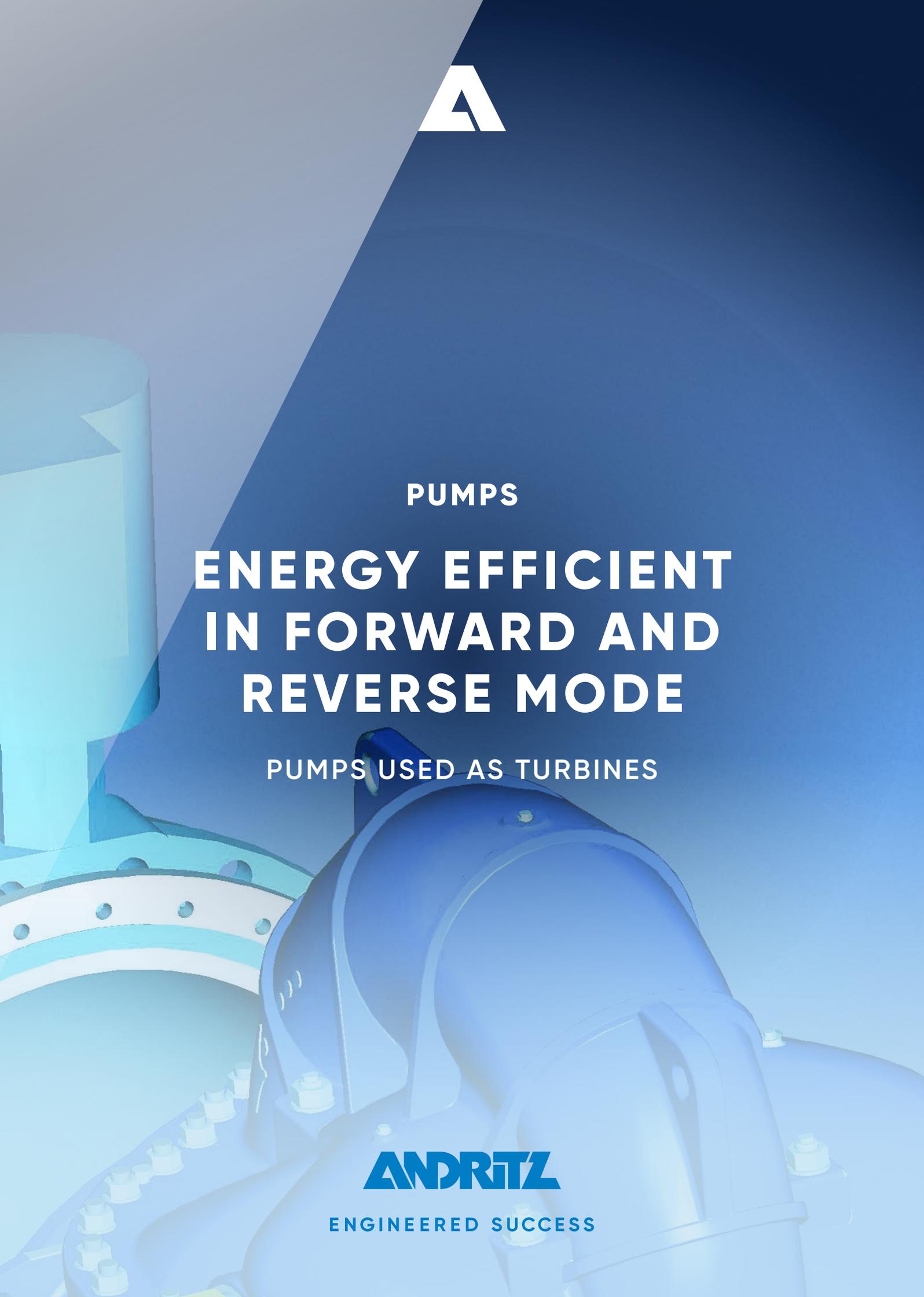




PUMPS

**ENERGY EFFICIENT
IN FORWARD AND
REVERSE MODE**

PUMPS USED AS TURBINES

A detailed 3D rendering of a blue industrial pump or turbine component is shown in the foreground. The component has a complex, curved shape with various bolts and flanges. The background is a gradient of blue, with a dark blue triangle pointing downwards from the top center, creating a sense of depth and focus.

ANDRITZ

ENGINEERED SUCCESS

ANDRITZ Pumps for your industry



ANDRITZ develops and manufactures high-quality custom tailored pumps for various industries. We supply pumps for different water and waste water applications. ANDRITZ pumps are operating successfully worldwide, for example in water resources management, waste water disposal, as well as large infrastructure projects for irrigation, desalination, and for drinking water and industrial water supplies.

Thousands of ANDRITZ submersible motors and pumps have been installed in mines around the world, working under severest conditions in water management and emergency drainage, including the largest submersible dewatering pumps in the world.

