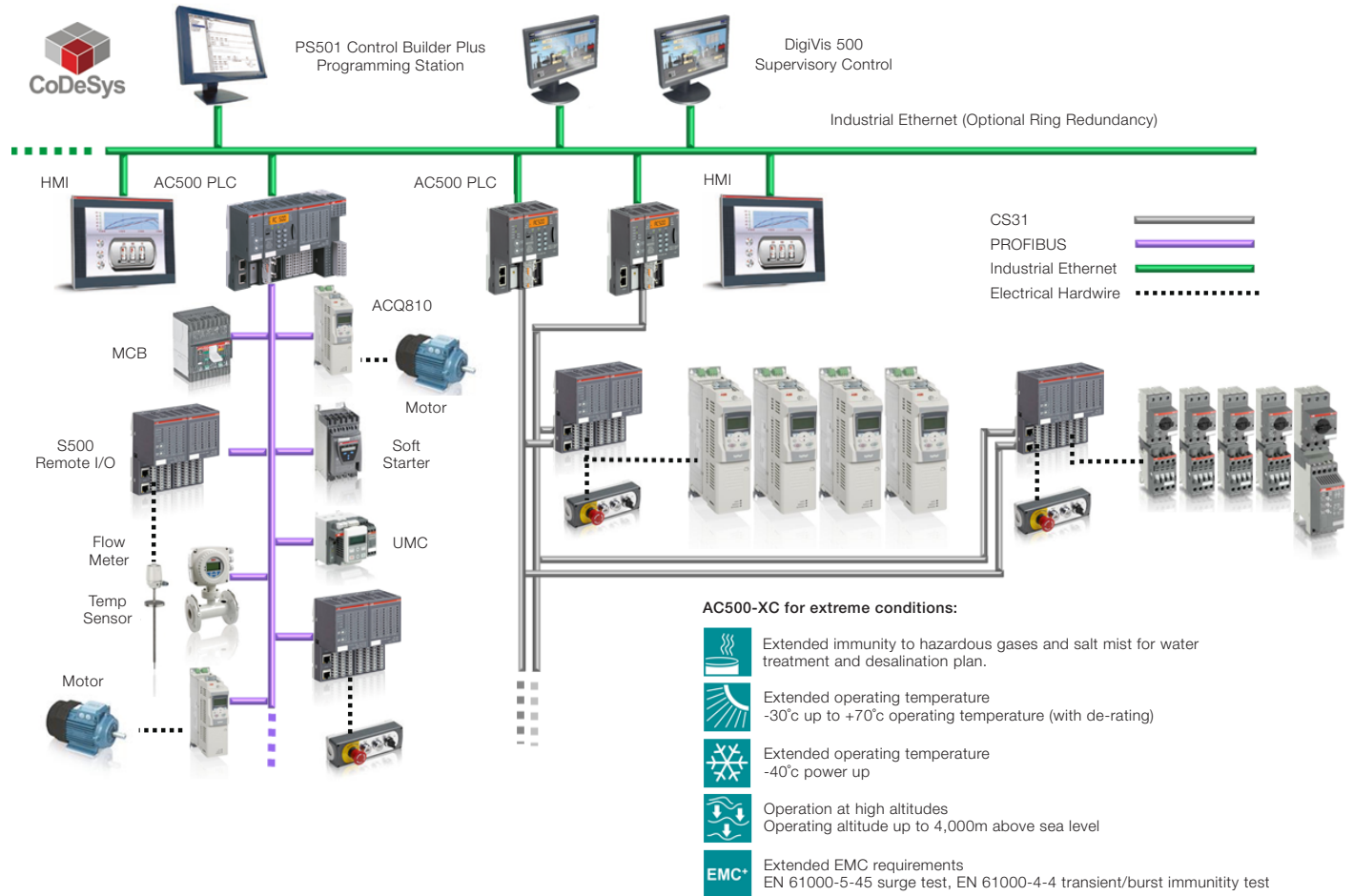
Demand for water is rising at three times the rate of population growth. ABB's PLC automation solutions help provide more flexibility, reliability, and efficiency producing clean water while ABB's motors and drives reduce energy consumption in treatment plants. ABB's instruments help to detect leaks and minimize chemical usage, reducing waste and improving quality at every step of the process.



# Water supply and waste water treatment

## Water supply and waste water treatment

ABB provides Supervisory Control solutions to allow real-time monitoring and control water systems. Because we integrate plant automation systems and field instrumentation, all the typical parameters (flow, pressure, level and quality) are under control.

