

► Our technology. Your success.

Pumps • Valves • Service

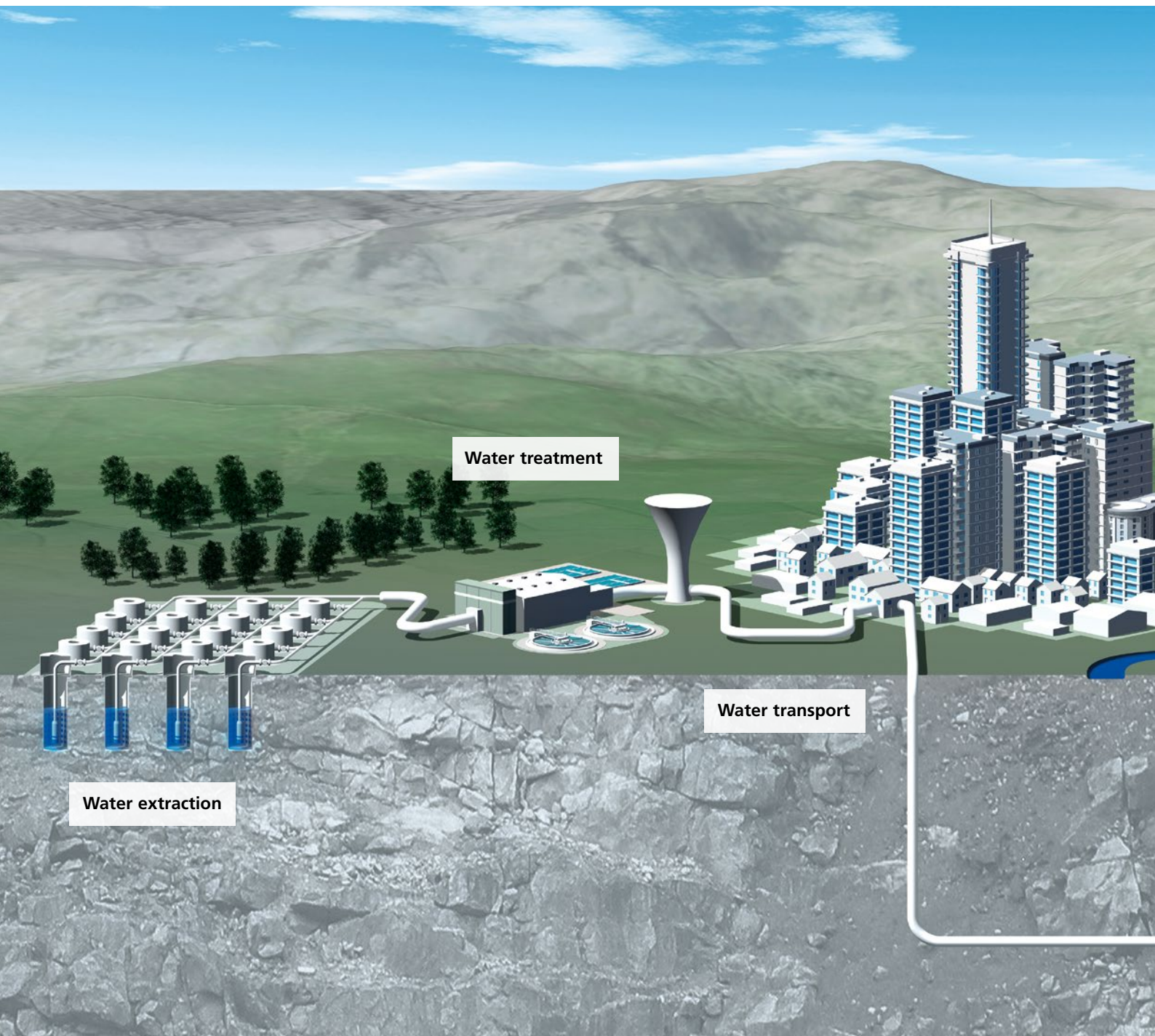


The cycle of solutions: water technology by KSB



Water is life – and our passion

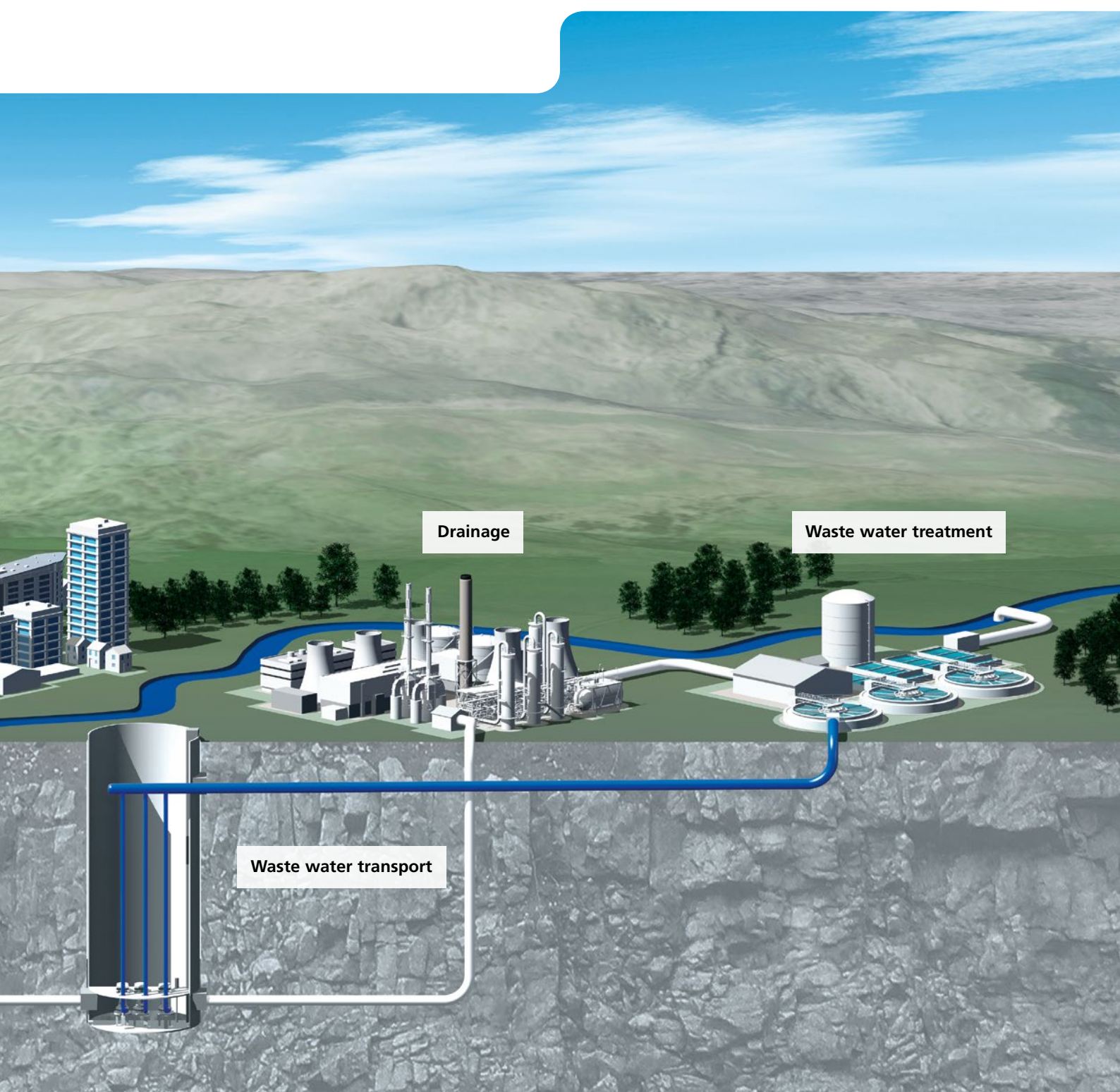
A responsible approach to water as a precious resource has always been one of KSB's core competencies. Some of the greatest challenges facing the world today involve the provision of clean water and the efficient treatment of waste water. In striving to meet these challenges, our product portfolio embodies an approach based on simplicity and sustainability when handling this vital resource.



As a globally active supplier of all-in solutions, KSB is able to offer a range of pumps, valves and associated services that cover the entire water cycle: all the way from water extraction, water treatment, water transport, drainage and the treatment and transport of waste water.

Whether in Sydney, London, Mexico City or St. Petersburg, KSB is on hand to offer truly global all-in solutions for water engineering.

Our role as a one-stop supplier goes far beyond providing a wide range of innovative products. Whatever your water or waste water needs, our 140 years of experience and expertise in the areas of planning, consultancy, research and development make us your first port of call.



Reliable water supply for New York: drinking water for the Big Apple

More than half of New York's drinking water is conveyed to the city via the Rondout-West Branch Tunnel of the Delaware Aqueduct – a 71 kilometre-long tunnel which supplies up to 37 m³ of drinking water per second via a natural incline from Ulster County located 160 km away. Measuring over four metres in diameter, construction of the tunnel was completed in 1944. As a result of geological conditions, the tunnel was losing up to 130 million litres of drinking water a day through leaks under the Hudson River.

To enable the tunnel to be pumped empty for repairs as quickly as possible, KSB supplied the most powerful single-entry submersible borehole pumps that our company has ever produced. Each of the 5 units is driven by a 2,000 kW, 4-pole electric motor operating at a voltage of 4,160 volts. The output of each pump is around 2,000 cubic metres an hour at a maximum rated head of 320 metres. In accordance with the customer's specifications, the components which come into contact with the fluid handled on selected pump sets are made of corrosion-resistant stainless steel. A special submersible connector system was used for the cable connections.



Valve for water extraction: SISTO-16TWA



New York relies on KSB's expertise



KSB UPA submersible borehole pumps



Water extraction with KSB: tapping all sources

Whether you need to pump surface water or tap groundwater from deep wells, KSB can provide equipment for all water extraction challenges. As a full-range supplier, we have the right products for virtually any application.

You'll not only find a comprehensive portfolio of dry-installed and wet-installed pumps for pumping surface water, but also the right valves for the job, e.g. the diaphragm valve SISTO-16TWA, and the requisite auxiliary equipment.

For pumping water from wells, we offer extremely durable submersible borehole pumps that meet the most stringent of drinking water requirements and also keep energy costs as low as possible thanks to their efficient motors. Even better: with our new UMA-S synchronous motors which offer over 8 % more efficiency compared to asynchronous motors, you can reduce your energy consumption even further.

Alongside comprehensive consultancy, at KSB you'll receive customer-specific solutions that go far beyond standard offers. For example, we tailor pump systems precisely to your individual requirements with selected engineering services. With our measurement equipment fitted to your well pumps, you can ensure that the pumps are run in the optimum range to keep the operating and maintenance costs as low as possible in the long term.

