

Low voltage AC drives

Controlling water and wastewater flow
Accurate speed control
with minimal energy use



It is not only water utilities but every major industry that has a need for water. Water is critical to industry. Water is the most common heat transfer fluid, cleaning fluid and solvent - and often forms a significant proportion of the final product.

Yet water is the most untapped source of financial and energy savings within a plant. The challenge is to use water of the appropriate quality and cost, effectively throughout the whole production process.

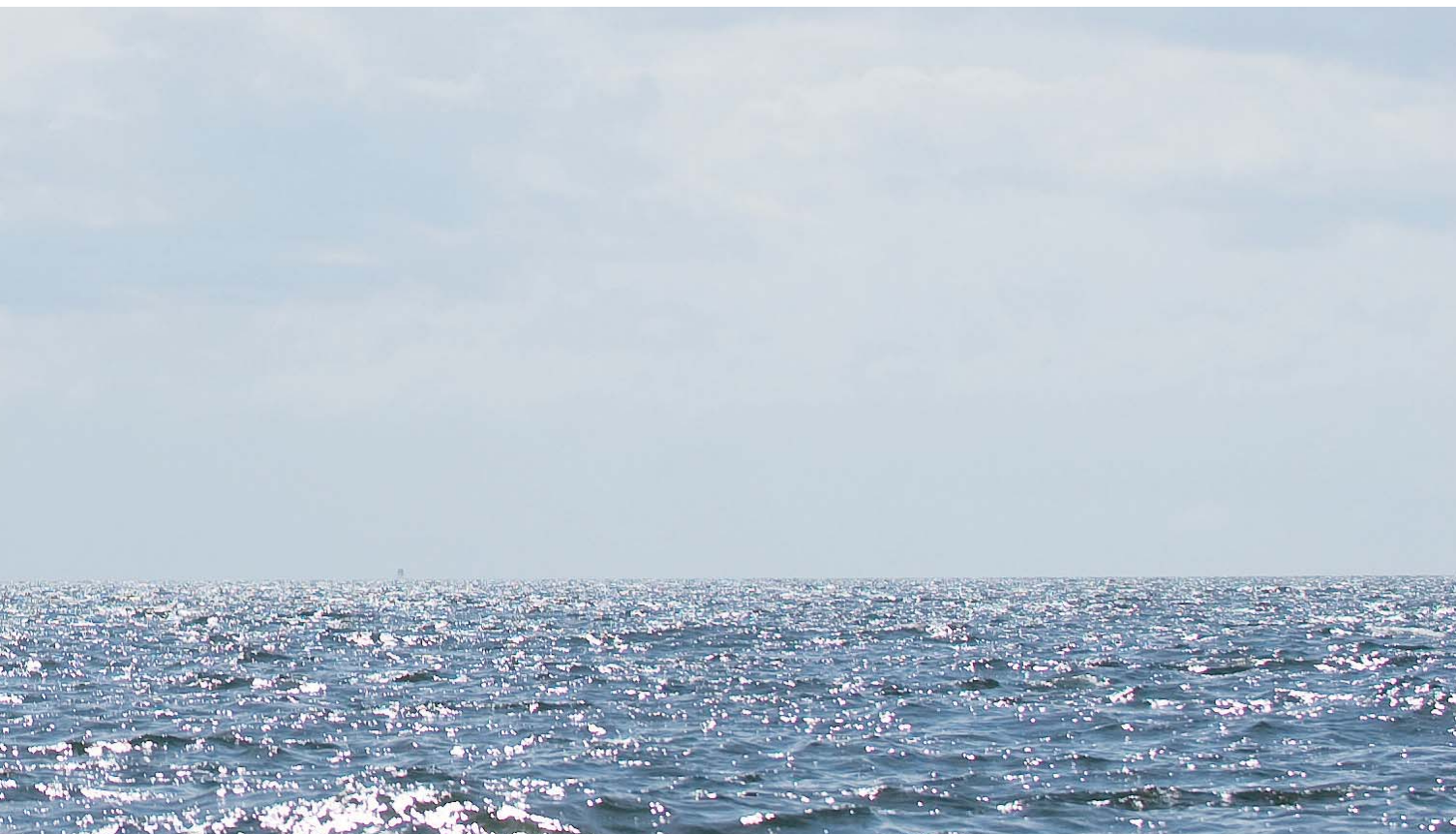
The responsible and sustainable treatment of water is one of the most important global issues. ABB's low voltage AC drives for the efficient use of water and for the purification of wastewater, play a major role in managing this challenge.

Challenges facing the water sector

ABB understands the challenges facing all users of water. Such challenges include:

- Rising cost of water – to buy and to discharge
- Falling availability of water
- Adverse affects of water quality on processes and products
- Ever stricter anti-pollution laws
- Rapid rise in cost of “end-of-pipe” effluent treatment plant
- Growing public concern for health and lifestyle

It is with these challenges in mind that ABB's engineers are working to bring the most efficient solutions to its customers.



The use of AC drives

With the help of low voltage AC drives, ABB aims to optimize the water supply, process use and effluent treatment to give industry a competitive advantage.

ABB drives are used in every phase of water supply and wastewater plants: from the moment water is taken in from the reservoir or river, through the water treatment and pumping stations, into the distribution system, back into the sewage system and, then, as final effluent, returned to the environment.

ABB drives are used for regulating a variety of pumps, fans and compressors used for flow and pressure control throughout the water process. They regulate the processes according to actual demand, based on inputs from flowmeters, pressure transmitters and other sensors.

Where can savings be made?	
Reduction in uncontrolled use	20 to 30 percent
Improved control	20 to 30 percent
Water reuse	10 to 20 percent
Water recycle	10 to 20 percent
Design improvements	10 to 20 percent

Benefits of AC drives

ABB drives bring many benefits, including large plant efficiency improvements, energy savings and less wear and tear on moving equipment. In addition, the drives bring:

- Better control of the water quality
- More intelligent automation to the processes
- Minimized energy consumption

All this has a major impact on the financial running of the plant and can help to:

- Reduce cost of water supply
- Recover raw material and/or product
- Reduce effluent treatment costs
- Improve asset life
- Increase plant availability/output

Products



ABB drives bring together a world-leading and recognized brand, which has carved a niche as a global number-one supplier for low voltage AC drives, together with a product range from 0.18 kW up to 100 MW that is simply the widest available from any manufacturer.

ABB drives is a reference for drives users the world over and signifies reliability, simplicity, flexibility and ingenuity, throughout the life cycle of an AC drive.

For the water and wastewater sector, ABB manufactures motors and drive systems, from sub-kilowatt to megawatt ratings in low voltage and medium voltage ranges.

Maximized life of pipework and valves

Small tanks and sewage facilities often have pumps that are frequently stopped and started. This causes extreme water turbulence in the pipework, so-called water hammer, which can lead to cavitation and failure of mechanical components. ABB drives can incorporate a soft-start facility that gently ramps the power up to limit this turbulence, bringing reduced maintenance.

Reduced cost of operating isolated sites

Many pumping stations are in remote areas, making round-the-clock staffing expensive and impractical. ABB's range of intelligent AC drives can be controlled remotely, bringing big savings on the cost of operating isolated sites.