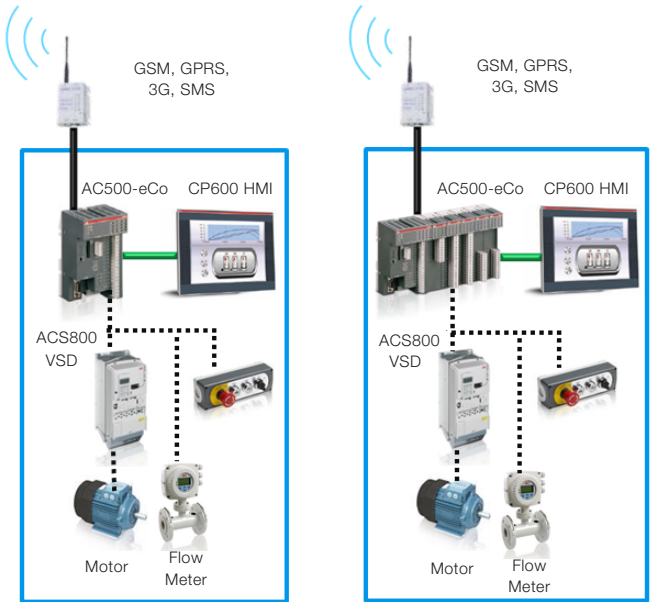
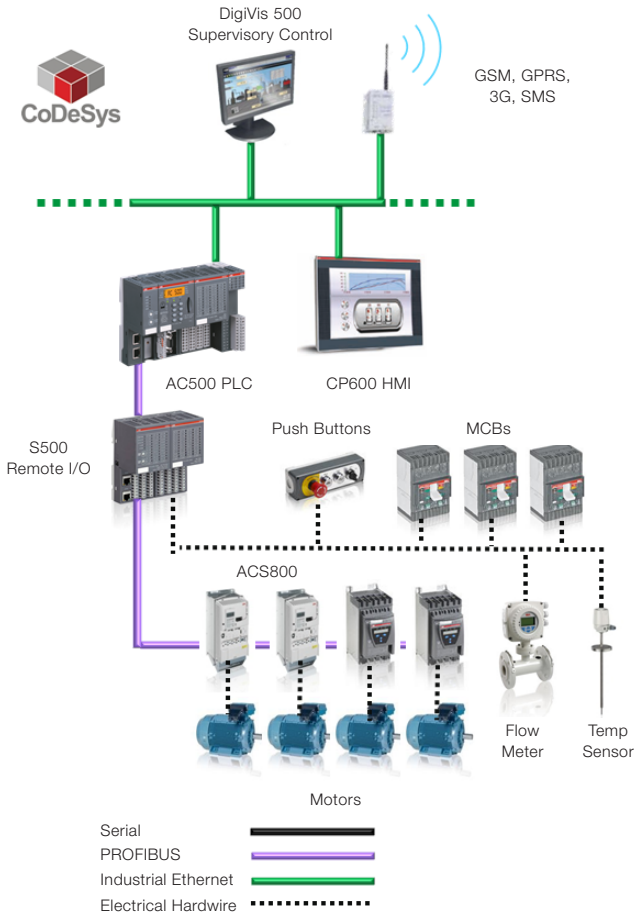









# Solutions for water distribution and pumping stations

## Water distribution network and pumping stations

ABB provides automation solutions for turnkey projects, including electrical and mechanical scope (pumps, hydromechanical components). Better management of pumping stations enables a significant saving in energy consumption. That is why ABB developed a complete range of products and solutions covering the electrical and automation processes and provide this through value added channels partners and system integrators.



### AC500-XC for extreme conditions:

-  Extended immunity to hazardous gases and salt mist for water treatment and desalination plant.
-  Extended operating temperature  
-30°C up to +70°C operating temperature (with de-rating)
-  Extended operating temperature  
-40°C power up
-  Operation at high altitudes  
Operating altitude up to 4,000m above sea level
-  EMC+ Extended EMC requirements  
EN 61000-5-45 surge test, EN 61000-4-4 transient/burst immunity test



# Condition monitoring for water

## Condition monitoring for all water solutions

Items for measuring, machine/motor/pump vibrations, operator inputs, temperature differences, voltages, speeds, water levels, flows and pressures. The real benefit from condition monitoring is malfunction prediction and identification of irregularities in system behavior which can significantly improve repair planning and can also prevent additional damage from occurring. ABB's monitoring systems would include vibration monitoring, monitoring of electrical measurements and process quantities (temperatures, pressures, flow etc.) Systems must include continuous measuring, trending and database creation of all measured data. Repair works based on system reports can reduce the cost of maintenance up to 50 %. Data can be recorded with the powerful data storage features of the AC500 with internal memory up to 4GB. AC500 can also report via email on the status of the system.