As plant and equipment supplier to the pulp and paper industry, ANDRITZ provides a complete pump program. Our product portfolio comprises medium-consistency pumps with an innovative fiber separation system, for example, as well as headbox pumps with efficiencies of over 90% and particularly low pulsation.

We also supply high-performance and reliable pumps for food applications such as proteins, dairy products, or beverages as well as a complete pump program for the entire sugar and starch industry. To round off the portfolio, ANDRITZ small hydropower plants and pumps used as turbines suitable for the private as well as the municipal sectors, and for industrial and commercial facilities ensure an economic and ecological independent power generation.

Pumps used as turbines

INNOVATIVE SOLUTIONS FOR ENERGY GENERATION

Are you looking for an economical way to generate energy with low investment and operating costs? Or do you need a standalone plant for a self-sufficient energy supply? Or perhaps you are even thinking of a small pump storage power plant?

Pumps and pump turbines from ANDRITZ are operating successfully all around the world. They offer robustness and wear resistance, thus fulfilling high customer expectations in terms of efficiency, life cycle, ease of maintenance, and economic efficiency.

COMPETENCE TO CONVINCE YOU

ANDRITZ is a byword for custom-tailored pumps used as turbines solutions at the very highest level. Customer-specific concepts are developed and manufactured according to requirements.

With the ASTROE technical center, we have an internationally recognized institute for hydraulic research and development at our disposal that provides the basis for the high technical quality of ANDRITZ pumps and turbines by means of numerical flow simulation and mechanical calculation.

FIELDS OF APPLICATION

- Small hydropower plants with grid feed-in
- As pressure reducing plants
- For use of residual water with energy utilization
- As energy recovery turbines, e.g. in the pulp and paper industry
- As stand-alone plant for a self-sufficient energy supply
- In pump storage power plants to generate and store energy

MEDIA

- River water
- Drinking water
- Waste water
- Pulp suspensions

OPERATING MODES

- Constant speed
- Variable speed
- Parallel operation with several pumps used as turbines
- Directly coupled to machine
- Turbine and pumping operation



ANDRITZ pumps used and controlled as turbines

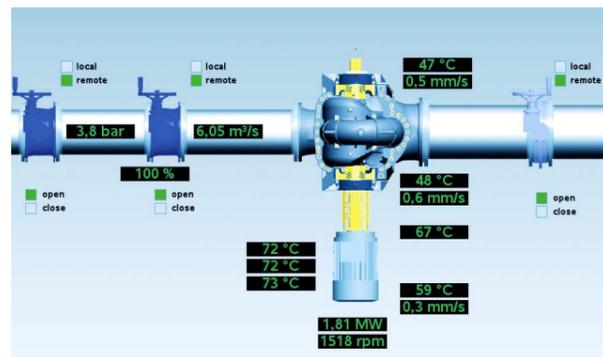
The modern automation system from ANDRITZ guarantees reliable, normal operation of the power plant and the head race tunnel at all times without any disruptions. The integrated control system takes account of all plant components. Special software modules utilize the individual turbines at optimized efficiency and with minimized wear. This applies both to mains parallel operation and to stand-alone operation with black start capability. In a pump storage power plant, additional water management is necessary. Both standardized and customer-specific solutions are available. With the appropriate grid technology and security, the plant is reliable in operation and accessible by mobile phone at all times.

RANGE OF SERVICES

- Advanced, scalable technology in industrial design
- Operating concepts with ergonomic details
- International standards applied
- Well-proven control concepts
- Self-monitoring system software
- Integrated vibration monitoring
- High-resolution long-term archiving
- Integrated collection of electrical measurement values
- Web cam integration
- Mobile phone alert by text message
- Secure remote access and remote maintenance facility

THE ADVANTAGES OF PUMPS AS TURBINES

- Low investment costs
- Minimal structural measures
- Low maintenance and repair costs
- Robust and wear-resistant design
- Research and development in ANDRITZ's own hydraulic laboratory
- High efficiencies (up to 87%)
- Variable installation possibilities
- Inspection tests possible in ANDRITZ's own hydraulic laboratory
- Modular system
- Short delivery times
- Complete delivery from a single source
- Well-tested and production-proven serial product
- Turbine and pumping operations possible
- Extensive range of products and materials
- Guaranteed hydraulic characteristic data from prototype tests