Freedom to interface with all systems

ABB drives offer the widest range of serial link modules, enabling interface with any control system.

Fast response to increased pumping demand

Special control macros are specifically designed for the water industry, including multiple pump systems. Macros will command the drive to bring in additional pumps as pressure drops, thereby providing a fast response to increased demand.



Applications

Xinxiang Fourth Water Plant, China: Constant pressure water system cures water hammer

Challenge

The Xinxiang Fourth Water Plant in China's Henan Province was suffering from variable water pressure and inconsistent water discharge problems, risking reduced water quality and cracked pipelines.

Each of the five 400 kW/10 kV pumps was started direct-on-line at full water pressure. Residual water in the pipeline was propelled at high pressure causing water hammer and the risk of damage to pipelines.

Solution

Five ABB industrial drives allow a soft start for the pump motors, smoothing demand and reducing the stops and starts that cause water hammer.

As the water pressure changes, the ABB drives guarantee constant pressure by adjusting the pumped water discharge through prompt, closed-loop control of the water pumps' motors, using the drive's built-in PID controller.

Benefits

Each drive is saving around 500,000 yuan (\$76,000) a year. In addition, the drives reduce the frequency of pump on/off cycles, extend the equipment's life and lower the noise level at motor start and stop. Other advantages include a full range of available power variants and easy maintenance.



Using ABB industrial drives provides a soft start for the motors, decreasing the current shock they experience on starting, reducing the frequency of pump on/off cycles, extending the equipment's life, and lowering the noise level at motor start and stop.

Applications

Southern Water Services, UK: Harmonic currents eliminated

Challenge

Southern Water Services (SWS) needed to improve the pumping facilities at its Range Road pumping station at Hythe in Kent, UK. The forwarding pumps at the plant ran at a fixed speed and intermittent flow allowed air to accumulate in the rising main. Damaging harmonic effects also needed to be avoided.

Solution

Low voltage AC drives were suggested to eliminate the problem and improve performance. The site already has a duty and standby AC drive system for the storm pumps, together with two diesel powered generator sets for automatic back-up.

A survey showed that although the mains supply from the electricity company would not be affected by harmonics, the emergency generators would be.

“The problem is solved using ABB regenerative drives, which produce very low levels of harmonic currents. The ABB solution is the most cost effective option and is certainly cheaper than replacing the two 350 kW generators,” says Andy Davenport, project engineer with Laing Utilities.

Benefits

The low voltage AC drives produced a smoother flow and also eliminated any danger of harmonic currents. SWS avoids the need to replace the standby generators.



ABB drives systems were designed to help Southern Water Services upgrade one of its pumping stations, while avoiding damaging harmonic effects.

Applications

Pietarsaari pressure boosting station, Finland: 30 percent less energy and better control

Challenge

The water supply for the city of Pietarsaari, Finland, is taken from a local river. Following treatment at a waterworks, the water is pumped to a storage tank and pressure boosting station, which feeds water directly into the distribution system and seeks to maintain constant pressure in the pipes.

The pressure boosting station is equipped with two 75 kW and one 37 kW electric pumps, with a diesel-powered pump as back-up.

Solution

The station was recently upgraded with ABB industrial drives to operate the pumps. The drives have intelligent pump control program for ABB industrial drives which incorporates all the functions generally required by pump users. In this case the functions used are multipump control, pump priority and flow measurement.

Multipump control is used to operate several pumps together. Each pump is controlled by its own drive, with one being speed adjusted and the rest run at constant speed. This gives smooth control with no pressure peaks.

Benefits

The drives reduce energy consumption by about 30 percent. ABB industrial drives maintain stable pressure without any water hammer effect. This reduces pipeline stresses, resulting in fewer leaks and reduced maintenance requirements. At the same time, the use of drives avoids disturbance to the electrical network compared to direct-on-line starting.

The use of intelligent pump control also eliminates the need for a PLC, contactors and other external equipment.



The water supply for the city of Pietarsaari, Finland, is taken from a local river.

Applications

West of Scotland Water, UK: Close pump control doubles efficiency

Challenge

There was a requirement to improve the efficiency of West of Scotland Water's Lomond Street wastewater pumping station in Helensburgh, West Dunbartonshire, Scotland.

Solution

The wet well is monitored with ultrasonic level instrumentation, generating a speed reference signal, which is fed to an ABB industrial drive. This increases or decreases the pump speed to give optimum energy efficiency, replacing simple on/off control of the motors. Flow rates, combined with the kilowatt-hour readings from the drives, give a pumping index for each pump.

"Indications are that the electricity consumption has been reduced by 48 percent, compared to the same period in the previous year. I estimate that 44 percent of the savings can be put down to maintenance and 56 percent to the drives," says Charles McCaig, Electrical Design Engineer at West of Scotland Water's Planning & Capital Procurement Department.

Benefits

The company predicts the ABB drives will save at least 80,000 pounds (\$125,000) in electricity costs over a 20-year life span while minimizing the risk of overflowing, as the pumping index has been increased from 14 to 30 m³ per kWh consumed. The installation has also reduced noise.



Two ABB drives keep the water flowing at the Helensburgh pumping station, with a predicted 80,000 pounds in energy saving.

Applications

Northumbrian Water, UK: Reducing energy costs

Challenge

Northumbrian Water's Winston village pumping station in the UK has two duty standby submersible pumps on a sewage pumping application. The pumps are 3 kW units designed for 3-phase, yet the supply to the site is a 480 V split phase.

To avoid the costs of installing a full 3-phase supply, the challenge was to run this 3-phase equipment from a 2-phase supply.

Solution

The problem was solved by ABB Drives Alliance partner Quantum Controls. Using an ABB drive, Quantum used the existing 2-phase supply to create a synthetic 3-phase supply.

"The electricity supplier often finds it impractical to provide a 3-phase supply to the more remote sites, making use of a split-phase arrangement instead. Upgrading the supply to 3-phase would have cost up to 50,000 pounds (\$78,000)," says Bob Dixon, Project Manager for Northumbrian Water.

Benefits

As well as saving 50,000 pounds (\$78,000) in capital costs, the ABB drive is also estimated to be saving 20 percent on the energy cost of running the pumps at Winston village, compared to the old fixed speed method. As well as this, the application benefits from the drive's soft start saves mechanical wear on the motors.



An ABB drive is helping Northumbrian Water to save up to 50,000 pounds by running its 3-phase equipment from a 2-phase supply.

Applications

Palma de Mallorca, Spain: Drives boost sewage pumping station efficiency

Challenge

EMAYA SA, the water supply and waste utility for the Spanish city of Palma de Mallorca, wanted to upgrade its wastewater pumping stations. Palma's sewage system consists of a chain of tanks, with wastewater being rapidly transferred from one tank to the next and finally to a treatment plant. The first pumping station that was upgraded, previously stored wastewater in a tower.

Solution

The pumping station has now been replaced with a 15 000 liter underground holding tank. Four 60 kW submersible pumps have been installed at the station. Each pump is operated by an ABB industrial drive running intelligent pump control program.

The four drives and pumps provide an unprecedented level of fail-safety. Even at peak times, only two pumps are required to empty the tank, and one pump can cope during lighter loads.

Two pumps are always ready to start up if necessary. Thus, if a pump should fail, another one immediately takes over. The pumping station is also equipped with a back-up diesel generator.