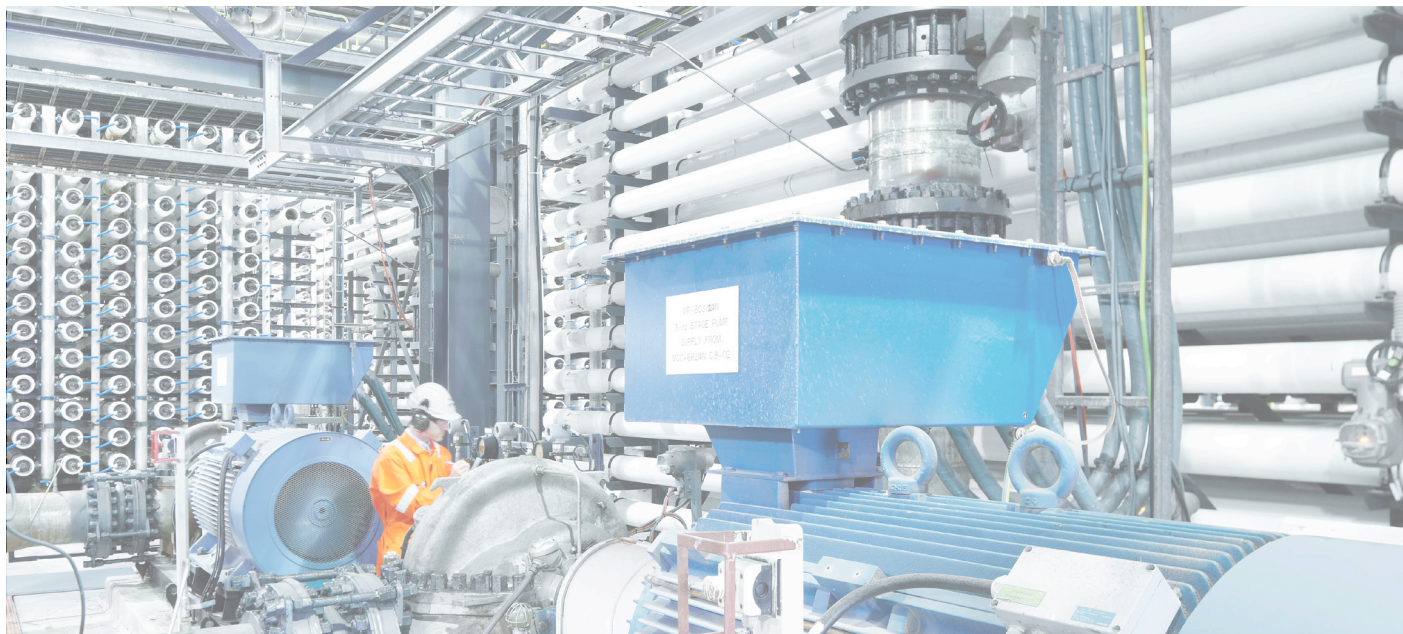
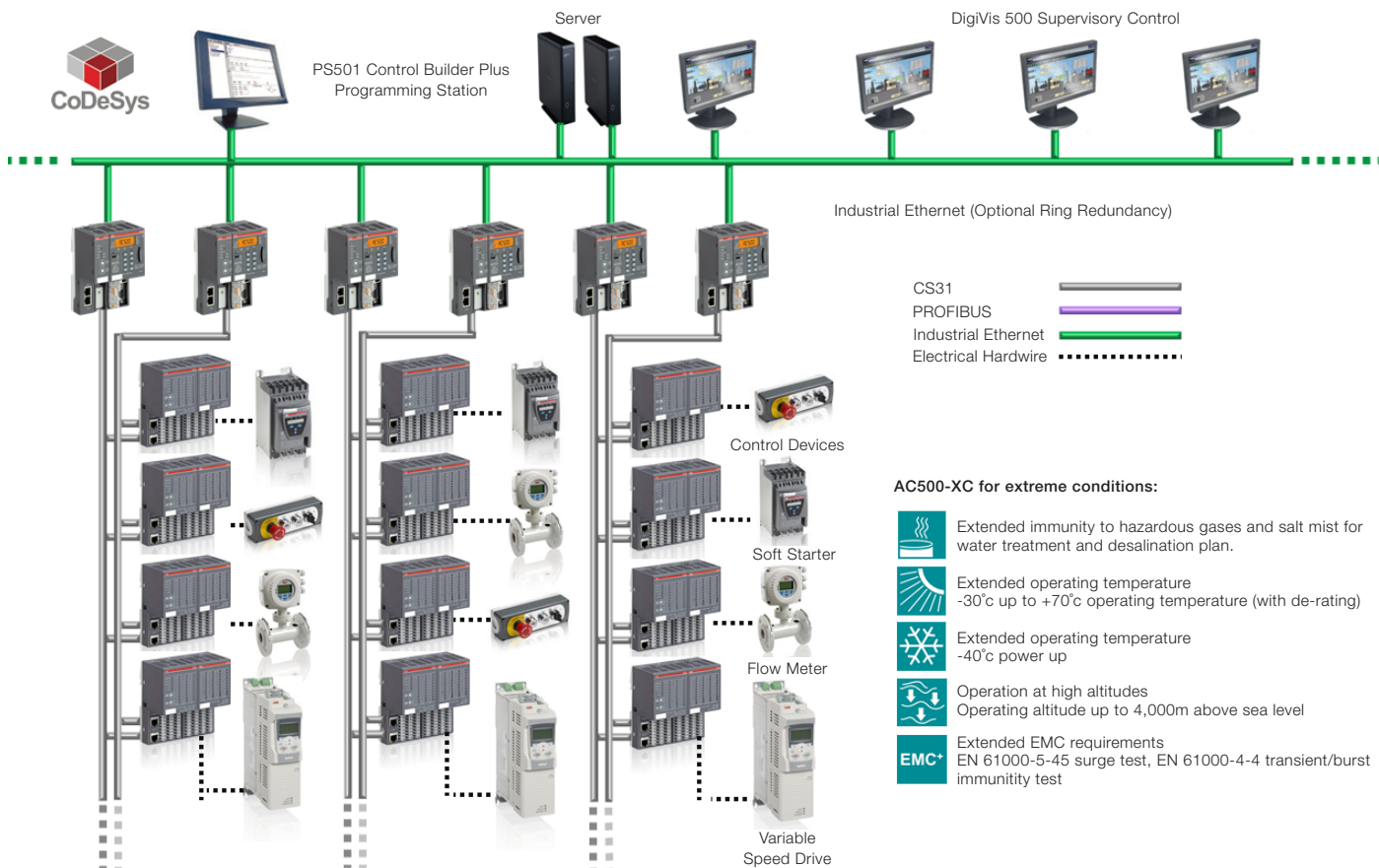