Seawater desalination by KSB: providing drinking water for Singapore

The SingSpring seawater desalination plant in Singapore is one of the biggest desalination facilities in Asia. It produces 136,000 m³ of drinking water a day via the reverse osmosis process, covering ten percent of the island state's water demand.

As an established specialist for desalination, KSB was able to supply Singapore with numerous high-pressure feed pumps, filtered water pumps, booster pumps and intake pumps.

Four pumps from the Amarex KRT K range, each capable of handling up to 5,000 m³ per hour, pump raw seawater into the plant's prefiltration system. 10 variable speed Omega pumps transport the prefiltered seawater to a total of

10 HGM-RO pumps; with a rating of 1,170 kW each, these high-pressure units force 708 m³ of seawater per hour through the osmosis membranes.

Thanks to a compact design, flexible connection nozzles and plug & play installation, KSB was able to supply the equipment ahead of schedule, enabling the construction costs to be kept to the absolute minimum.



Butterfly valve ISORIA 25



Salino Pressure Center: low life cycle costs thanks to 4-in-1 technology



City-state of Singapore – the smallest country in South East Asia desalinates seawater with KSB

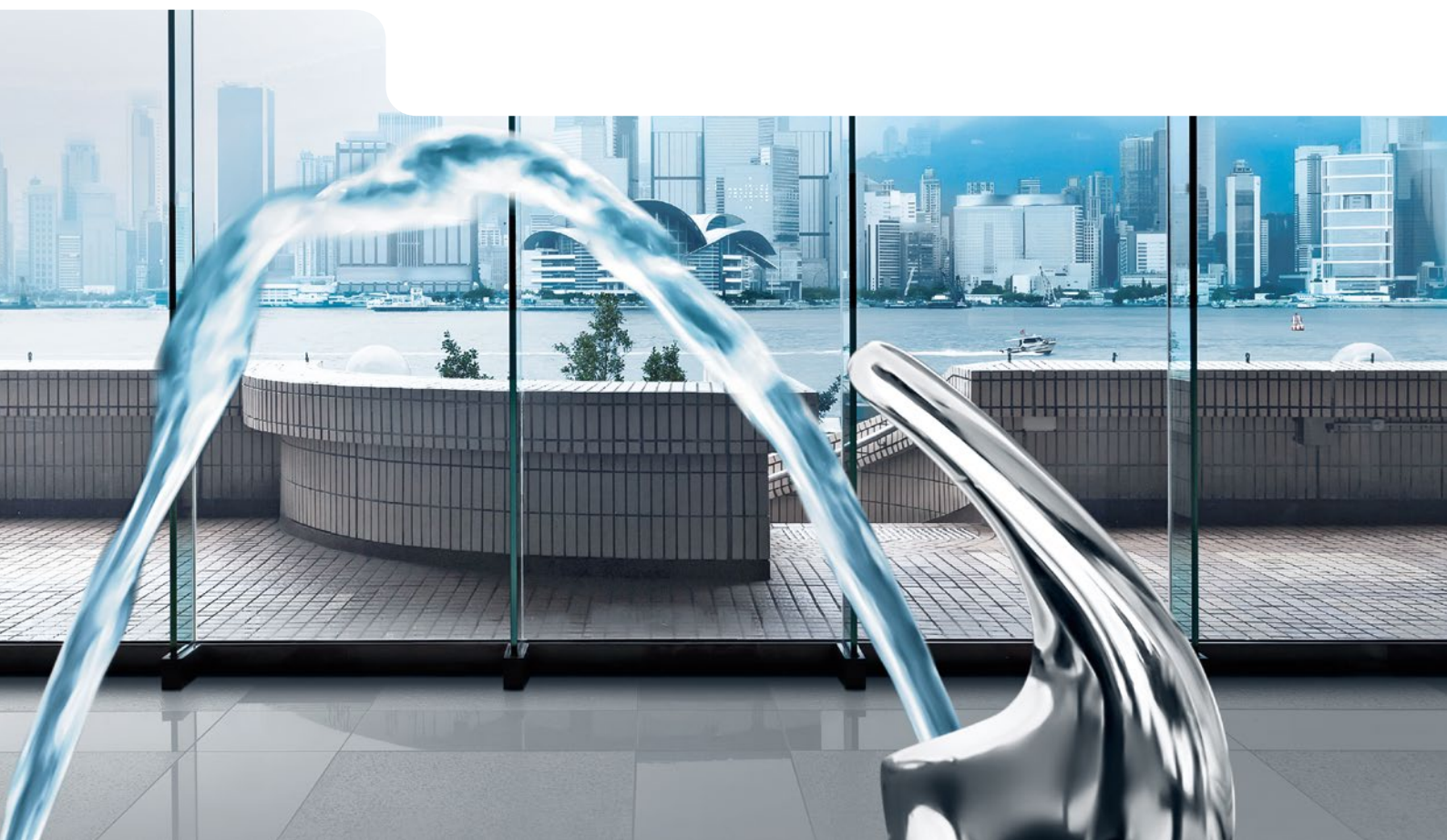
**Innovative, durable and efficient:
KSB solutions for water treatment**

KSB is a globally recognised specialist in the field of water treatment and seawater desalination. Our pumps, valves and services set technical standards in waterworks and desalination plants.

We have become the global market leader for desalination plant equipment with our solution-orientated approach and innovative products. For example, we have tailored our HGM-RO high-pressure pump to meet the requirements of seawater desalination. Our Salino Pressure Center is the first ever 4-in-1 solution, replacing a high-pressure pump, energy recovery device, booster

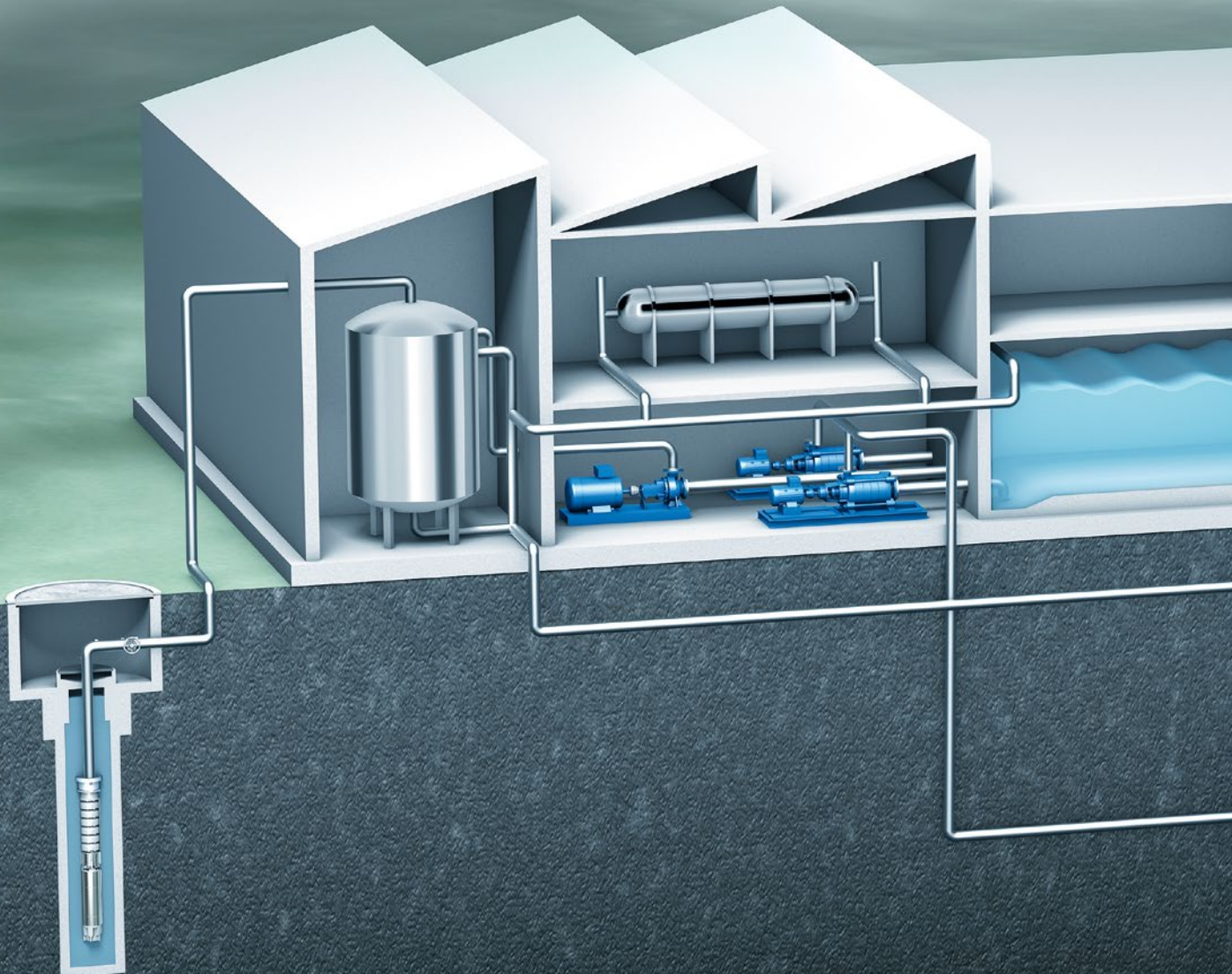
pump and electric motor with a single compact unit. This makes it ideal for use in small and medium-sized desalination systems – for example in industry, ships and hotels.

We also provide numerous cutting-edge pump ranges for water treatment in waterworks, all highly efficient, extremely reliable and cost-effective to maintain. This enables you to reduce the life cycle costs of your systems, creating the ideal conditions for a cost-effective and reliable water supply.



Water treatment with top performers: KSB pumps in central roles

Whether extracting water or channelling it into the drinking water network: water treatment with KSB offers optimised, energy-efficient top performance with exceptionally low life cycle costs.