Intelligent pump control's pump priority control function balances the operating time of all the pumps. As all four

pumps are run, two at a time, maintenance can be scheduled so that all the pumps can be serviced at the same time.

The ability of the system to withstand disturbances was demonstrated during commissioning, when the power supply to the optical distributor was temporarily switched off. The pumps were unaffected and continued operating as stand-alone units.

Benefits

Four pumps provide unprecedented level of fail-safety, as two can handle the maximum load. The anti-jam feature performs preventive maintenance on pumps. Furthermore, there is no restriction to flow in the pipeline, so less risk of clogging and blockages.

Another benefit of using ABB industrial drives in a pumping system of this kind is that the overall system is very straightforward. The system consists only of the drives and pumps, with no need for a dedicated control unit with the extra wiring and complexity that involves.

"This pumping station was old, and there were also odor problems. Simply put, the local environment needed improving," says Lorenzo Mestre, Industrial Engineer at EMAYA.



Four ABB industrial drives are helping boost sewage pumping efficiency at EMAYA's wastewater station.

Applications

Aqua Latina, Italy: Greater control accuracy for water pumping station

Challenge

The Fonte La Penna pumping station can deliver 144 m³ of water per hour to the 20,000 inhabitants of Sezze Latina near Rome.

Two 132 kW submersible pumps draw water from wells and feed it to an accumulator tank. From here, three parallel 75 kW pumps feed water to the town's distribution network, as well as to a further accumulator tank located at 440 meters above sea level.

When the switch room was destroyed by fire following a storm, owners Aqua Latina asked ABB to replace the control system.

Solution

The mechanical control system was replaced with five ABB industrial drives. The submersible pumps now use 4/20 mA level transducers in the accumulator tank to keep a constant level. Emergency level probes stop the pumps if the transducers malfunction. Discarding the power factor correction equipment has helped save space in the cabinet room while eliminating financial penalties.

Benefits

The intelligent pump control program divides the load between the pumps, giving all pumps the same number of running hours, without the use of a PLC. If one of the drives stops or is taken out of service, the other drives continue to operate, making up the capacity lost and providing 100 percent redundancy.

A pressure transducer on the main riser controls the 75 kW pump motors, ensuring the correct flow is produced.



The switch room of the Fonte La Penna pumping station in Sezze Latina, near Rome, had its outdated control system replaced with low voltage AC drives, resulting in better operation and reduced energy bills.

Applications

City of Lawrence, Kansas, USA: Drives cut water pumping maintenance

Challenge

To deal with the wastewater that its 90,000 inhabitants produce, the City of Lawrence, employs 725 km of sewers and 33 lift stations that feed into a central wastewater treatment plant. Previously, the site ran its pumps when the water level in the wet well reached a designated point, triggering the starter to run the pump motors up to maximum speed as quickly as possible.

Because it used a direct-on-line starter, rapid acceleration created spikes and mechanical stress on the motor and pump. Starting and stopping caused wear and tear on the bearings and impellers, causing the motors to deteriorate. The aging equipment and increasing flow from new residential developments called for a station upgrade.

Solution

ABB industrial drives are installed on each of four new 93 kW pump motors with the aims to increase efficiency and power factor to improve electricity cost savings; extend the life of the motors and reduce repair costs; and minimize or eliminate harmonics.

The drives control the pump motor's speed, maintaining an optimum level that gives a constant flow between input and output, eliminating unnecessary pump starts. The drives respond to sensors in the wet well that are relayed to a PLC unit via DeviceNet. The wastewater treatment plant

communicates with the PLC unit at the lift station via Ethernet to ensure that wastewater levels are being pumped out consistently, based on established parameters.

Dave King, Wastewater Maintenance Manager for the city, says: "ABB drives give us the ability to handle the wide range of variations in wastewater flow entering the station due to time of day, time of year and weather conditions, as well as the capacity to accommodate future growth. The fact that we can now pump wastewater out at the same rate it enters also helps us reduce odors."

Benefits

By maintaining a consistent level in the lift station wet well, the drives help to avoid water hammer, which can damage pipes. Because the ABB industrial drives provide acceleration and de-acceleration ramps to the pumps, wear and tear on the pump mechanisms are reduced.

Because the lift station is located next to a residential district, minimizing harmonic distortion is a necessity. With the amount of dynamic load on the existing transformer, drives without harmonic suppression were not a viable option.

The ABB industrial drives feature an active rectifier to eliminate low-order harmonics, eliminating the need for equipment such as multi-pulse transformers or external filters.



ABB industrial drives are installed on four 93 kW pump motors to improve performance.

Applications

Helsinki Water, Finland: 20 percent energy savings with new drive control system

Challenge

Helsinki Water's Viikinmäki wastewater treatment plant in Finland treats all the wastewater from Helsinki and the surrounding area.

A sludge dewatering decanter centrifuge separates water from the solids. The main parts of the decanter centrifuge are the bowl and the scroll (screw conveyor). Solids start to separate from the sludge in the bowl, wherein the centrifugal force accelerates the sedimentation process.

Both the bowl and the scroll rotate, but a speed difference between them augers the solids out of the conical end of the centrifuge. Liquids discharge from the other end.

Solution

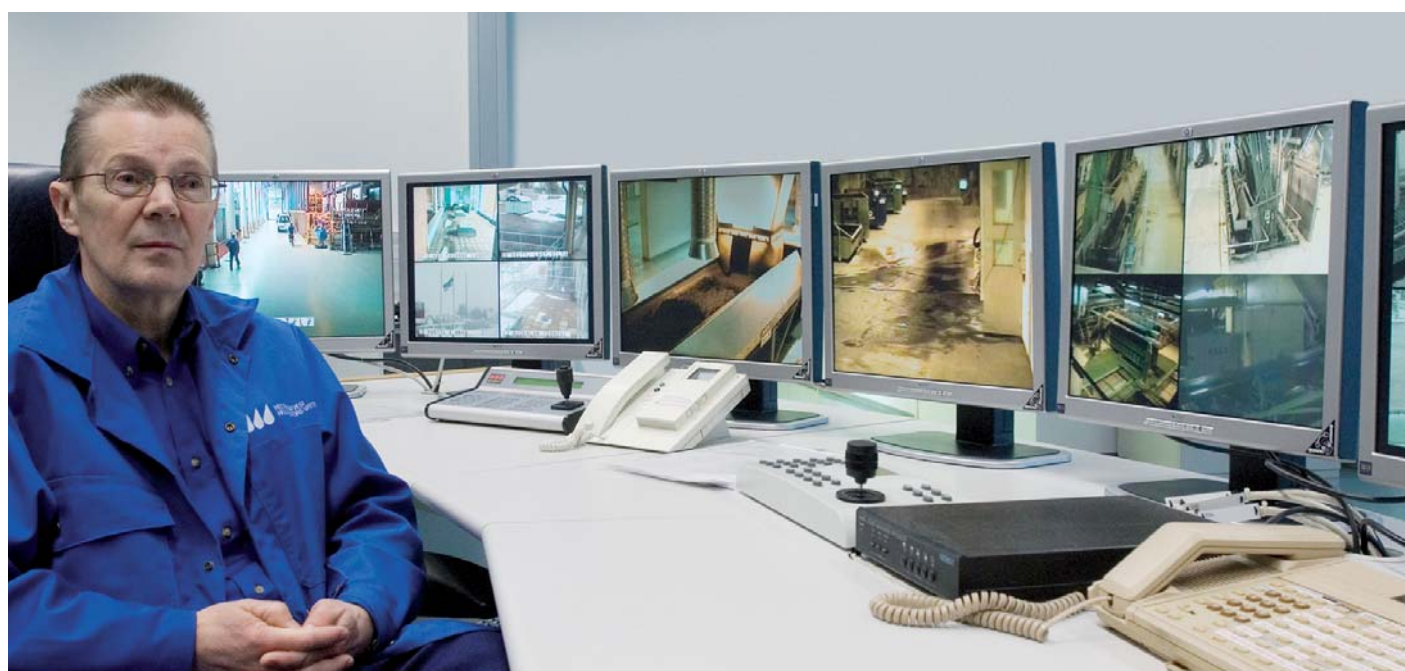
Originally, the decanter centrifuge was equipped with a hydraulic system to control the speed difference between the bowl and the scroll.