# Solutions for desalination and industrial treatment

## Desalination and industrial treatment

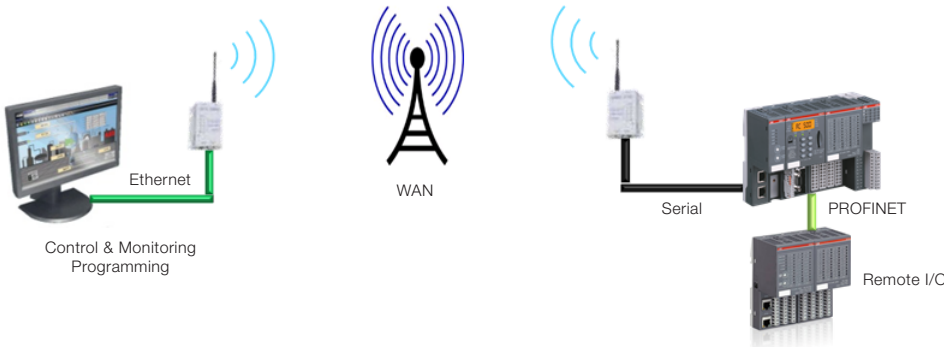
As desalination becomes more essential in water production in those areas where increasing demand outpaces the availability of natural resources. In some cases combined desalination and power plants are the flexible solution to produce both water and energy. Hybrid desalination plants use two or more different desalination processes in one plant; these plants have a complex system structure, which allows multiple possibilities for optimization. ABB's portfolio includes a wide range of products covering electrical and automation solutions. ABB is the ideal partner for EPC contractors that are looking for engineered ICE solutions (Instrumentation, Control and electrification) also applicable for pharmaceutical.



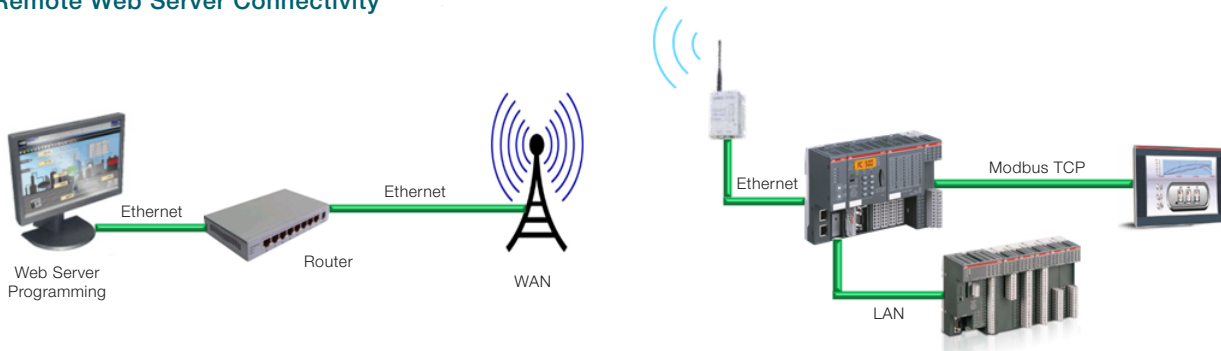
# Remote Connectivity

Remote communications with AC500 PLCs can be realized in a number of differing ways and we recognize that the ability to create remote connections to equipment can provide service and maintenance great savings in time and money, not only this but improved availability and reliability through easier monitoring and diagnostics. With the following communication solutions we are able to control and monitor, update software or troubleshoot, irrespective of where the equipment is located, by simple means of remote connection. Being able to connect to a remote site from main control facility or whilst working in a different location makes a much more efficient and flexible working conditions for support and maintenance personnel. ABB's solutions for remote connectivity use wireless switches, hubs, modems and devices which are available from 3rd party vendors.