Well chamber

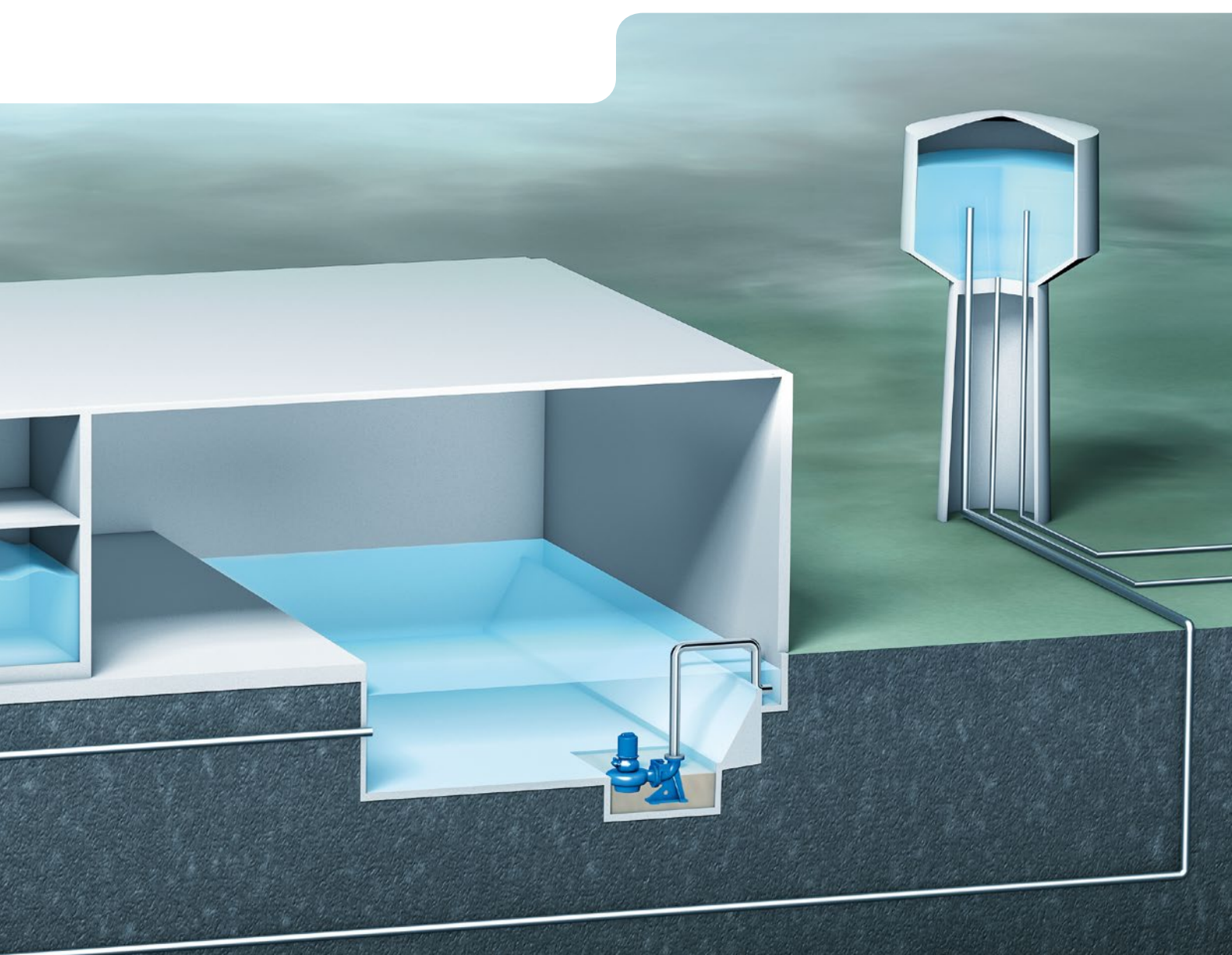
Water is extracted from a deep well and pumped to the waterworks by pumps from the UPA type series.

Waterworks

Pumps from the Etabloc/Etanorm series are used as backwash pumps for filter vessels, while feed pumps from the Multitec series pump treated water from the pure water chamber into the supply network.

Settling tank

Deposited solids are pumped by Amarex KRT pumps to the waste water treatment tank.



Water transport down under: Sydney pumps drinking water with KSB pumps

The biggest city in Australia derives part of its drinking water from the Nepean Dam, which is located some 100 km south-west of Sydney and its several million inhabitants. For transporting the water, the city relies entirely on KSB. Three high-efficiency KSB pumps of the RDLO series extract raw water at the lowest point of the dam and transfer it to a filtration plant. It is then treated and pumped to Sydney via a network of pipelines.

To ensure that the pumps run at maximum efficiency even under conditions of fluctuating demand, they are fitted with frequency inverters. These ensure that the motor speed is always in the most energy-efficient range, thus minimising the operating costs of the pumping station.

However, KSB provided its customer, the construction company Baulderstone Hornibrook, with much more than just pumps. During the planning stage of the project, we supported the customer by designing and sizing the entire system. The KSB competence centre in Germany and our team on site provided valuable help with the calculations and assisted with the entire process right through to commissioning of the system.



100 km of drinking water transport: KSB supplies Sydney



High-efficiency water transport pump RDLO



Reliable and cost-effective: unbeatable water transport

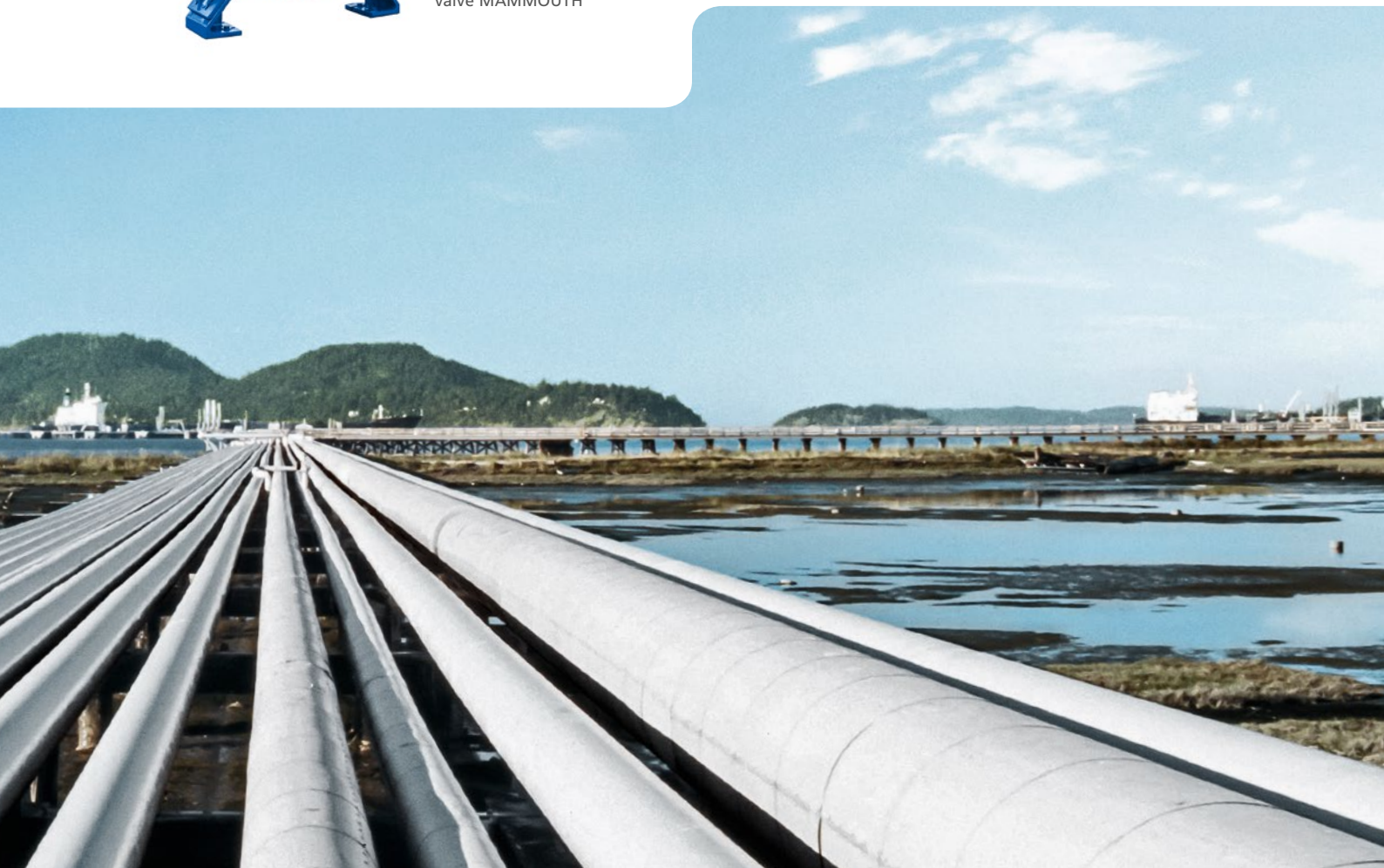
When it comes to transporting water, the key priorities are reliability and energy efficiency, as these factors play a major role in determining the operating costs. As a full-liner, KSB is able to offer a wide selection of powerful pump ranges that guarantee not only maximum availability and operating reliability, but also outstanding efficiencies and low maintenance costs.

Our pumps are built for easy servicing and set worldwide standards with regard to quality, reliability and durability. We've optimised the pump design to offer minimal life cycle costs. Furthermore, with accessories such as our PumpMeter, you can ensure that your pumps are always operating with the lowest possible energy consumption. Reliable valves, e.g. the centred-disc butterfly valve MAMMOUTH complement our comprehensive range of products for water transport applications.

You also directly benefit from our wealth of expertise. On request, we advise our customers during all project phases, supply complete or partial solutions for special requirements and provide continuous support with projects right from the initial planning stage to commissioning and maintenance.



Centred-disc butterfly valve MAMMOUTH



KSB drainage equipment installed in museum: protecting a World Heritage Site

Berlin's Pergamon Museum is one of the most important museums in Germany, attracting around a million visitors every year. In the cellars of this historic building, waste water is handled by an AmaDS³ pump station with solids separation system from KSB. This waste water pump station is especially dependable, ensuring reliable operation thanks to upstream separation systems which protect its pumps against clogging from solids. A redundant design concept encompasses all of the key components located in the basement of the Pergamon Museum. This virtually rules out an entire system failure and also enables maintenance work to be carried out while the equipment is in operation.

The fully dry-installed system offers hygienic working conditions for the operating personnel as gases or fluids are kept tightly sealed. Carrying out maintenance work is also very straightforward because the solids separators are externally installed for easy accessibility.

KSB designed AmaDS³ with two especially energy-efficient pumps from the Sewabloc range. Due to their high level of efficiency, these pumps make a major contribution to reducing the energy costs of the entire system.



The Pergamon Museum on Berlin's Museum Island



The patented AmaDS³ pump station with solids separation system



Quick, clean, reliable – KSB offers optimum all-in solutions for drainage

Maximum reliability at minimum overall costs

Just like the equipment installed at the Pergamon Museum in Berlin, KSB products ensure reliable drainage of houses, public buildings and industrial facilities all over the world. Whether it's rainwater, groundwater from drainage systems or highly solids-laden waste water that needs to be transported, KSB is guaranteed to have the right product to suit your needs, offering a diverse range of pumps and numerous valves. This broad range of

products enables us to offer the perfect product for your particular situation – from waste water lifting units and pumps for cellar drainage and waste water right through to sewage lifting units and powerful waste water pumping stations.