The hydraulic system in one of the centrifuges is replaced by an ABB industrial drive with a newly developed decanter centrifuge application. ABB industrial drives are also used for the bowl and for the scroll drive.

Benefits

AC drives require much less maintenance than the old hydraulic system and less space for equipment. The control of the decanter centrifuge is now more accurate than before, giving greater process stability. Start-ups and shutdowns have become easier.

Energy savings of 20 percent are achieved due to the new control system. The hydraulic control required a 75 kW scroll motor, whereas with an AC drive, a smaller 22 kW motor is sufficient.



Helsinki's Viikinmäki wastewater treatment plant uses an ABB industrial drive to replace a hydraulic system used to control the speed of a centrifuge.

Applications

United Utilities (formerly North West Water), UK: Meeting environmental targets

Challenge

United Utilities (formerly North West Water) needed to find an alternative to its sludge-to-sea operation for the 1.9 million wet-tonnes of waste material that was dumped in the Irish Sea each year.

Solution

Four 500 kW motors and two ABB multidrives, each with two 630 kVA inverters, are installed at the Sandon Docks wastewater pumping station to transfer domestic and commercial waste from the Liverpool catchment area to the newly commissioned Shell Green wastewater treatment facility, 18 km away.

Both drives control two motors: under normal conditions, two pumps are used to lift the sludge some 20 meters up to the filtration compartment. A third pump is used as required, with a fourth used as a stand-by.

“This solution is a big step forward in reducing the environmental impact of dumping wastewater in the Irish Sea,” says Bob Godfrey, Commissioning Manager for United Utilities.

Benefits

The ABB industrial drives help United Utilities meet its environmental commitments. During the sludge-to-sea operations the fermented sludge was stored in two 9,000 m³ tanks before being transferred onto a sludge ship to be dumped at sea. Now the waste is pumped from the storage tanks to the treatment works at Shell Green.



ABB motors and drives are enabling North West Water to curb the environmental impact of its 'sludge-to-sea' operation from its wastewater silos in Merseyside.

Applications

M/S Torishima Pump Mfg Co., Qatar: Increased pumping capacity with low harmonic distortion

Challenge

M/S Torishima Pump Mfg Co. needed 40 variable speed drives and 34 process performance motors for use in a variety of water pumping stations and refurbishment projects in Qatar. The projects are seeing the capacity of a number of pumping stations increased, resulting in pump sizes being changed and other pumps added.

Solution

ABB supplied cabinet built versions of its low harmonic drive rated 160 kW, 200 kW, 355 kW and 400 kW and cabinet built up to 2700 kW with IP21, IP22, IP42, IP54 and IP54R protection.

Benefits

ABB low harmonic drives produce exceptionally low harmonic content in the drive input based on the use of an active rectifier, along with the motor control method, direct torque control (DTC) and the use of a low pass filter, giving a total current distortion of less than five percent.

The electrical system is also more reliable, due to avoiding external harmonic filters. Expensive multi-winding transformers are also unnecessary.

ABB works in close co-operation with the customer to identify and provide the best technical solutions, as well as thoroughly following up project developments to ensure customer satisfaction and success.



Some 40 ABB drives are used at a variety of water pumping stations throughout Qatar.

Applications

Gold Coast desalination plant, Australia: Minimal energy consumption

Challenge

The Gold Coast desalination project in Queensland, Australia, is designed to ensure a reliable water supply to residents during an emergency. It provides 125 million liters of potable water each day to the Gold Coast and South East Queensland.

In desalination, one of the major needs is to minimize energy consumption and operating costs. It is these challenges that the ABB motors and drives, planned for installation at the plant, have helped address.

Solution

The motors and drives are used on the first and second-pass reverse osmosis pumps, as well as on the energy recovery device (ERD) booster pumps.

Over 100 low voltage AC drives are installed to control intake, booster, filter backwash and potable water pumps, ranging from 250 to 900 kW. The drives are supplied with a number of ABB accessories that match the particular needs of the application, including PROFIBUS adapters and EMC filters to protect against radio frequency interference.

RTD temperature monitors are used to check the temperatures of motor windings and the bearings in the motors and pumps, allowing for predictive maintenance.

Benefits

The ABB motors have an energy efficiency of 97 percent and are saving hundred of thousands of dollars in running costs, as well as saving many tonnes of carbon dioxide gas from being released into the environment.



Over 100 low voltage AC drives control intake, booster, filter backwash and potable water pumps.

Applications

Wiggenhall St Germans pumping station, UK: Protecting against flood risk

Challenge

The pumping station at Wiggenhall St Germans, UK, protects a 700 km² area of land from flood risk. With four pump sets delivering a total capacity of about 70 m³ per second, it lacks the capacity to deal with extreme events that climate change may cause. At 70 years old, it has also reached the end of its operational life.

Solution

ABB advised the consultant and contractors on the possible technologies for the new pumping station. The eventual choice was six 1250 kW ABB industrial drives, each driving a new pump set which will raise 16.66 m³ per second to a static head of 4.25 m, giving a total capacity of 100 m³ per second.

No more than three pumps at a time will be run, with a rotation system used to ensure that the pumps are used equally. The pump impeller and low voltage AC drive control have been carefully designed to prevent cavitation occurring at the extremes of high or low head.

Benefits

The drives give the new station the capacity to deal with extreme events, although in normal conditions, the drives adjust the pumps to suit a wide range of flows. Each pump operates to match the actual flow demand and can respond immediately whenever circumstances change. The new pumps also provide quicker response at start-up as they do not need priming, as is the case with the existing units.



Six, 1250 kW ABB industrial drives control pump sets at the St. Germans pumping station.

Expertise

As the premier company for low voltage AC drive technology, ABB has amassed a wealth of knowledge and expertise on all aspects of drive systems throughout the water and wastewater sector. ABB has dedicated experts who understand all details of water and wastewater sector applications; talk your language; and can offer the quickest route to a profitable solution, without forgetting personnel safety and environmental responsibility. Here's how:

Leading technology in design and production

For over 100 years, ABB has consistently invested a large proportion of its turnover in research and development, working closely with some of the world's leading universities and institutions. The result is the most advanced range of low voltage AC drives in the market, designed to meet the specific needs of various water and wastewater sector applications. This has also led to several patents for leading edge technology within ABB drives.