Process visualization

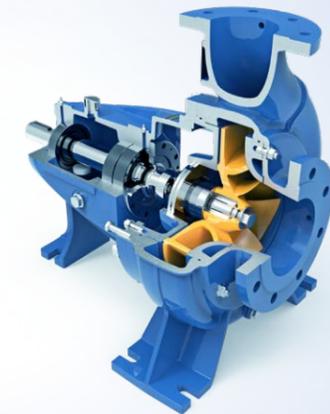


Low-voltage switchgear

Product overview – custom-tailored solutions

Single-stage centrifugal pumps

Close, semi-open, or open impeller

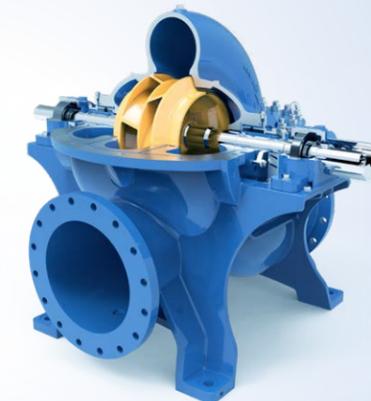


MODULAR SYSTEM WITH HIGH AVAILABILITY, EFFICIENCY UP TO 87%, SERVICE-FRIENDLY

- Flow rates up to 800 l/s
- Heads up to 80 m
- Output up to 250 kW
- Gray cast iron, stainless steel materials

Single-stage, double-flow split-case pumps

Closed impeller

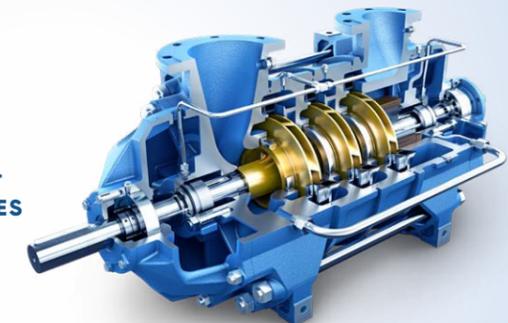


INLINE HOUSING, MOTOR MOUNTED ON THE LEFT AND/OR RIGHT, EFFICIENCY UP TO 86%

- Flow rates up to 6,000 l/s
- Heads up to 80 m
- Output up to 2,000 kW
- Gray cast iron, stainless steel materials

Multi-stage high-pressure pumps

Variable number of stages



HORIZONTAL AND VERTICAL DESIGN, FLEXIBLE ARRANGEMENT OF PRESSURE AND SUCTION BRANCHES

- Flow rates up to 250 l/s
- Heads up to 300 m
- Output up to 250 kW
- Gray cast iron, stainless steel and bronze materials

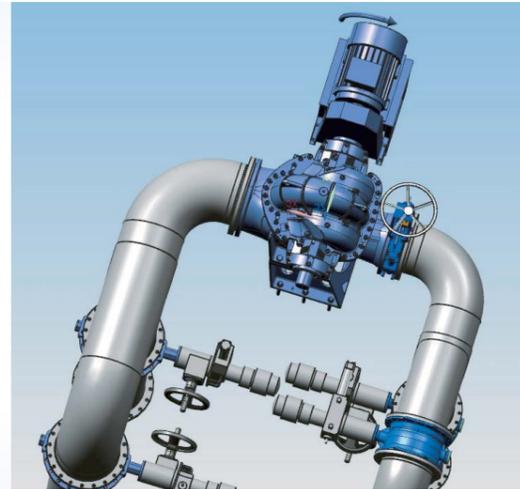
Product overview – custom-tailored solutions

Complementary mechanical components

Plant-specific design

TECHNOLOGY FOR SAFE OPERATION AND ECONOMICAL MAINTENANCE

- Control and shut-off valves
- Bypass valves
- Belt and geared drives
- Flywheels



Electrical Power Systems

Low- and medium voltage components

EFFICIENT AND RELIABLE ENERGY TECHNOLOGY

- Asynchronous and synchronous generators
- Frequency inverters, soft starters
- Low- and medium-voltage switchgears
- Power factor correction
- Transformers