The reliability of our systems takes top priority and we are always developing new technical solutions, like AmaDS³. Right from the design stage we strive to maximise operating reliability and minimise the amount of maintenance required. This

reduces your overall costs and, in combination with extremely efficient drives such as the KSB SuPremE motors, ensures that your energy requirements are kept as low as possible.



Europe's deepest waste water pumping station: pumping from the depths

In St. Petersburg, Russia, a major waste water project has been under way since 2005. The aim is to conserve water resources and to protect the Baltic Sea against the discharge of untreated waste water and associated eutrophication.

One of the most important sub-projects is the deepest waste water pumping station in Europe, which reaches a depth of 92 metres. Here, numerous pumps from KSB handle the rain-water and waste water that collect from a twelve kilometre-long tunnel system. An average of approx. 600,000 m³ of waste water is pumped into a channel from which it flows by gravity to the waste water treatment plant.

The bulk of the work is carried out by 12 dry-installed pumps from the Amarex KRT K 400-710 submersible motor pump range. With a nominal power of 580 kW per hour each, they transport 2,592 m³ of waste water at a head of 59 m, achieving 81 % efficiency. In addition to the main pumps and frequency inverters, KSB also supplied a number of drainage and sump drainage pumps.



St. Petersburg, formerly Leningrad – the second biggest city in Russia



Amarex KRT
submersible motor
pump in operation
in St. Petersburg



Incorporating control equipment for each pump and an uninterruptible power supply (UPS) system complete with power cables, control cables and cable ducts, the control cabinets installed play a crucial role in ensuring the effective functioning of the entire system.

Complete supply programme for waste water transport

From municipalities and cities to industrial companies, individual buildings and private households, KSB provides comprehensive solutions for waste water transport. Whether performing surface drainage or transporting aggressive waste water, we offer a broad range of technically advanced equipment for waste water transport, pumping stations and sewage treatment plants. This is complemented by decades of experience and our bespoke all-in solutions.

KSB provides powerful waste water lifting units, pumps for pumped drainage and special solutions for residential areas with a high groundwater table or for buildings in water protection areas. But

that's not all. We also offer propulsive jet pumps for use in storm-water retention tanks or waste water pump stations with an integrated solids separation system.

KSB's products are optimised for minimum energy consumption and a maximum life cycle. Our in-house materials laboratories develop wear-resistant materials that are extremely resilient to corrosive and abrasive waste water. From these materials our foundry staff produce highly durable components that can withstand adverse conditions for many decades, providing an important basis for minimising the costs of waste water transport in the long term.

Waste water treatment with KSB: rising to the challenge in Shanghai

The Bailonggang waste water treatment plant in Shanghai is the biggest in Asia and one of the largest in the world. With a population in the double-digit millions, a third of the waste water produced in the city is treated here. Every day over two million cubic metres of waste water flow through the plant, which handles the waste water from around 3.6 million inhabitants in a catchment area covering more than 270 km².

Hundreds of pumps were needed to equip the waste water treatment plant. The operating company opted for KSB as the supplier because KSB pumps meet all relevant requirements, deliver higher levels of hydraulic efficiency than many competitor products and thus make a major contribution to the overall energy efficiency of the pumping system.

KSB supplied a total of 241 submersible motor pumps from the Amacan range, 65 from the Amarex KRT and Amarex N ranges, six dry-installed SPN waste water pumps and six dry-installed ZL axial flow pumps. The pumps were delivered with all requisite components ready for connection, some already with the necessary control cabinets.



Knife gate valve HERA BD



Shanghai – a megacity with state-of-the-art waste water equipment from KSB



Amacan submersible pump in discharge tube

Comprehensive portfolio for waste water applications

KSB offers you a comprehensive portfolio of pumps for tackling all waste water treatment tasks. You'll find not only classic waste water pumps, but also sludge handling pumps, progressive cavity pumps, propulsive jet pumps for stormwater tank cleaning, and clean and hot water pumps for general use. Whatever the application, reliability always takes top priority. KSB therefore sets great store by choosing the most suitable hydraulic system for waste water handling, selects especially wear-resistant materials or incorporates carefully considered details such as absolutely water-tight cable entries and mechanical seals with a covered spring for particularly abrasive waste water. We also offer a wide range of mixers that prevent sludge deposits in sedimentation tanks and ensure that contaminants are fully eliminated. The Amaprop

low-speed mixer, for example, is one of the best products in its segment on the market – a powerful performer with an optimised hydraulic system, a break-proof propeller and especially long maintenance intervals. Last, but not least come our reliable valves such as the HERA knife gate valve. They ensure the precise control of all processes in waste water treatment.

The best impellers for every application

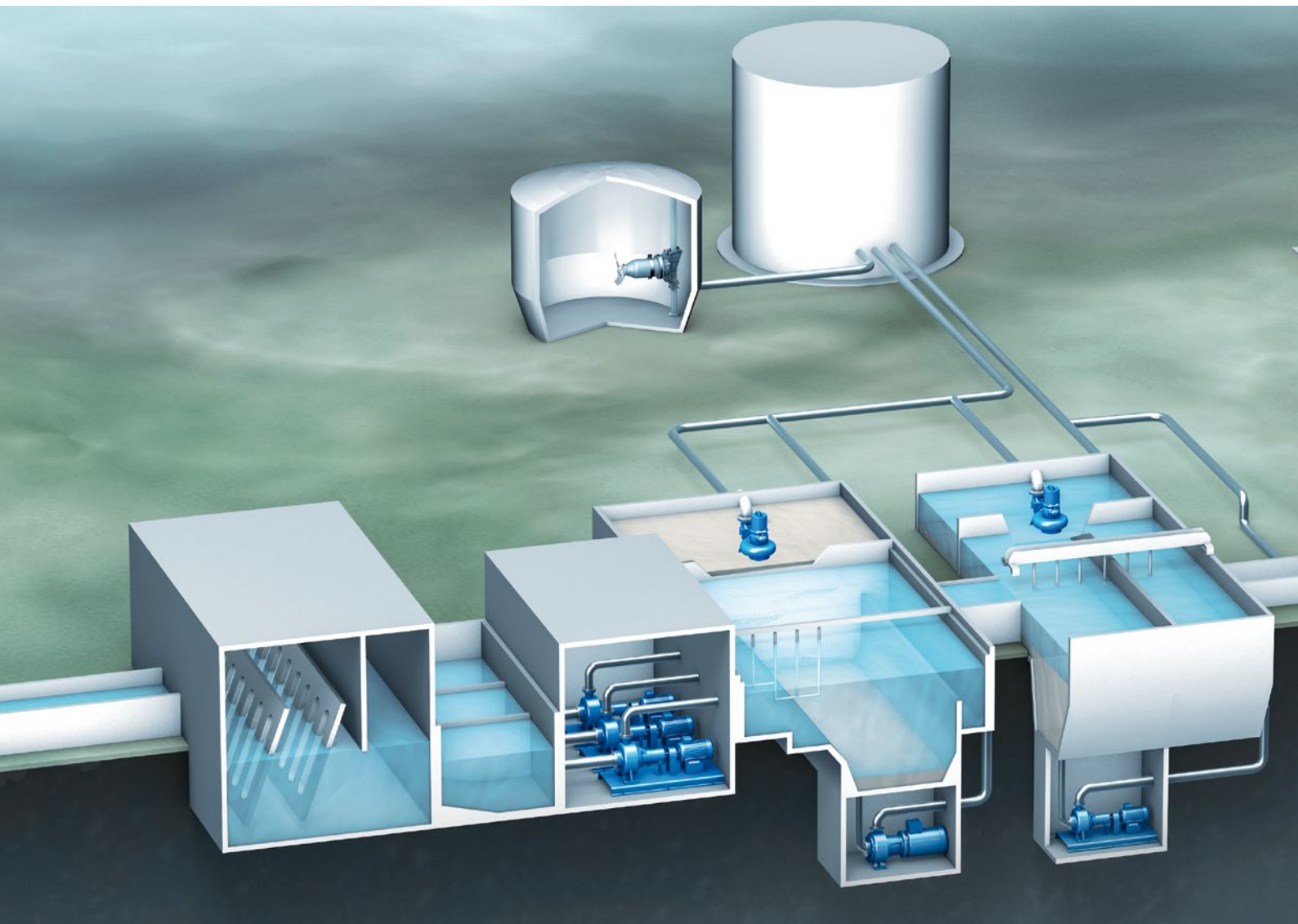
In waste water applications impellers play a vital role in preventing clogging and maximising energy efficiency. We ensure the right impeller for every application with a choice of five different impeller types featuring large free passages and high levels of efficiency.

The right impeller type for every application (from left): semi-open free-flow impeller, closed multi-channel impeller, free-flow impeller with cutter, closed single-channel impeller, semi-open single-channel impeller



KSB solutions for waste water treatment: reliable, sustainable and efficient

From intake to biological treatment and final clarification: waste water equipment from KSB ensures smooth process chains.



Intake pumping station

Waste water is transported via combined and separate sewers to the treatment plant, Amarex KRT or Sewatec pumps lift the incoming waste water to the pretreatment stage.