ABB's reputation is further enhanced through its work with world-leading authorities and legislative bodies. This cooperation contributes to the safety of ABB's products and thus the personal safety of the users.

Cooperating with its sub-suppliers, ABB can exploit the latest component technology when designing its drive products. This results in improved quality of ABB's drive products and in enhanced component quality.

ABB's drive manufacturing facilities are equipped with the most modern production lines using the latest production techniques and advanced software. Precision robots combined with fully automated material flow and testing routines guarantee high quality of products and short throughput times.

As part of its supply chain management, ABB is the first company in Europe using radio frequency identification (RFID) of components which considerably improves product quality and traceability.

Product reliability is further enhanced through stringent quality control procedures, with all manufacturing facilities operating to ISO 9001. Identical manufacturing facilities are located in Finland, the USA, China, India and Estonia.

Complete technical advice from selection to installation and use

ABB constantly monitors all legislation, regulations, directives and standards, not only ensuring that its products comply but by offering sound advice to customers. Examples of directives guiding the design and use of AC drives are the European



EMC (electromagnetic compatibility) directive and the low voltage directive.

Another example is ATEX, which became mandatory in July 2003. ATEX is the European regulation covering equipment intended for use in potentially explosive atmospheres. ABB is one of the first companies to gain blanket ATEX certification for its ABB industrial drives and flameproof and non-sparking motors, for use in hazardous areas. By gaining the blanket certification, ABB provides combined ATEX-approved drives and motors packages that do not need further testing on site.

ABB's expertise extends throughout water and wastewater treatment plants' entire electrical installations. ABB's engineers can advise on the correct selection, dimensioning, installation, operation and maintenance of drives, motors, transformers, relays, switches, contactors through to transducers and meters. Advice is available on long cabling, weak networks, protection functions, harmonics, EMC, power factor correction, mounting options and air flow requirements.

Using harmonic filters developed by ABB eliminates the severe plant disruptions caused by harmonic disturbances in electrical equipment. ABB offers proven ways to assess the users' vulnerability to harmonic problems and the need for filters.

In water and wastewater treatment plants, the consumption of inductive reactive power is significant. Reactive power compensation equipment offered by ABB helps minimize the amount of reactive power.

In many applications there is a need to interface the drives with external systems. ABB has the expertise in all high performance communication protocols.

ABB offers knowledge-based publications which include a series of detailed technical guides covering harmonics, EMC, bearing currents and motor control platforms, through to single page FactFiles, offering the latest thinking on topical subjects. These, and much more, can be downloaded from www.abb.com/drives.

Thorough process know-how for improved competitiveness

Not only is ABB the leading supplier of low voltage AC drives, but it has also built a formidable knowledge databank of all applications from pumps, fans and compressors through to conveyors and mixers.

This know-how has been honed in tackling many unusual applications across a variety of industries. As such, ABB boasts that no application is beyond its experts. Today, ABB has created an enviable team of dedicated industry specialists whose focus is on their chosen industry but who share the knowledge from other sectors to their benefit.

This pioneering spirit has its roots in the 1970s when ABB developed the very first high-power AC drive. In subsequent decades, ABB has led a technology revolution, which is driven by the needs of its customers. ABB is recognized as the world's leading application engineering organization.

ABB's advice covers all aspects of process control and focuses on increasing production capacity, improving end product quality, reducing waste and maintenance costs.

Sustainable development for people and the environment

All water and wastewater treatment plants experience financial and environmental pressures to reduce energy consumption.

One of the biggest benefits of using AC drives is the energy saving opportunity over fixed speed motors. As such, ABB is a world leader in assessing the energy saving potential within all industries.

A structured process that includes an energy appraisal, coupled with a series of energy saving tools, has been devised to ensure that customers see the benefits of changing to AC drives. Greenhouse gases are also reduced thanks to AC drives.





ABB has devised a replacement drive scheme for upgrading older, inefficient drives for new, space saving and highly efficient ones. Following an assessment of a plant, ABB helps select a replacement drive with improved efficiency and features for the application.

In some countries, ABB is able to remove the redundant drives, regardless of the original manufacturer and ensure that they are disposed of in accordance with the latest world standards. ABB's commitment to the environment means that old drives are recycled whenever possible. All new products, even the packaging, are designed for recycling.

The ISO 14001, international environmental management standard, has been implemented and the Finland factory is certified since 1996. Life cycle assessment is applied continually to all product development. All certificates and declarations relating to environmental issues can be found at www.abb.com/drives.

Health and personnel safety is a fundamental part of ABB's commitment to sustainability. ABB cares deeply about how its operations and products affect its employees, customers, contractors and neighbors.

Many of the industries in which ABB works – often on customer sites – are by their nature very challenging and, accordingly, ABB operates to the highest standard of occupational health and safety excellence, and remains constantly vigilant in carrying out its duty of care.

ABB's ultimate aim is to prevent all accidents, injuries and occupational illness through the active participation of its customers, contractors and employees.

The successful management of safety starts with the involvement of everyone, from the CEO to ABB's front line workers in a systematic and continual focus on hazard recognition and mitigation.

ABB's combined efforts and commitment allows it to achieve continuing improvement in its safety record.

ABB technical partner network



The ABB global technical partner network brings ABB's products and services straight to your front door. The partners have in-depth knowledge of local markets and are conversant with the ABB low voltage drives products and processes. Many of them also have extensive industry and application knowledge and experience.

The technical partner network includes technical distributors, system integrators as well as electrical wholesalers. Each brings its own set of skills and services and, collectively, they can tackle all your diverse drives needs, and a lot more.

Customer driven network structure

ABB technical partners are authorized according to a global program. They provide a quality of services that are world-class and globally consistent.

All ABB technical partners are authorized for the relevant category of the partner program. The category describes the product line and services the partner is authorized for and promoted by ABB towards the end-customer.

Partner companies are regularly trained and audited to provide consistency in the services and support. Together ABB and the partners strive for continuous quality improvement for products and customer services.

Maximized process up-time and energy efficiency

The partners are fully conversant with ABB drives and many have thorough application knowledge. The partners can help with all kinds of drives and motors related issues to improve process efficiency, and offer support wherever and whenever it is needed.

The ABB drives technical partner network provides consistent and authorized quality in sales, support, service and engineering, both globally and locally.

Via dedicated sales engineers and authorized technical personnel, the ABB technical partner network provides the following services:

- Optimized product dimensioning and selection
- Technical product support
- Engineering
- Installation
- Commissioning
- Preventive and corrective maintenance
- Spare part services
- Training
- Access to an extensive stock of ABB products and spare parts

Categories and main focuses

All ABB technical partners are authorized for the relevant category of the partner program.



Find the members of the network at www.abb.com/drivespartners.

Services

ABB has the largest service team of all drives suppliers. Field service engineers with experience within the water and wastewater sector are located worldwide.

The service team works to the ABB drive life cycle management model. This model offers maximum profit for your investment by maintaining high availability, eliminating unplanned repair costs and extending drive lifetime.