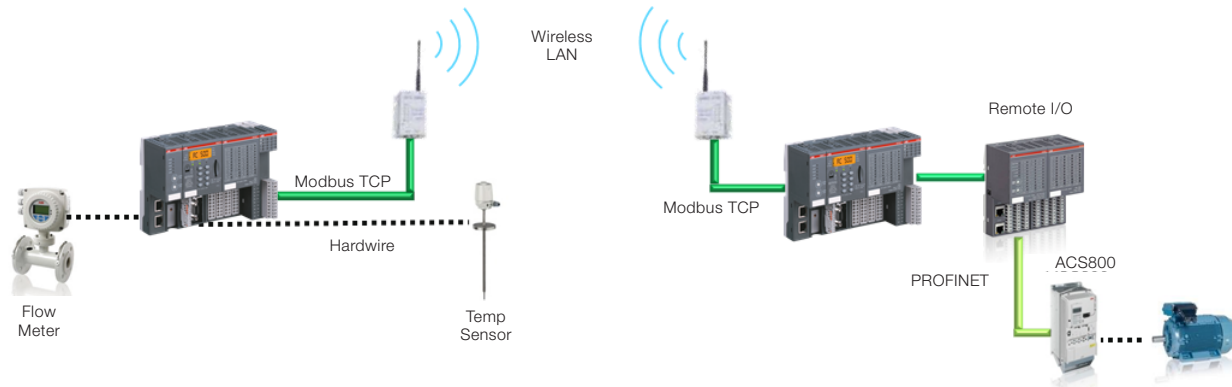
## Remote Connectivity: SMS Reporting and Alarm Monitoring



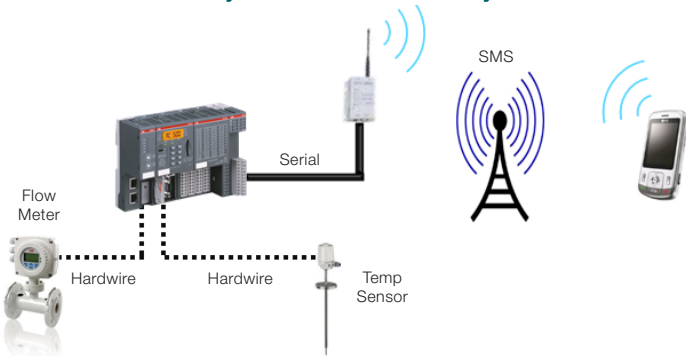
## Remote Web Server Connectivity








## Remote Connectivity: Remote Distributed Controlling



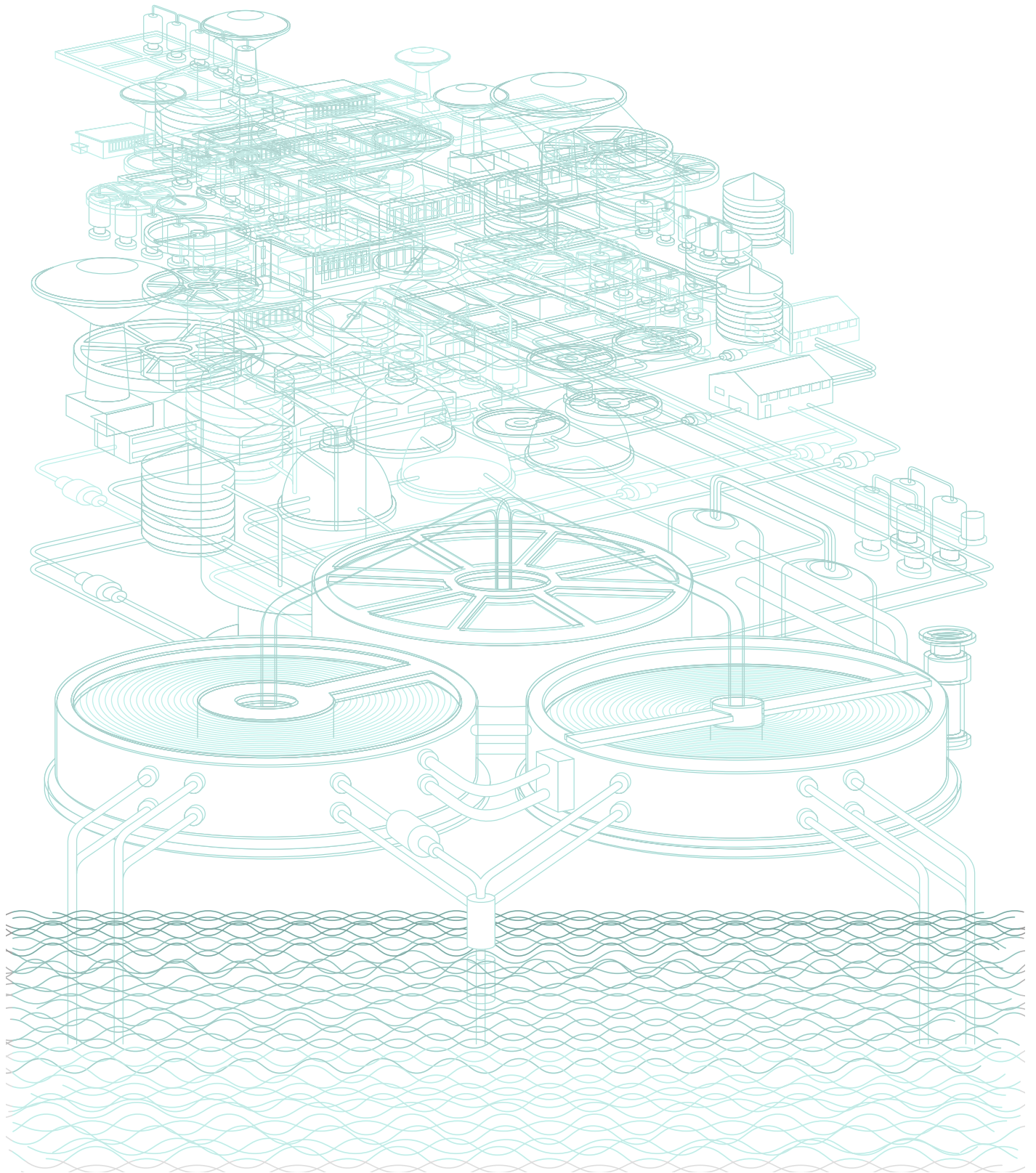
## Remote Connectivity: Modem Connectivity and Email Functionality