Screening installation

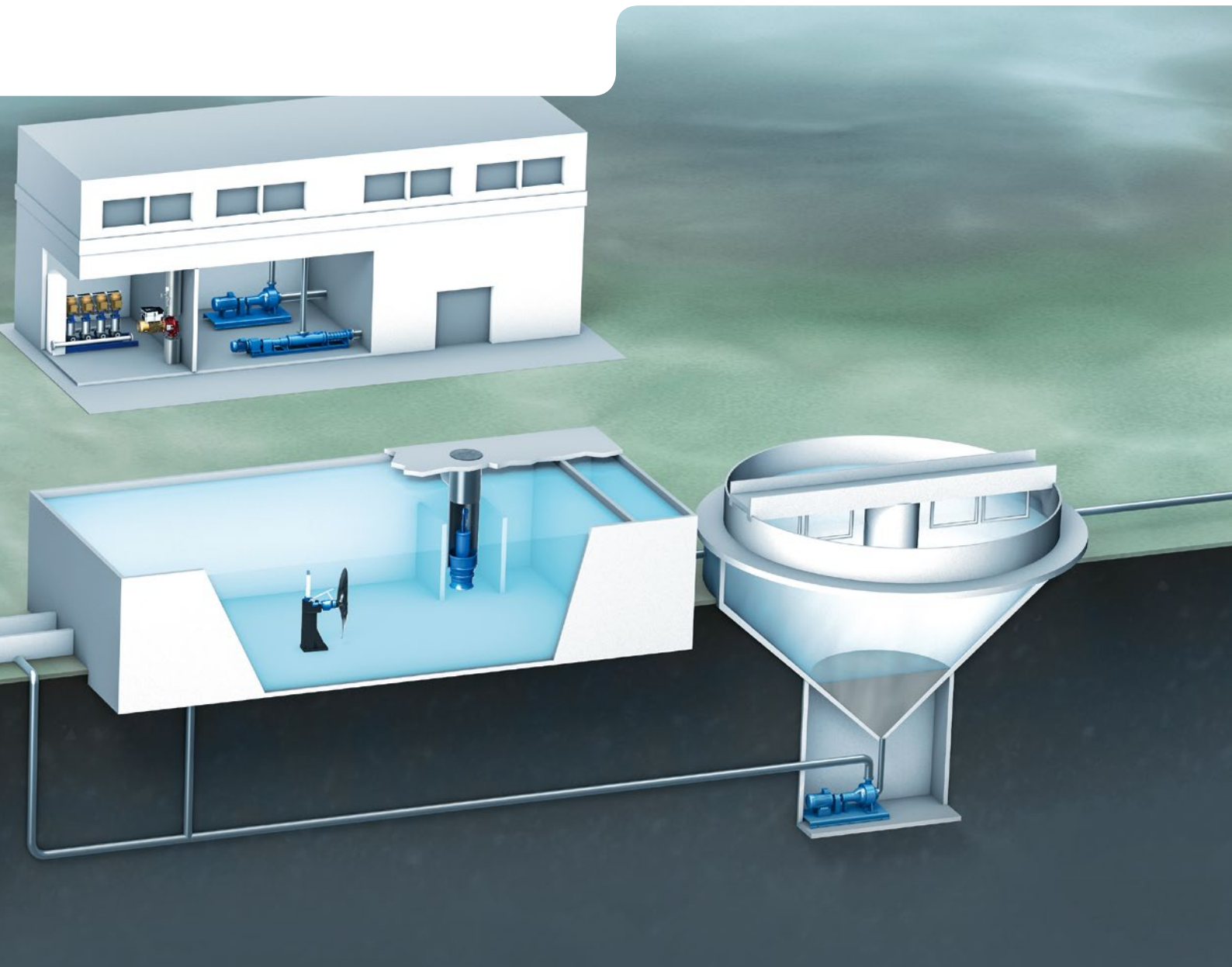
Coarse solids are mechanically removed, Movitec pumps boost the scrubbing water pressure.

Sand trap

The sand contained in the waste water is separated, a Sewatec or KWP pump is used to pump the sand and water mixture; the sand is handled by a Amarex KRT pump; the water and fat mixture is pumped by a Amarex KRT or Sewatec pumps; Movitec pumps boost scrubbing water pressure.

Primary clarification

Primary sludge is handled by Amarex KRT or Sewatec pumps, floating sludge by Amarex KRT or Sewatec pumps.



Biological sewage treatment

Amamix and Amaprop mixers circulate the activated sludge; Amarex KRT, Amacan P, Sewatec pumps return the activated sludge; Amaline pumps recirculate the activated sludge.

Final clarification tank

The sludge is returned from final clarification to biological treatment using Amacan, Amarex KRT and Sewatec pumps; Amarex KRT and Sewatec pumps take care of floating sludge handling.

Sludge treatment

The sludge liquor and sludge are pumped by Sewatec pumps.

Sludge storage

Homogenisation of sludge with Amamix mixers.

Process water system

Water extraction and pressure boosting in warm water and cooling water applications with UPA and Etaline pumps and Hyamat pressure booster systems.



Special solutions from KSB: going beyond circulation

When it comes to water applications, we have every angle covered. As well as supplying pumps, valves and services for core applications, KSB is also a leading provider of special solutions.

We provide protection and safety: flood control

Every year hundreds of thousands of people worldwide become victims of stormwater and flooding. KSB helps to secure living space and protect lives.

Our efforts are above all dedicated to flood prevention: from Austria to Mexico, our pumps and valves work reliably and effectively in low-lift and drainage pumping stations that protect

high risk zones against flooding or are used to drain flood-prone areas. Right from the outset, KSB provides support with designing pumps and system elements as efficiently as possible, supplies piping calculations with regard to torsional stresses and natural frequencies, and conducts model tests for system optimisation. We are also on hand during installation, commissioning and test runs on site.

KSB pumps put the splash into water: fun parks

Water is not only a vital resource, it can also be a great deal of fun – as shown by the fun parks where our pumps and valves are installed. There they are subject to extreme demands during continuous operation and have to meet the highest safety standards.

Our pumps and valves are not only used for transporting the water, they are also essential for many attractions: water rides and white water rides, water slides, standing waves, fountains and other water features – with pumps and valves from KSB the possibilities are virtually limitless. With KSB's decades of experience, your project is in safe hands. Our proven technology and high quality standards ensure maximum reliability and safety for

your installations. As a one-stop provider, we offer you an all-in service, covering everything from professional advice, planning and design through to commissioning. This also includes specialised engineering services such as hydraulic and transient flow analyses, economic feasibility analyses and system optimisation, CFD modelling and physical model testing, installation management and commissioning.

Aquaculture

We also provide pumps for aquaculture and fish farming. You'll find everything you need in our product portfolio – from products for fresh water supply or water treatment, for fish farming and transporting live fish. Just ask us!



Europe's cutting-edge white water park: Markkleeberg canoeing park



Open-water fish farming is profitable with KSB technology

World's biggest seawater distribution facility: KSB valves in Qatar



The seawater distribution facility with its 1,150 KSB valves is capable of providing up to one million cubic meters of seawater per hour

Established in 1997, Ras Laffan Industrial City in the State of Qatar is a large industrial complex located approximately 80 km north-east of the capital Doha on the Persian Gulf. As well as an industrial port, the location comprises petrochemical plants, power stations and facilities for seawater desalination and gas liquefaction.

To provide the necessary quantities of cooling water for these extensive plants and systems, Ras Laffan operates the world's biggest and most complex seawater distribution facility. It is capable of providing up to one million cubic metres of seawater per hour.

Given the large volumes involved and the huge importance of the location, the reliability of key components such as butterfly valves was a major priority in the construction of the seawater

distribution facility. Economic considerations also played a role. KSB stood out from the competition and was clearly the best supplier for the job. The contract was awarded based on KSB's incredibly long experience in water transport and the demonstrably high quality of its valves, with which the customer had already had excellent experience in the past. During the first construction phase, KSB supplied over 600 butterfly valves, including numerous MAMMOUTH valves with diameters of up to 3.50 m. In the second construction phase, more than a further 550 butterfly valves from KSB were installed, again including numerous MAMMOUTH valves with diameters measuring up to 3.40 m.

Extensive range of valves

Wherever water is handled, valves constitute key elements. Globe valves, gate valves, butterfly valves, ball valves and control valves have a decisive influence on the functioning of a system, while also influencing reliability and, last but not least, the operating costs of the entire system.

For over 140 years KSB has been one of the world's leading valve suppliers. As a fully-equipped supplier for hydraulic applications, we offer our customers a comprehensive range of high-quality, energy-effi-

cient valves, serving as the perfect complement to our pumps portfolio.

Whether for use in drinking water production, water transport, drainage or waste water treatment our product portfolio covers an enormous range of applications, ensuring you are fully equipped for every requirement. Just like our pumps, our valves are among the best on the market. Through our innovations, we have continually pushed back the technological boundaries and opened up new possibilities. You, too, can profit from our wealth of

expertise – not only in terms of our products, but also through various forms of support when it comes to designing systems and dimensioning valves.

KSB valves: MAMMOUTH, COBRA-SG, APORIS-DEB02, BOAVENT SVF/SVA

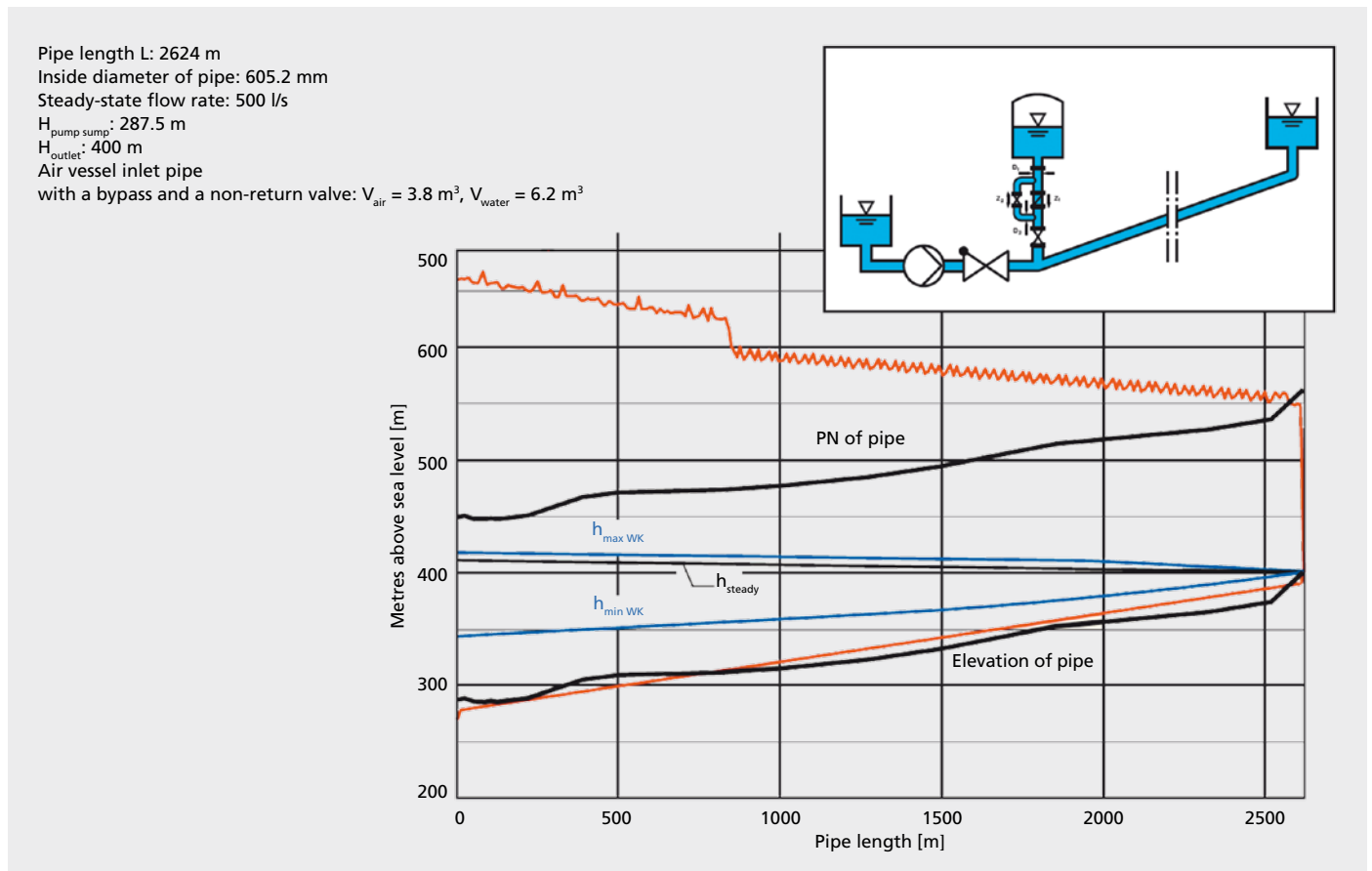


Comprehensive expertise: KSB engineering services for consultants, engineering contractors and operators

High-quality pumps and valves are extremely important in the water and waste water sectors – but they alone do not guarantee a perfectly working system. It is only by selecting the right system components and incorporating them in the pumping station that a flow-optimised system is created in which maximum output, a long service life and optimum energy efficiency go hand in hand. KSB therefore offers support to consultants, plant engineers and operators with a wide selection of engineering services that can address different stages of a project.