The life cycle management model comprises a palette of dedicated services for the entire life cycle of ABB low voltage AC drives. Services include:

Energy appraisal

The increasing interest in AC drives in the water and wastewater sector is partly due to a greater awareness of energy issues and rising energy prices. In many countries, ABB offers energy appraisals that can rapidly determine just where and how much energy can be saved.

Power savings up to 50 percent can be reached by reducing the motor speed by just 20 percent, with payback as short as six months.

Harmonic survey

ABB collects data on harmonic currents and voltages interfering with the electricity supply network and details actions to minimize them.

Selection and dimensioning

Whatever the water or wastewater treatment application, ABB's vast experience will help in the correct selection and dimensioning of the drive. This ensures the correct drive installation, powerful enough for your motor requirements.

Installation and commissioning

ABB's certified engineers install and adjust the drive according to the application requirements as well as to instruct the user on how to operate the drive. All commissioning information and the production parameters are saved, should the engineer need to restore any information at a later date.

Training and learning

ABB offers dedicated drives training for service and operating personnel to acquire the skills to use ABB drives correctly and safely.

Technical support services

Technical support services provide accurate, consistent and responsive information and support to all ABB customers.



Maintenance and repair

ABB recommends regular preventive maintenance throughout the lifetime of low voltage AC drives.

Maintaining drives in accordance with the maintenance schedules, ensures maximum availability, minimum repair costs, optimized performance and extended lifetime of the drive.

Maintenance can be performed on a contract basis.

Drive preventive maintenance (PM) consists of annual drive inspections and component replacements according to the product specific maintenance schedules using PM kits which contain all the service parts and materials defined for a certain preventive maintenance.

ABB's certified engineers provide maintenance and repair services on site and in authorized ABB drive service workshops.

Workshop services include:

- Module maintenance and repair service - instead of performing maintenance or repair on site, modules can be sent to an ABB drive service workshop. It is often practical to recondition the drive at the same time.
- Exchange unit service - a convenient and fast way to fix a problem with a drive is to order an exchange module. A reconditioned drive is immediately shipped to the customer (subject to availability). The defective but repairable unit is returned to ABB.

Spare part services

Genuine ABB factory-certified drive parts are delivered quickly worldwide. They guarantee full compatibility and are available throughout the drive lifetime following the drive life cycle model.

Spare part services include:

- Parts OnLine - a web based spare part information and ordering system for quick and easy access from your PC around the clock. Address: www.abb.com/partsonline
- Conventional spare part service - contact your local ABB representative for spare part orders.
- 24-hour emergency spare parts service - provides spare parts 365 days a year.
- Preventive maintenance kits - contain all the replacement parts for a scheduled maintenance.
- Inventory Access - an ABB owned and maintained spare part inventory at the disposal of a customer. This spare part inventory is usually located at the customer's site or at an ABB location. This service provides the customer with up-to-date spare parts with no capital investment for a fee that is based on the inventory value and duration of the contract commitment.

Upgrade and retrofits

Drives upgrade and retrofit offerings are designed for improved performance and extending the life cycle, resulting in the best possible return on your drive assets.

Replacement and recycling

ABB's replacement drive scheme provides a correctly dimensioned drive, while disposing of old equipment. The scheme covers any drive or motor, regardless of the original manufacturer.

ABB drive life cycle management model

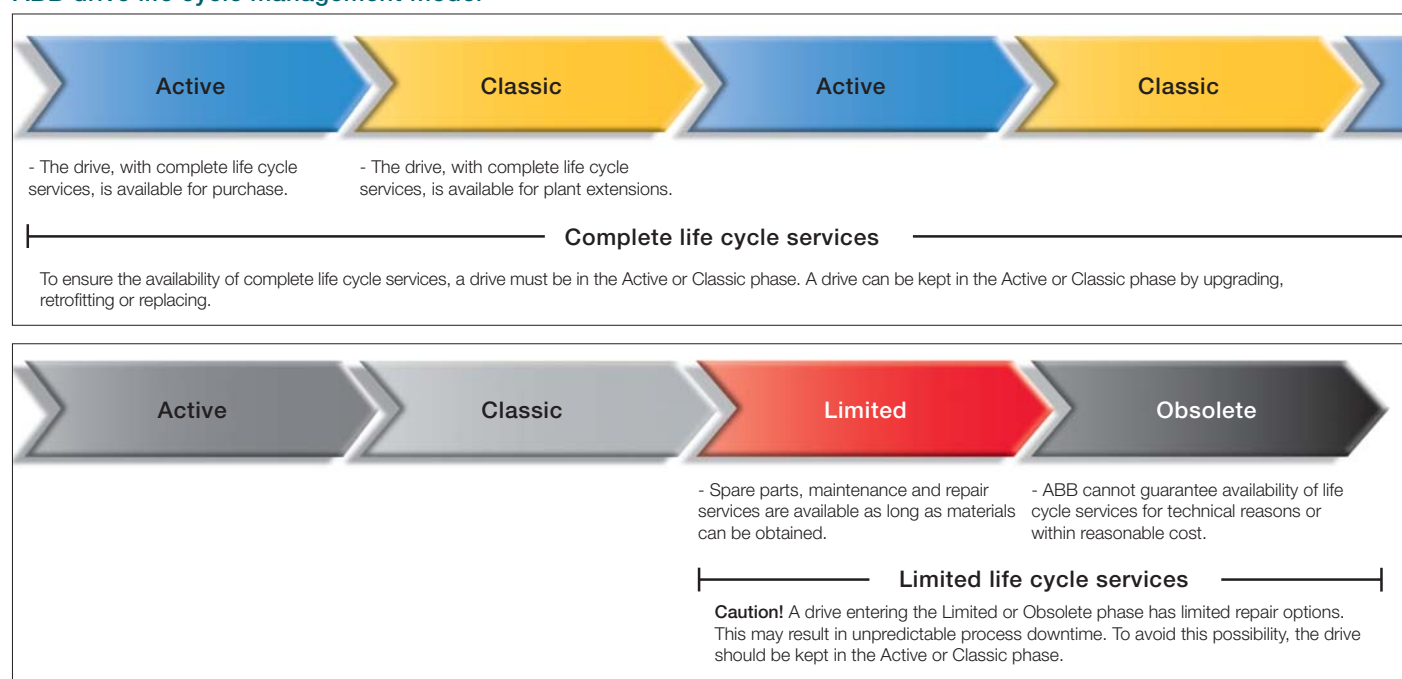


ABB follows a four-phase model for managing drive life cycles, which brings enhanced customer support and improved efficiency.

Examples of life cycle services are: selection and dimensioning, installation and commissioning, preventive and corrective maintenance, remote services, spare part services, training and learning, technical support, upgrade and retrofit, replacement and recycling.