### AC500-XC for extreme conditions:

-  Extended immunity to hazardous gases and salt mist for water treatment and desalination plant.
-  Extended operating temperature -30°C up to +70°C operating temperature (with de-rating)
-  Extended operating temperature -40°C power up
-  Operation at high altitudes Operating altitude up to 4,000m above sea level
-  Extended EMC requirements EN 61000-5-45 surge test, EN 61000-4-4 transient/burst immunity test





Municipal water treatment is a key process in the water lifecycle, as it must guarantee a sufficient degree of water quality before use. ABB's portfolio includes a wide range of products and solutions for water and wastewater treatment plants with a specific focus on energy efficiency. These include PLC, motors & drives, control products and systems, instrumentation and analytics and complete electrical distribution components.

# AC500 products family

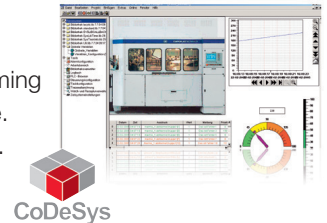
## Fields of application

ABB has more than 40 years of experience in producing PLC offering a comprehensive range of scalable PLCs and robust HMI control panels as well as high-availability solutions. The AC500 PLC platform has achieved significant industry recognition for delivering high performance, quality and reliability. Our unique family of IP67-rated wireless Input/Output devices extends PLC solutions for robotics and similar applications. ABB delivers scalable, flexible and efficient ranges of automation components to fulfill all conceivable automation applications including:

### Programming software PS501 Control Builder Plus

PS501 Control Builder Plus complies with the IEC61131-3 CoDeSys standard offering all 5 programming languages, extensive function block libraries, a powerful embedded simulation or visualization feature. It also supports a number of languages (e.g. Chinese, English, French, German, Italian, Spanish, etc).

**New: New libraries, FTP functions, SMTP server, smart diagnostics and debugging.**



### AC500

ABB's powerful flagship PLC offering a wide range of performance levels and scalability within a single, simple concept and where most competitors require multiple product ranges to deliver similar functionality. Web server integrated and IEC 60 870-5-104 remote control protocol.

**New: "Extreme Conditions" modules with extended operating temperature, immunity to vibration and hazardous gases, use at high altitudes, in rainy conditions, etc.**

### AC500-eCo

Meets the cost-effective demands of the small PLC market whilst offering total inter-operability with the core AC500 range. A CPU integrating onboard Ethernet.

**New functionalities: Web server for all Ethernet versions, up to 10 I/O modules connected to the CPU, a fast counter up to 50 kHz.**



### S500 I/O modules

Digital and analog modules can be configured to best meet customer requirements as well as offering local and/or remote expansion options using most industry standard communications protocols.

**New: "Extreme Conditions" modules and an assortment of PROFINET interface modules.**

### Control panels

Touchscreen or keypad graphical displays utilizing low cost, user friendly configuration software, offering extensive libraries and drivers for most PLC platforms and other automation devices. IP switch function managing High Availability.

**New: CP600 range up to 15" available with Panel Builder 600 engineering software or web panel version.**



### DigiVis 500

DigiVis 500 software is a simple and easily accessible solution in the development of supervision applications. It offers all the functions that are essential to a secure environment, its functional reliability and dual-display mode will simplify all your supervision operations, keeping interruptions to a minimum.