On request we assess all project-relevant factors and prepare installation designs and budget quotes long before construction work begins. We can oversee the project through all phases of system planning and construction, contributing expertise where it counts while always pursuing the goal of creating an optimised and efficient system for the operator.

Result of a transient flow analysis: the "pressure envelopes" of dynamic pressure changes after pump failure with and without air vessels



*WK = Windkessel = air vessel



Air intake demonstrated in a model test: vortex formation with curtain wall and "balcony"

Comprehensive services for all key areas

In every planning and execution phase you can also use other KSB services to ensure the smooth functioning of your installation. As well as hydraulic calculations, we also assess economic feasibility and take care of system analysis and optimisation. We provide project planning services and help you to select suitable pumps, auxiliary equipment or alternative drives such as diesel motors. In addition, we advise you on achieving more energy efficient systems and assist you with designing the optimum intake and outlet structures and optimising your pumping station. If required, we also perform model tests and CFD simulations, conduct piping system analyses, transient flow analyses, flow simulations and hydraulic calculations. Our trained professionals are on hand to provide support with commissioning and test runs of KSB equipment. Furthermore, we assist with designing control concepts, handle installation management, take care of on-site servicing and, last but not least, provide training for your employees.

Testing without compromise: at our test facilities

We take tough to the ultimate level: all pumps produced by us are put through their paces on the KSB test facility.

Thanks to painstaking technical design, cutting-edge production technology and a manufacturing process consistently geared to special care and quality, all KSB pumps fulfil the toughest of demands – above all those that we set ourselves. But even that's not enough for us. Every single pump that leaves one of our plants must first be rigorously tested in one of our test facilities.

Halle's unique hydraulic test facility is the most technologically advanced of its kind in the world today. The length and height of the test line can be automatically changed, with diameters of up to DN 1,200. This enables very short set-up times even with pump sets having a rating of up to 10 MW.

The latest control technology ensures efficient operation and smooth interaction of all test room components. A frequency inverter allows the motor to be run at any speed required by the customer. The easy-access piping design enables the pump and motor to be replaced in a very short time.

One of the most modern in the world: the test facility in KSB's factory in Halle, Germany



Making the right choice simple: KSB selection tools

To make it as easy and straightforward as possible to select the optimum and most cost-effective system for you needs, we offer two professional tools:

The Helps selection software

KSB designed the selection software Helps specifically for engineering contractors working in the waste water segment, simplifying the process of selecting equipment for demanding projects. Helps enables you to quickly and easily calculate pressure losses, identify suitable pumps and configure the pump sets. The CD contains precise CAD drawings for all pumps, complete with installation options and detailed tender texts – ideal for presentations to customers and business partners.

It is not necessary to install Helps on your computer. The CD is available in 23 languages and available worldwide from all KSB sales companies.

Simply ask for the CD from your KSB field sales engineer!



The KSB EasySelect selection software

KSB EasySelect is the only software on the market that enables you to select pumps, valves and mixers.

Step by step, the software takes you through the KSB product range and finds the right product for every requirement. Within no time, you will be provided with individual solutions – whether it is a pump, valve or a complete module with drive/actuator and matching automation solution. While unregistered users also have access to the EasySelect selection software, registered users enjoy a number of additional benefits:

- Access to customer-specific net prices
- Direct ordering via the KSB Web Shop
- Hotline for software-related questions

KSB EasySelect is available in 19 languages.

At www.ksb.com/easyselect you can access the software around the clock and test the basic version.

For full access please register and use KSB EasySelect via the KSB Web Shop.



Fluid

Energy: we spend all ours to save lots of yours

To operate a system efficiently and sustainably, you have to know it inside out. Drawing on our years of experience, we help you to save energy and money with our energy efficiency concept FluidFuture.

The ErP regulations play an important role in saving energy at the component level. But there's even more potential to be tapped by optimising the overall efficiency of a system with FluidFuture.

We already use ErP-compliant high-efficiency pumps, valves and drives as part of our FluidFuture concept.

For static load profiles, we use IE3 motors as standard. KSB's own development of Amarex KRT submersible motors also meet the requirements of the IE3 efficiency class.

Innovative synchronous motors are particularly suitable for variable load profiles – for example our new UMA-S synchronous motors designed for the UPA submersible borehole pump range offer at least 8 % higher efficiency than comparable asynchronous motors.

Even at part load, the KSB SuPremE magnet-less variable speed motor achieves higher levels of efficiency than specified by the 2017 ErP regulations and meets the requirements of efficiency level IE4 to IEC/CD 60034-30.



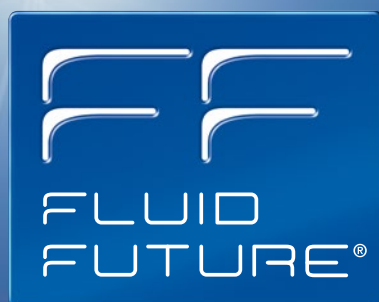
KSB SuPremE the world's most efficient magnet-less pump motor



Waste water specific automation functions

Continuous-duty pumps operating under low-flow conditions are typically used in water treatment plants. By using automation components such as our PumpDrive frequency inverter, the pump power input is continually matched to actual demand to ensure maximum energy efficiency. But that's not all. PumpDrive also offers waste water specific functions. For example, incipient clogging is detected on the basis of the flow velocity and a rinsing

function is triggered when this falls below the minimum flow velocity. Minimum pump speeds can be set to prevent flow velocities from dropping below a certain level. This ensures that sand and stones are reliably removed and prevents sludge deposits. All PumpDrive functions considerably reduce the frequency of maintenance work, increase system availability and help to minimise the overall costs.



SYSTEM ANALYSIS

Our experts analyse your system and show where you can save energy – with SES System Efficiency Services or PumpMeter.



SELECTION

Your KSB partner or KSB EasySelect will help you find exactly the right pumps and valves.



HIGH-EFFICIENCY PUMPS & VALVES

Top pump and valve performance with minimum loss – all thanks to 140 years of innovation and expertise.



HIGH-EFFICIENCY DRIVES

Our high-efficiency motors even exceed today's standards.



DEMAND-DRIVEN OPERATION

Optimised control systems like PumpDrive continuously match pump output to system requirements.

We don't just offer more. We offer everything

State-of-the-art equipment is rounded off by comprehensive service and spare parts solutions.

We always give 100 per cent for the benefit of our customers – be it providing pumps and valves, complete systems or services and spare parts solutions that cover the entire life cycle. Whatever you need, over 3,000 service specialists are there for you in more than 160 service centres worldwide – around the clock, all over the world. Because your success is our success.

KSB Service offers a broad range of individual solutions to ensure your success



We offer a broad range of individual solutions for water and waste water systems, both for utilities and industry.

You decide the scope of services within the framework of our inspection service concept. Our service engineers are perfectly equipped to carry out the job as efficiently and cost-effectively as possible. In addition to the usual certification, KSB's engineers meet the most stringent requirements of the Water Resources Management Act (German WHG) and SCC^P Safety Certificate Contractors. Their professional training also encompasses servicing explosion-proof pump sets.

In cooperation with our experts from the materials laboratory, fluid mechanics and other specialist departments, we develop refurbishment and upgrade solutions tailored to your system. These include special coatings that reduce the high level of wear caused by especially abrasive fluids or innovative solutions that ensure the availability of your submersible borehole pumps. The savings you make on energy, maintenance and repair costs ensure our solutions will really pay off.

Our knowledge, your success

Current information on special service training for water and waste water products can be found at www.ksb.com.

Rely on our good advice – through the entire life cycle of your equipment

1. Products and systems

- Technical consultancy and support
- Pumps
- Valves
- Complete system solutions
- Customised pump sets
- Numerous fields of application

2. Commissioning

- Inspection of supplied pump sets
- Verification of system requirements and conditions
- Supervision of all installation steps
- Leak tests
- Correct alignment of pump sets using laser equipment
- Preservation measures taken in the event of delayed commissioning
- Checking of installed measuring equipment
- Instruction of operating staff
- Preservation measures in the case of delayed commissioning

3. Operation

- Inspection service
- Inventory management service
- Extension of the warranty period

- Maintenance inspection management
- Framework agreements such as TPM Total Pump Management
- Efficiency analyses using SES System Efficiency Service or PumpMeter

4. Repair

- Repairs on site or at KSB's service centre
- 24-hour emergency service
- Worldwide service network
- Retrofitting: the alternative to buying new equipment
- Spare parts in manufacturer quality
- Services and reverse engineering – in particular for non-KSB products

5. Refurbishment and decommissioning

- Modifications due to changed framework conditions
- Modernisation solutions
- Product upgrades
- Professional decommissioning of entire systems
- Preservation measures
- Quick and safe removal of components
- Environmentally friendly disposal and recycling
- Planning and project engineering of new systems

Unbeatable performance whatever the location: wet or dry installation

Wet installation

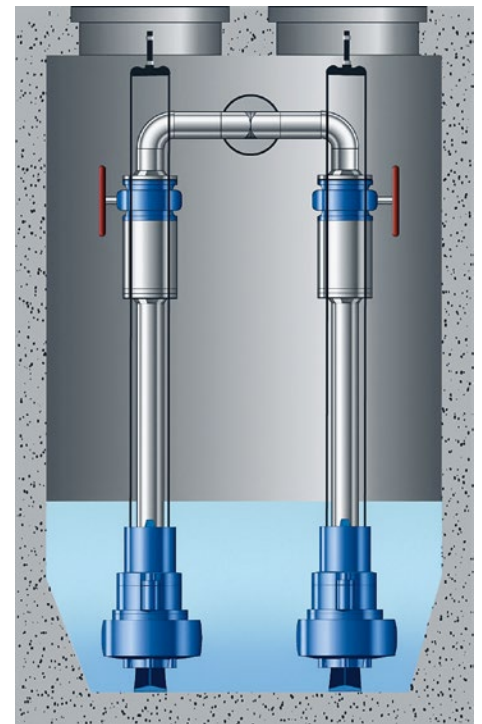
Submersible motor pumps are used in pumping stations requiring wet installed pumps and are located directly in the wet zone, i.e. the pump sump. As the pump sets work either fully or partially submerged, separate machine rooms are not needed. As a result, the planning and investment costs for the pumping station building itself are correspondingly low. However, the investment costs for the actual pumps are slightly higher compared with dry-installed pumps.