ABB drives for the complete water cycle

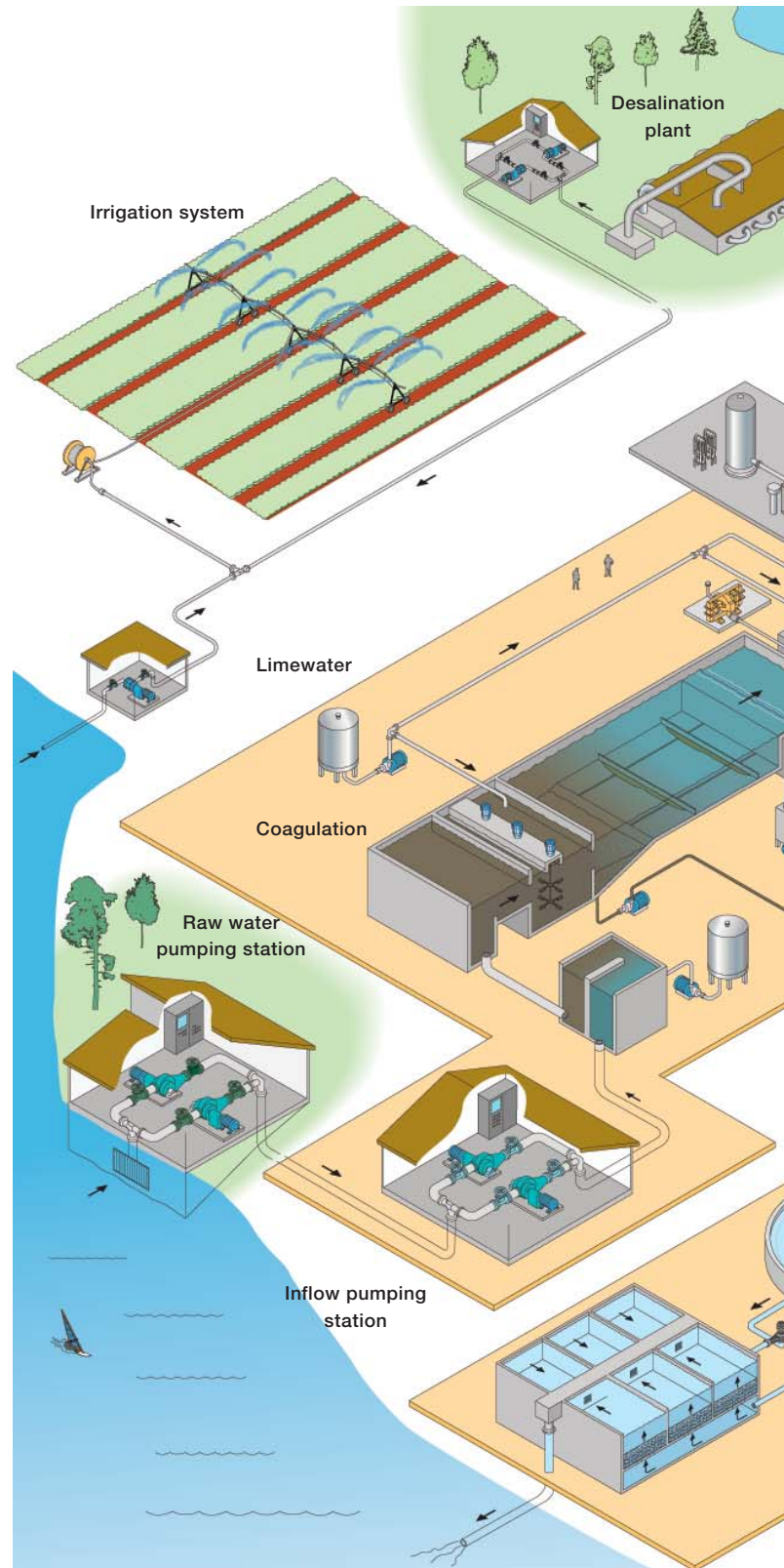
A key advantage of low voltage AC drives is their versatility which is highly visible in the water process. Throughout all stages of the water cycle – from water supply, process use and effluent treatment - ABB drives can be found accurately controlling water flow and reducing energy consumption, while lowering the overall maintenance costs.

While pumping is undoubtedly the biggest beneficiary of drives, there are many other suitable applications, including compressors, fans, centrifuges, mixers and screw conveyors that are used throughout the water process.

Innovative ideas, like ABB's intelligent pump control, incorporate all the functions most commonly required by pump users, while eliminating the need for an external PLC. This further helps to save energy, reduce downtime and prevent pump jamming and pipeline blocking.

The end result: improved asset life and increased plant availability.

The achievements of ABB drives and its support services is recognized by the international pump industry, with ABB becoming the first company to be awarded "Pump Industry Supplier of the Year" for three consecutive years, from 2007 to 2009.