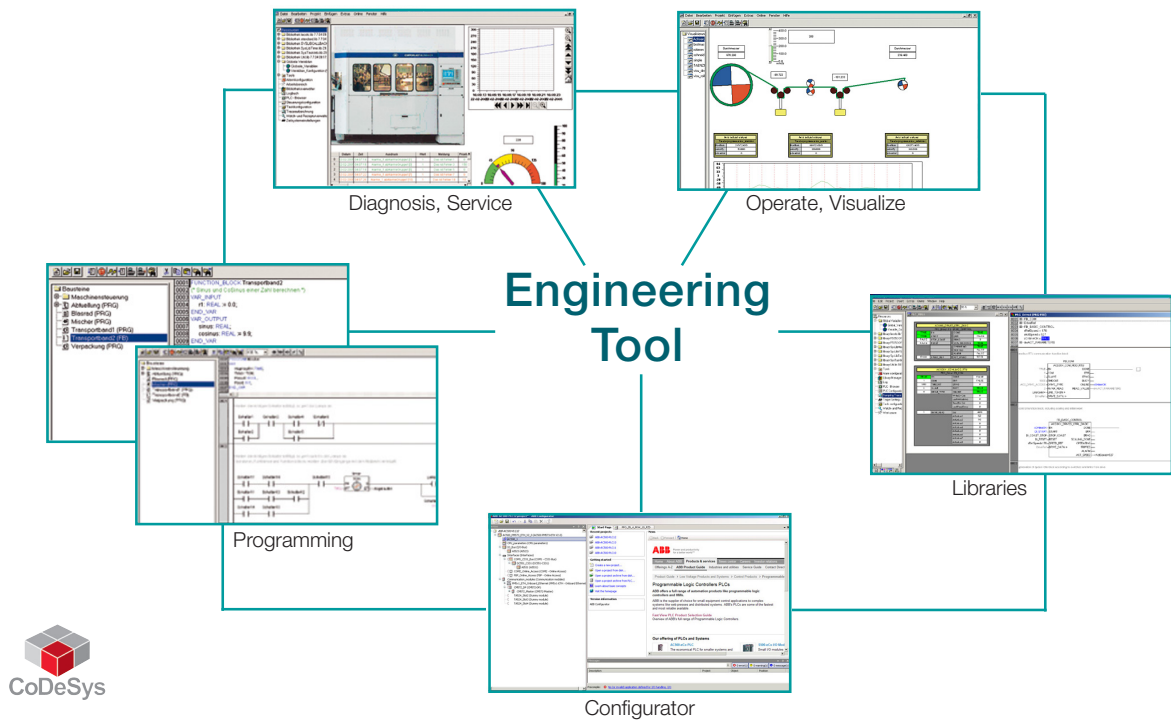
### Wireless interface for sensors and actuators

Factory Automation for high productivity thanks to reliable sensor and actuator networks. Broken cable and wire issues can be a thing of the past with this solution. Wireless is ideal for machines with sensors or actuators on moving end effectors.





# Engineering tool PS501 Control Builder Plus



## Programming ABB PLCs and configuring drives with PS501 Control Builder Plus

For PLC, drives and control panels, there is now one single smart engineering tool: PS501 Control Builder Plus!

PS501 Control Builder Plus provides:

- Powerful programming functionality
- Advanced visualization capabilities
- Convenient diagnostics and debugging
- Easy network and fieldbus connectivity
- Remote and bulk update and parameterization of all your machine devices

Features include:

### Powerful IEC 61131-3 and C programming

- One tool for programming and configuration of PLCs AC500, AC500-eCo and specific LV drives offered by ABB
- Programming in all five IEC 61131-3 languages, the only recognized international standard
- In addition, PLC functions can now be written in ANSI-C language and integrated using an external compiler

### Advanced visualization

- Control Builder Plus supports many different kinds of enhanced visualization built-in
  - Integrated visualization when using online
  - Standalone visualization used in PC with protection of code
  - AC500 web visualization built using Control Builder Plus
  - Integrated panel builder software for CP600 series panels
  - OPC server integrated with CoDeSys

### Convenient diagnostics and debugging

- Recipe management for simpler production solutions
- Multiple watch lists for superior overview and for customized tasks
- Smart diagnostics and debugging for easier online use
- Alarm handling for enhanced maintenance and commissioning

### Easy network and Fieldbus connectivity

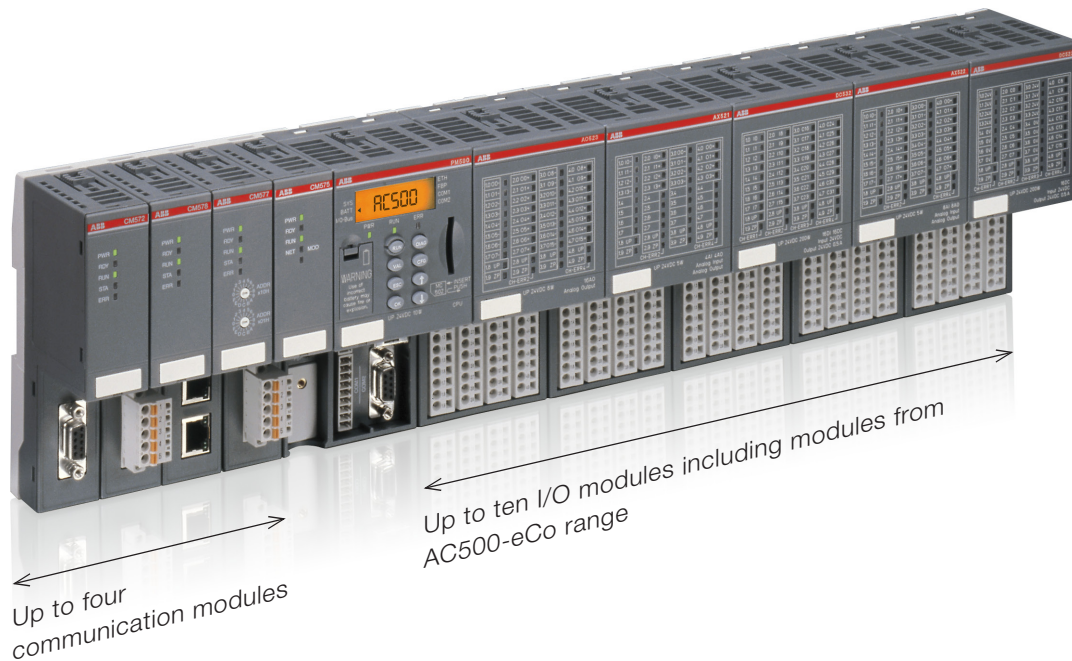
- Simple configuration of Fieldbuses and serial connections:
  - PROFIBUS DP, CAN, CANopen, Modbus, serial and ABB IO-bus CS31
  - DeviceNet with Sycon.net configurator
- Easy configuration of real-time Ethernet networks:
  - PROFINET, EtherCAT,
- Internet protocol suite includes:
  - HTTP (Web server in AC500 CPU)
  - SNTP (Time synchronization of CPUs)
  - SMTP (Email messages and attachments)
  - FTP (File transfers)
  - DHCP (Automatic network IP configuration)
  - TCP/IP (Standard transmission control and internet protocol)
  - UDP/IP (Fast network communication)
  - IEC60870-5-104 (Sub station automation protocol)
- IEC 60870-5-104 (Sub station automation protocol)