The space-saving design of the pumping stations is ideal for densely populated urban areas; the pumps' noise emissions are already low and are further dampened by the fluid handled.

For wet installation, a lifting chain and a guide arrangement are used to lower the submersible motor pump into its final installation position and lift it out again as necessary. The entire pump and sections of the motor cable are directly exposed to the fluid handled. Monitoring sensors are fitted to the submersible motor as standard in order to detect any water or moisture penetrating the motor. Before beginning maintenance work or in the event of pump failure, the pump set must be removed from the sump. This unavoidable step means that working on the pump set is extremely unhygienic. It must therefore be thoroughly cleaned before maintenance personnel can start working on it.



Amarex KRT submersible motor pump, wet-installed in pump sump, side view



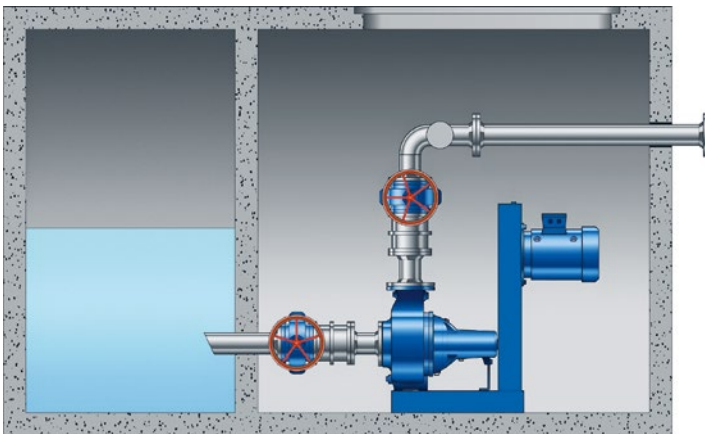
Amarex KRT submersible motor pump, wet-installed in pump sump, front view

Installation in machine rooms

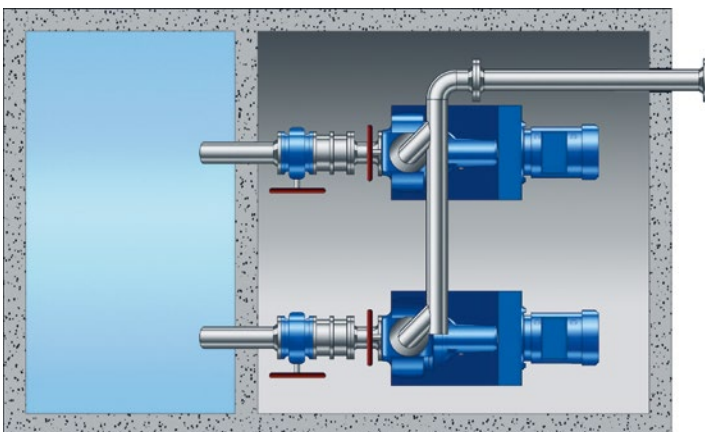
With dry installations in pumping stations, the wet zone and the machine room are separated – the pumps are located in the dry area of the machine room. A compact design is also feasible with this installation option, however the civil engineering costs are always higher than with wet installation.

The main advantage of a pumping station with dry-installed pumps lies in their operation: the pumps are directly accessible, they can be seen, heard and felt during operation (skilled machine operators can tell by placing their hand on the pump whether everything is running smoothly). Maintenance work is performed under largely hygienic conditions, as only the inside of the

pumps comes into contact with the fluid handled. The operating point of the pumps can be established by measuring the differential pressure at the pump nozzles. The pump can be fitted with sensors (either at the factory or on site at a later stage) for the purposes of monitoring pump operation and planning maintenance work. Thanks to the combination of IE4 electric motors and operation on frequency inverters, a more efficient level of operation can be achieved than is possible with submersible motor pumps.



Sewatec waste water pump, dry-installed, side view



Sewatec waste water pump, dry-installed, top view

The cycle of solutions







All KSB products used in the water cycle at a glance

Type	Type series	Application Water extraction	Application Water treatment	Application Water transport
Automatic waste water lifting units	Ama-Drainer-Box Ama-Drainer-Box Mini			
Axially split pumps	RDLO	■		■
Axially split pumps	Omega	■	■	■
Axially split pumps	RDLP	■		■
Cleaning units	Amajet			
Concrete volute casing pumps	Beveron	■		
Deep-well turbine pumps	BEV, B-Pump	■		■
Dry-installed volute casing pumps	Sewatec/Sewabloc			
Floodable sewage lifting units	Compacta/Mini-Compacta			
Fully floodable submersible motor pumps	Ama-Drainer, Ama-Drainer 80/100 Ama-Drainer 400/500			
High-pressure in-line pumps	Movitec	■	■	■
High-pressure in-line pumps	Multitec, Multitec PumpDrive	■	■	■
High-pressure pump units with integrated energy recovery device	Salino Pressure Center		■	
In-line pumps	Etaline/Etaline R			■
Non-clogging impeller centrifugal pumps	KWP/KWP Bloc			
Pressure booster systems	Hyamat			
Pump stations	Amarex CK-Pump Station			
Pumps for desalination by reverse osmosis	HGM-RO		■	
Pumps for desalination by reverse osmosis	Multitec-RO		■	
Pumps for desalination by reverse osmosis	RPH-RO		■	
Standardised water pumps	Etanorm	■	■	■
Standardised water pumps	Etanorm R	■	■	■
Submersible borehole pumps	UPA	■	■	■
Submersible higher-speed mixers	Amamix			
Submersible low-speed mixers	Amaprop/Amaprop 1000			
Submersible motor pumps	Amarex N, S32	■	■	
Submersible motor pumps	Ama-Porter			
Submersible motor pumps	Amarex KRT	■		■
Submersible motor recirculation pumps	Amaline			
Submersible pumps with axial propeller	Amacan P	■		
Submersible pumps with mixed flow impeller	Amacan S	■		■
Submersible pumps with non-clogging impeller	Amacan K	■		
Tubular casing pumps	SEZ	■		■
Tubular casing pumps	SNW/PNW	■		■
Vertical low-pressure pumps	Etanorm GPV/CPV	■		
Volute casing pumps	SPY	■		■
Volute casing pumps in close-coupled design	Etabloc	■	■	■
Waste water pump station with solids separation system	AmaDS ³			

Application Drainage	Application Waste water transport	Application Waste water treatment	Application Flood control	Application Amusement parks	Application Aquaculture	Selection software
■				■		EasySelect
						EasySelect*
				■	■	EasySelect
	■					
■			■			
	■	■	■	■	■	EasySelect/Helps
■	■					EasySelect
■				■		EasySelect
		■				EasySelect
				■		EasySelect
						EasySelect
	■	■		■	■	EasySelect
		■		■		EasySelect
■	■					EasySelect
						EasySelect
						EasySelect
		■		■	■	EasySelect
				■	■	EasySelect
				■		EasySelect
	■	■		■		EasySelect*
		■				EasySelect*
■	■			■		EasySelect/Helps
■	■					EasySelect
■	■	■	■	■	■	EasySelect/Helps
		■		■	■	Helps
■		■	■	■	■	EasySelect/Helps
		■	■	■	■	Helps
	■	■	■	■	■	Helps
■		■	■			
■		■	■	■	■	
■	■	■	■			EasySelect
		■		■	■	
■						

* With special access on request

Water pumps/waste water pumps portfolio


Ama-Drainer	Ama-Drainer 400 / 500	Ama-Drainer 80 / 100	Ama-Drainer-Box	Ama-Drainer-Box Mini	AmaDS ³
					
Q max.: 16.5 m ³ /h H max.: 12 m	Q max.: 22.5 m ³ /h H max.: 50 m	Q max.: 26 m ³ /h H max.: 130 m	Q max.: 46 m ³ /h H max.: 24 m	Q max.: 10 m ³ /h H max.: 6.5 m	Q max.: 200 m ³ /h H max.: 85 m
■ LevelControl Switchgear	■ LevelControl Switchgear	■ LevelControl Switchgear	■ Automation options	■ Automation options	■ PumpDrive, LevelControl Switchgear ■ SuPremE ¹ , IE3 motor








Ama-Porter	Amaprop	Amaprop 1000	Amarex N CK-Pumpstation	Amarex KRT wet-installed	Amarex KRT wet-installed/dry-installed vertical/horizontal
					
Q max.: 40 m ³ /h H max.: 24 m	Drehzahl: 24–109 1/min 50 Hz 27–110 1/min 60 Hz Nominal propeller diameter: 1,200 mm–2,500 mm	Drehzahl: 166–208 1/min 50 Hz 158–200 1/min 60 Hz Nominal propeller diameter: 1,000 mm	Q max.: 50 m ³ /h H max.: 49 m	Q max.: 10,080 m ³ /h H max.: 120 m	Q max.: 550 m ³ /h H max.: 25 m
■ LevelControl Switchgear	■ PumpDrive		■ Automation options	■ PumpDrive HyaMatic Amacontrol LevelControl Switchgear ■ IE3 motor	■ PumpDrive HyaMatic Amacontrol LevelControl Switchgear ■ IE3 motor

■ Factory-automated

■ Can be equipped with high-efficiency drive






¹ Only in combination with PumpDrive






Amacan K	Amacan P	Amacan S	Amajet	Amaline	Amamix
					
Q max.: 5,400 m ³ /h H max.: 30 m	Q max.: 25,200 m ³ /h H max.: 12 m	Q max.: 21,600 m ³ /h H max.: 55 m	Q max.: 195 m ³ /h	Q max.: 6,600 m ³ /h H max.: 3.5 m	Propeller diameter: max. 630 mm
<ul style="list-style-type: none"> ■ PumpDrive ■ HyaMatic ■ Amacontrol 	<ul style="list-style-type: none"> ■ PumpDrive ■ HyaMatic ■ Amacontrol 	<ul style="list-style-type: none"> ■ PumpDrive ■ HyaMatic ■ Amacontrol 			

Amarex KRT with closed cooling system	Amarex N S32	BEV, B-Pump	Beveron	mini-Compacta	Compacta	Etabloc
						