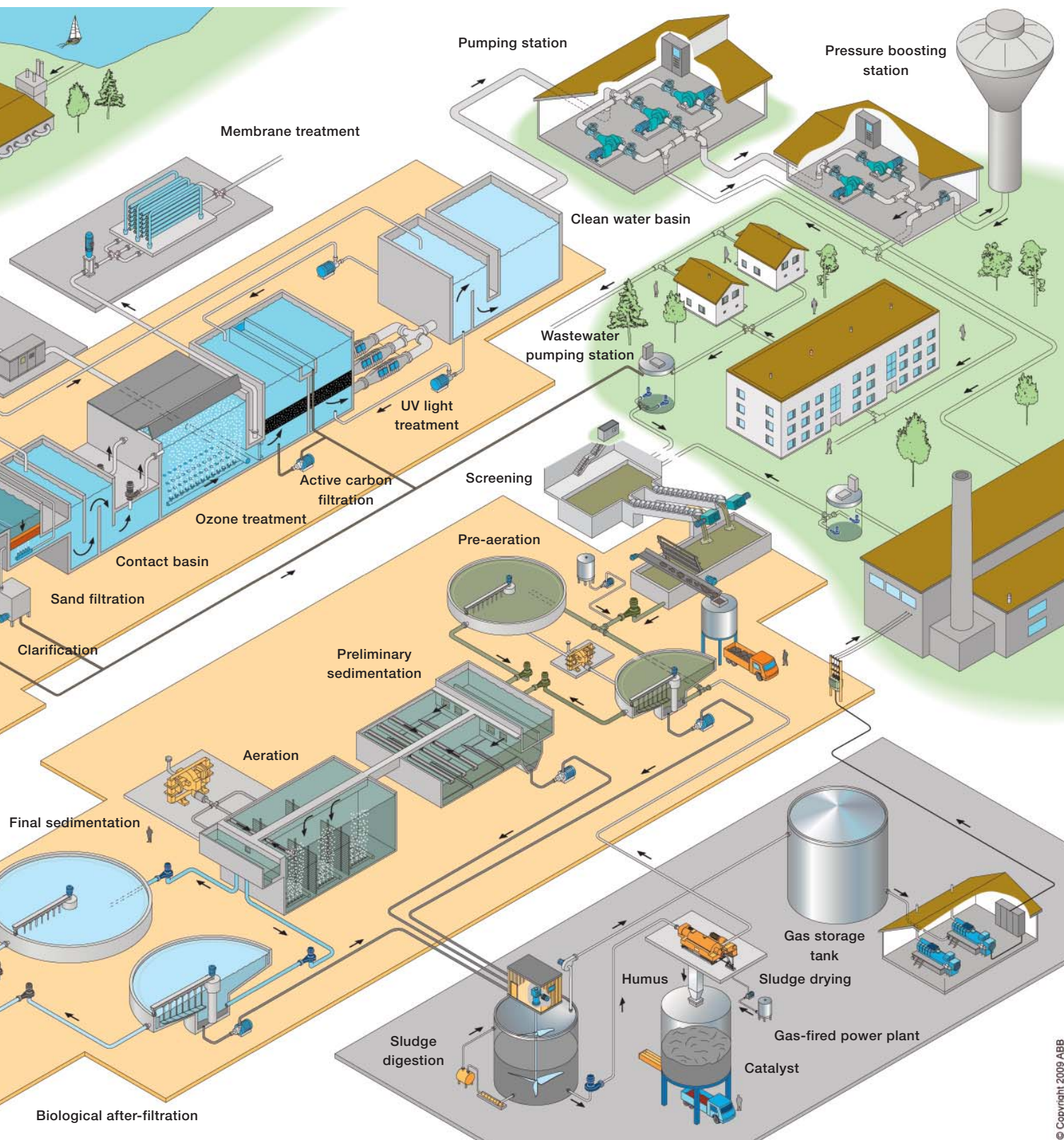


ABB in water

For purification, distribution and collection of water, ABB offers complete integration of instrumentation, control and electrical systems for water utilities. With innovative products and in-depth process and automation experience in the water utility business, the integration experts from ABB are able to deliver reliable and economical system solutions specifically tailored to your individual pumping stations needs.

ABB provides a broad range of products and systems equipment for water utilities such as instrumentation, drives and motors, substations, low and medium voltage switchgear, transformers and automation.

Motors

Since motors account for a major part of total consumed energy, increased efficiency levels are extremely cost effective. For this reason, ABB is one of the first companies to manufacture motors to the new harmonized IE (International Efficiency) grading standard IEC/EN 60034-30, which replaces the current voluntary EFF labelling scheme for single speed, three-phase, 50 and 60 Hz induction motors.

ABB totally enclosed motors are widely used for all kinds of pump applications. Energy savings and controllability are optimized when the motors are used with an ABB drive.

Low voltage motors

- Process performance motors for demanding applications, cast iron and aluminum frames, 0.25 to 1000 kW
- General purpose motors for standard applications, cast iron, aluminum and steel frames, 0.06 to 630 kW
- Hazardous area, high speed, water cooled and permanent magnet motors for special applications

High voltage motors

- Modular induction motors ranging up to 15 kV and 18 MW, 50 and 60 Hz
- High voltage cast iron motors ranging up to 2250 kW
- Synchronous and hazardous area motors

Medium voltage AC drives

Power range from 315 kW to more than 100 MW. Voltages 2.1 to 10 kV. Suitable for induction, synchronous and permanent magnet motors. ABB MV drives are suitable for new or existing motors and meet the most stringent requirements for current and voltage harmonic distortions as defined by international standards.

Instrumentation

ABB is one of the world's largest manufacturers of pressure and temperature transmitters, flow meters, recorders, analytical products and control valves.

Flowmeters

Including electromagnetic, coriolis, thermal mass, vortex, swirl, DP, and variable area including CalMaster (verification).

Pressure transmitters

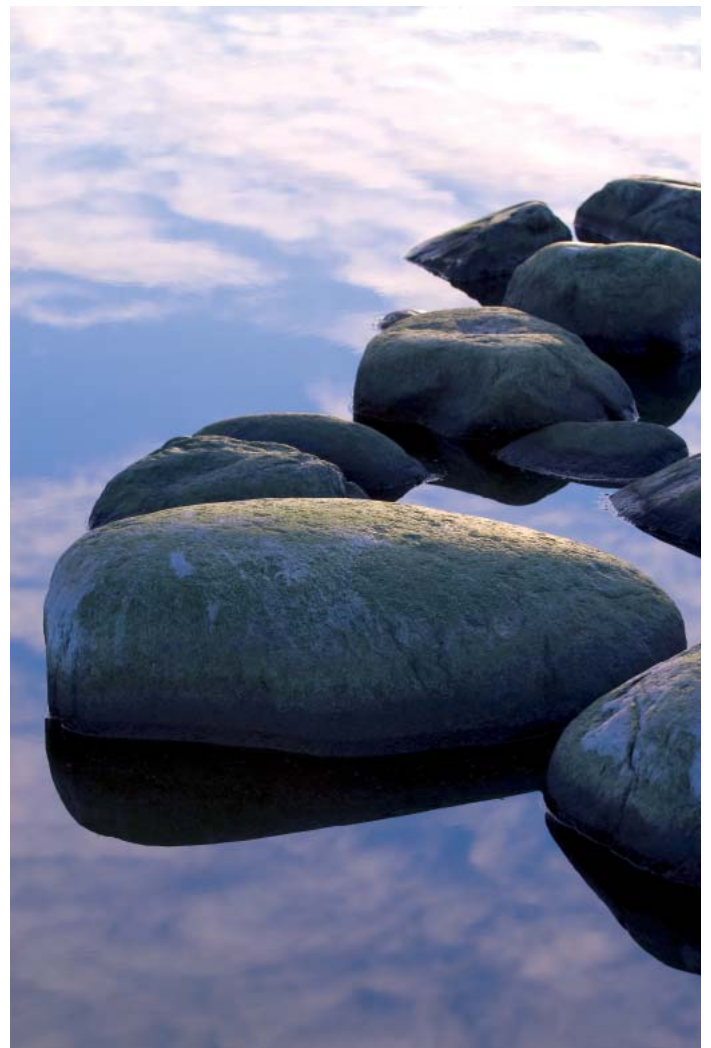
Including intelligent electronic transmitters for measuring absolute-, gauge-, differential- and level pressure.

Level measurements

Piezoresistive, variable capacitance.

Temperature measurements

Thermo-couples, thermo-resistances, transmitters.





Analytical instruments

- Sensors for conductivity, dissolved oxygen, pH/redox, turbidity analyzers
- Ion-sensitive and colorimetric analyzers: chlorides, fluorides, nitrates, phosphates
- UV monitors: nitrates

Recorders and controllers

Including circular or strip chart recorders, video graphic recorders, analog and digital indicators, single loop controllers.

Metering devices

Electricity meters: single-phase and three-phase meters.

Measurement instruments

Digital and analog instruments.

Low voltage systems

ABB builds best-in-class low voltage power distribution and motor control systems such as its MNS switchgear platform for low voltage (400 V and 690 V) Motor Control Center (MCC) and switchgear.

Low voltage products

Modular DIN rail products

A wide product range offering protection and switching, checking and monitoring, control and programming.

Circuit-breakers and switches

A range of MCBs, MCCBs, switch disconnectors, switch fuses and enclosed safety switches.

Motor protection and control

Including circuit breakers for motor protection such as modular motor starters, soft starters, contactors and miniature size contactors, thermal overload & protection relays, command and signaling units.

Electronic products and relays

Including power supply, relays (conventional and electronic), signal converters, timers, programmable logic controllers, I/Os, human-machine interfaces.

Enclosures

Sheet-steel boards, plastic enclosures, metal distribution boards.

Terminal blocks

Terminals for remote controls and power connections.

Other products

- Trunking systems
- Transformers
- Medium voltage switchgear, apparatus, modular systems (up to 52 kV) and distribution automation (up to 110 kV) for industrial, commercial and utility applications

Contact us

www.abb.com/drives
www.abb.com/drivespartners

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