### Remote and bulk update and parameterization

- ABB drives connected by Profibus or PROFINET to AC500 can now be remotely parameterized from a single point - the PC running PS501 Control Builder Plus
- Multi-online-change allows to modify and transfer multiple PLC programs simultaneously
- Remote firmware updates reduces travel cost and time.

# Scalable PLC AC500

## Superior local extension capabilities for I/O and communication



## AC500 CPU: Amazing functionality and industry leading performance with extensive range of communication modules and industrial interfaces

### ① Terminal base:

- Easy snap-on of CPU and optional communication module
- CPU performance upgrade is convenient and fast
- Pre-wiring of CPU connections

### ② Communication module:

- Up to 4 modules in numerous combinations to communicate with nearly everything

### ③ FieldBusPlug connector:

- Slaves for Profibus DP, CANopen, DeviceNet



### ④ Onboard Ethernet (optional)

- Programming via PC
- Internet protocols (web server, FTP, e-mail, time sync and more)
- IEC 60870-5-104

### ⑤ COM2 (Sub-D9, RS232/RS485)

- Programming via PC
- ASCII protocol
- Modbus-RTU (master or slave)

### ⑥ COM1 (spring terminal, RS232/RS485)

- Programming via PC
- CS31 bus (master)
- ASCII protocol
- Modbus-RTU (master or slave)



# Extreme Conditions AC500-XC



The new AC500-XC series is designed to withstand various harsh conditions during operations. In many cases, this makes engineering and operations much more cost-efficient than before.

## General benefit

The major benefit of using AC500-XC is cost saving in engineering and in operations.

AC500-XC simply works in harsh areas - even if installed in plain cabinets. Many expensive extras become obsolete:

- Sealings at cable entrances and doors
- Shock absorbers
- HVAC for the panel
- Cooling fins and cut-outs
- EMC protection.

When HVAC is no longer needed, the energy and maintenance costs can be kept at a minimum.

So the efforts to design, purchase, install and argue for expensive housings are fully gone.

Everybody affected with special cabinets or panels will save time and money thanks to the now possible straight-forward cabinet design.

## Savings in cable infrastructure

Plain components are often placed in buildings for protection, while the I/O port is needed elsewhere. The required cabling requires relatively complex Fieldbusses, cables and ducts. The better way can be the robust AC500-XC, placed at the point where the I/O is needed. AC500-XC eliminates the cable hassle.



Extended operating temperature  
- -30°C up to +70°C operating temperature  
- -40°C power up



Extended immunity to vibration  
- 4 g root mean square random vibration up to 500Hz  
- 2 g sinusoidal vibration up to 500Hz



Extended immunity to hazardous gases and salt mist  
- G3, 3C2 immunity  
- Salt mist EN 60068-2-52 / EN 60068-2-11



Use at high altitudes  
- Operating altitude up to 4,000m above sea level



Extended EMC requirements  
- EN 61000-4-5 Surge immunity test  
- EN 61000-4-4 Transient / burst immunity test

## Benefits for design engineers

Mechanical dimensions and electrical specifications of connections are the same as for AC500. Panel layouts and wiring harnesses can be re-used. Mechanical design effort is mostly as for plain control gear. Time and complexity are saved.

## Benefits for system engineers

The new products are functionally fully compatible with the proven AC500 series. As important consequence, configuration, programming and commissioning remain completely identical with AC500. Software works as before. PS501 Control Builder Plus is the same engineering tool to be used.

## Benefits for operators

Investments can be kept at minimum due to smaller engineering efforts. Maintenance and repair efforts are lower than with special expensive cabinets carrying plain components.

## Product range

Most of AC500 products are available as AC500-XC version.

## Example for AC500-XC product

CPU module PM592-ETH-XC with highest speed, most memory and numerous Internet technologies built-in. AC500-XC products carry the snow symbol.

# Contact us

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