Q max.: 10,080 m ³ /h H max.: 120 m	Q max.: 16.5 m ³ /h H max.: 29.5 m	Q max.: 2,200 m ³ /h H max.: 350 m	Q max.: 108,000 m ³ /h H max.: 27 m (higher heads on request)	DN 32–100 m ³ /h Q max.: 36 m ³ /h H max.: 25 m T [°C] max. + 40 up to + 65 for short periods	DN 80–100 m ³ /h Q max.: 140 m ³ /h H max.: 24 m T [°C] max. + 40 up to + 65 for short periods	Q max.: 612 m ³ /h H max.: 102 m
<ul style="list-style-type: none"> ■ PumpDrive ■ HyaMatic ■ Amacontrol ■ LevelControl ■ Switchgear <ul style="list-style-type: none"> ■ IE3 motor 			<ul style="list-style-type: none"> Discharge nozzle arranged below floor 	<ul style="list-style-type: none"> ■ LevelControl ■ Switchgear 	<ul style="list-style-type: none"> ■ LevelControl ■ Switchgear 	<ul style="list-style-type: none"> ■ PumpDrive ■ PumpMeter ■ HyaMatic ■ SuPremE¹

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Water pumps/waste water pumps portfolio

Etaline Etaline R	Etanorm Etanorm R	Etanorm GPV / CPV	HGM-RO	Hyamat VP
				
<p>Q max.: 700 m³/h H max.: 95 m</p> <ul style="list-style-type: none"> ■ PumpDrive ■ PumpMeter ■ Switchgear 	<p>Q max.: 1,900 m³/h H max.: 160 m</p> <ul style="list-style-type: none"> ■ PumpDrive ■ SuPremE¹ 	<p>Q max.: 660 m³/h H max.: 102 m</p>	<p>Q max.: 1,500 m³/h H max.: 950 m</p>	<p>Q max.: 660 m³/h H max.: 160 m</p> <ul style="list-style-type: none"> ■ Automation options




Omega	RDLO	RDLP	RPH-RO	Salino Pressure Center
				
<p>Q max.: 2,880 m³/h H max.: 210 m</p> <ul style="list-style-type: none"> ■ PumpDrive ■ PumpMeter ■ SuPremE¹ 	<p>Q max.: 10,000 m³/h H max.: 240 m</p> <p>(higher flow rates and heads on request)</p> <ul style="list-style-type: none"> ■ PumpMeter 	<p>Q max.: 18,000 m³/h H max.: 550 m</p>	<p>Q max.: 2,500 m³/h H max.: 150 m</p> <ul style="list-style-type: none"> ■ PumpDrive ■ SuPremE¹ 	<p>Q feed (feed water): 23 m³/h Q permeate: max. 250 m³/day Operating pressure: 70 bar (higher operating pressure on request)</p>

■ Factory-automated

■ Can be equipped with high-efficiency drive

¹ Only in combination with PumpDrive

KWP / KWP Bloc	Movitec	Multitec-RO	Multitec
			
<p>Q max.: 15,000 m³/h (18,000 m³/h) H max.: 100 m</p> <ul style="list-style-type: none"> ■ PumpDrive ■ HyaMatic ■ Hyatronic 	<p>Q max.: 113 m³/h H max.: 401 m</p> <ul style="list-style-type: none"> ■ PumpDrive ■ PumpMeter ■ HyaMatic 	<p>Q max.: 850 m³/h H max.: 1,000 m</p> <ul style="list-style-type: none"> ■ PumpDrive ■ HyaMatic ■ SuPremE¹ 	<p>Q max.: 850 m³/h H max.: 630 m (1,000 m)</p> <ul style="list-style-type: none"> ■ PumpDrive ■ PumpMeter ■ HyaMatic

Sewatec / Sewabloc	SEZ	SNW / PNW	SPY	UPA
				
<p>Q max.: 60–10,000 m³/h H max.: 115 m</p> <ul style="list-style-type: none"> ■ HyaMatic ■ PumpDrive ■ LevelControl ■ SuPremE¹ 	<p>Q max.: 80,000 m³/h H max.: 120 m</p> <p>Discharge nozzle arranged above or below floor</p>	<p>Q max.: 9,000 m³/h H max.: 50 m</p> <p>Discharge nozzle arranged above or below floor</p>	<p>Q max.: 20,000 m³/h H max.: 50 m</p>	<p>Q max.: 330 m³/h H max.: 460 m</p> <ul style="list-style-type: none"> ■ HyaMatic ■ UMA ■ UMA-S

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The cycle of solutions








All KSB valves used in the water cycle at a glance

Type	Type series	Application Water extraction	Application Water treatment	Application Water transport
Actuators	ACTAIR	■	■	■
Actuators	ACTELEC	■	■	■
Air relief valves	BOAVENT-AVF	■	■	■
Air relief valves	BOAVENT-SVA			
Air relief valves	BOAVENT-SVF/SIV	■	■	■
Ball check valves	BOA-RPL			
Butterfly valves	APORIS-DEBO2	■	■	■
Butterfly valves	BOAX-B	■	■	■
Butterfly valves	BOAX-CBV13	■	■	■
Butterfly valves	DANAIS 150	■	■	■
Butterfly valves	ISORIA 10/16/20/25	■	■	■
Butterfly valves	KE ELASTOMER	■	■	■
Butterfly valves	MAMMOUTH	■	■	■
Butterfly / check valves	DUALIS			■
Butterfly / check valves	SISTO-RSK	■	■	■
Control Systems	AMTRONIC		■	■
Control Systems	SMARTRONIC MA		■	■
Diaphragm valves	SISTO-10/16/20	■	■	■
Diaphragm valves	SISTO-16RGA	■	■	■
Diaphragm valves	SISTO-16TWA	■	■	■
Diaphragm valves	SISTO-KB	■	■	
Gate valves	COBRA-SG	■	■	■
Gate valves	COBRA-SMP	■	■	■
Gate valves	ECOLINE GT40	■	■	■
Globe valves	BOA-Compact EKB	■	■	■
Globe valves	BOA-CVE EKB	■	■	■
Knife gate valves	HERA-BD		■	
Knife gate valves	HERA-BHT		■	■
Knife gate valves	HERA-SH		■	■
Pressure control valves	CONDA-VLC	■	■	■
Pressure control valves	CONDA-VRC/VRVA	■	■	■
Swing check valves	COBRA-SCBS	■	■	■
Swing check valves	ELA/ELA-K	■	■	■
Tilting-disc check valves	COBRA-TDC01 / TDC03	■	■	■
Twin plate check valves	SERIE 2000	■	■	■
Venturi-type check valves	BOA-RFV			

Application Drainage	Application Waste water transport	Application Waste water treatment	Application Flood control	Application Amusement parks	Application Aquaculture	Selection with: EasySelect
■	■	■	■	■	■	EasySelect
■	■	■	■	■	■	EasySelect
				■	■	
■	■	■		■	■	
■	■	■	■	■	■	
				■	■	
■	■	■	■	■	■	EasySelect
■	■	■	■	■	■	
■				■	■	EasySelect
■	■	■	■	■	■	EasySelect
■	■	■	■	■	■	EasySelect
■	■	■	■	■	■	EasySelect
■	■	■	■	■	■	
	■	■	■	■	■	EasySelect
	■	■	■	■	■	EasySelect
■	■	■	■	■	■	
■	■	■	■	■	■	
■						
		■				
■	■	■	■	■	■	
				■	■	
				■	■	
■	■	■	■	■	■	
■				■	■	
			■	■	■	EasySelect
				■	■	

Water valves/waste water valves portfolio

AMTRONIC SMARTRONIC MA		APORIS-DEB02		BOAX-CBV13		BOA-Compact EKB		BOA-CVE EKB		BOAVENT-AVF	
											
Enclosure	IP67	PN	10/16/25	PN	10/16	PN	10/16	PN	6/10/16	PN	16
Control air pressure [bar]	8	DN	150–2,200	DN	500–1,200	DN	15–200	DN	15–200	DN	50–300
T [°C]	-20 to +80	T [°C]	-10 to +80	T [°C]	-10 to +115	T [°C]	-10 to +80	T [°C]	-10 to +120	T [°C]	-10 to +120
		■ m, e, p		■ m, e, p		■ m, e		■ e			

ECOLINE GT40		HERA-BD		HERA-BHT		HERA-SH		ISORIA 10		ISORIA 16		ISORIA 20	
													
PN	10–40	PN	10	Class	150	Class	150	PN [bar]	max. 10	PN [bar]	max. 16	PN [bar]	max. 20
DN	50–600	DN	50–1,200	DN	80–600	DN	50–600	DN	40–1,000	DN	40–1,000	DN	32–600
T [°C]	-10 to +400	T [°C]	-10 to +120	T [°C]	-10 to +100	T [°C]	-10 to +180	T [°C]	-10 to +200	T [°C]	-10 to +200	T [°C]	-10 to +80
■ m, e		■ m, e, p		■ m, e, p		■ m, e, p		■ m, e, h, p + AMTROBOX / AMTRONIC / SMARTRONIC		■ m, e, h, p + AMTROBOX / AMTRONIC / SMARTRONIC		■ m, e, h, p + AMTROBOX / AMTRONIC / SMARTRONIC	

- Actuator type/automation
 m = manual
 e = electric
 p = pneumatic
 h = hydraulic

BOAVENT-SVF / SIV		COBRA-SG		COBRA-SMP		COBRA TDC01 / TDC03		CONDA-VRC / VRVA		DANAIS 150	
PN	16/25/40	PN	16/25	N	16	PN	10/16/25	PN	16/25/40	PN [bar]	max. 25
DN	25–300	DN	25–600	DN	40–300	DN	100–2,200	DN	15–150	or Class	150
T [°C]	-10 to +70	T [°C]	-10 to +70	T [°C]	-10 to +110	T [°C]	-10 to +70	T [°C]	-10 to +70	DN	50–1,200
		■ m, e		■ m, e						T [°C]	-50 to +260
										■ m, e, p +	
										AMTROBOX / AMTRONIC /	
										SMARTRONIC	

ISORIA 25		KE ELASTOMER		MAMMOUTH		SERIE 2000		SISTO-KB		SISTO-RSK		SISTO-16TWA	
PN [bar]	max. 25	PN [bar]	10	PN [bar]	6/10/16/20/25	PN	max. 16	PN	10	PN	16	PN	16
DN	32–1,000	DN	40–300	DN	1,050–4,000	DN	50–600	DN	15–200	DN	15–300	DN	15–200
T [°C]	-10 to +60	T [°C]	-20 to +150	T [°C]	0 to +65	T [°C]	-5 to +200	T [°C]	-20 to +140	T [°C]	-20 to +140	T [°C]	-10 to +140
■ m, e, h, p +		■ m, e, h, p +		■ m, e, p +				■ m, e, p				■ m, e, p	
AMTROBOX /		AMTROBOX /		AMTROBOX /									
AMTRONIC /		AMTRONIC /		AMTRONIC /									
SMARTRONIC		SMARTRONIC		SMARTRONIC									

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