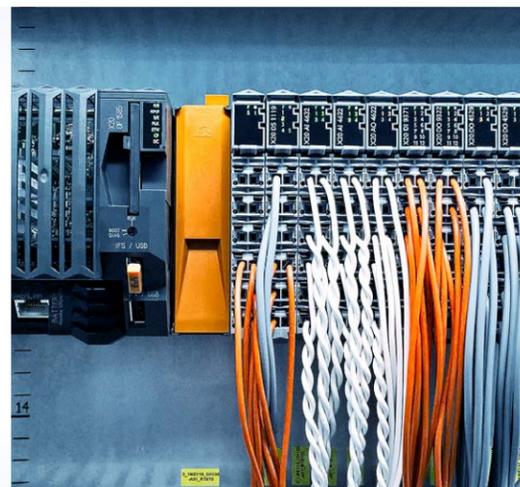


ANDRITZ Turbine Controller – ATC

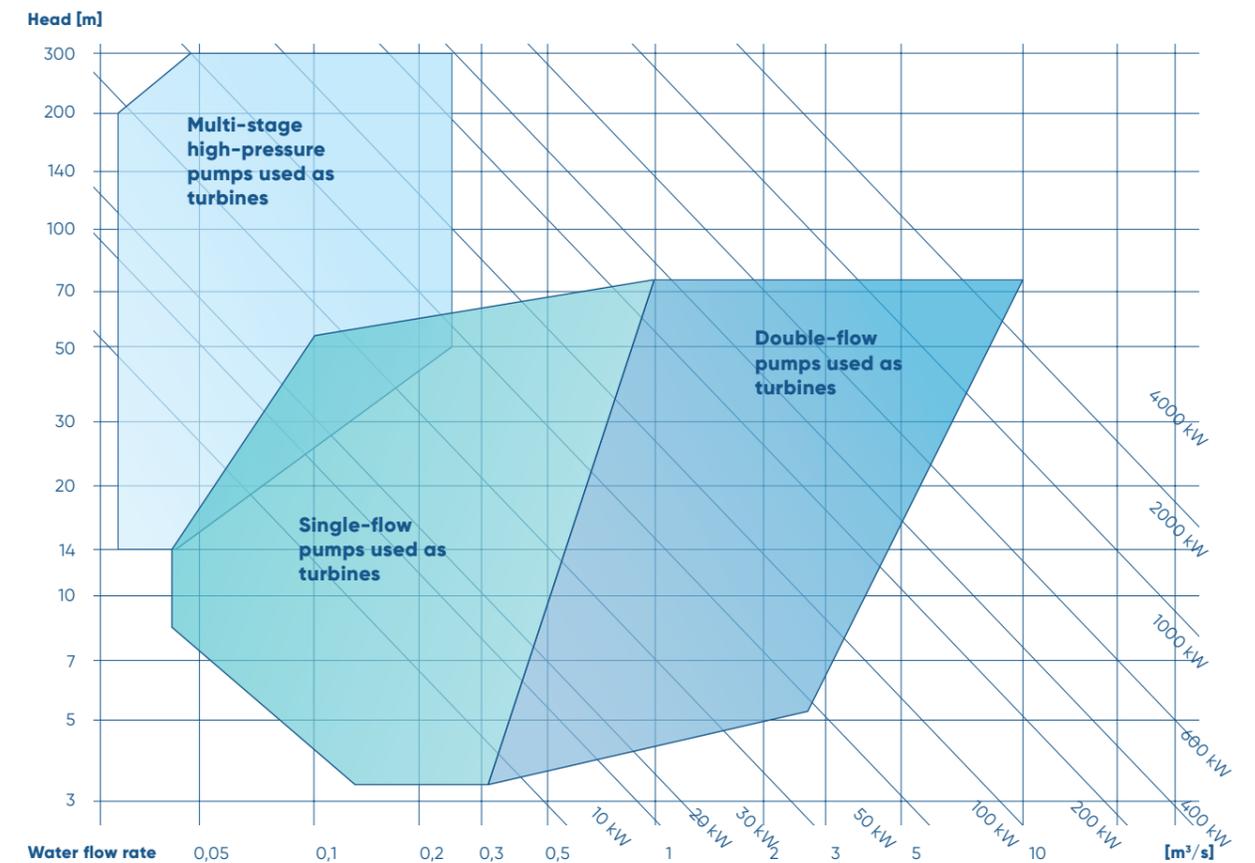
Unit and plant automation

FLEXIBLE, SAFE AND INNOVATIVE AUTOMATION

- Turbine and plant control
- Process visualization
- Electrical protection
- Excitation and synchronization
- Instrumentation



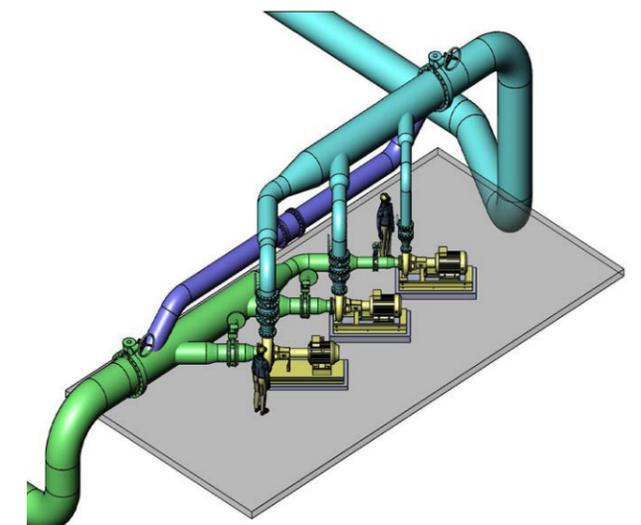
Performance range of HPT/ACT/AST series



FROM WATER TO WIRE

Our services with focus on complete solutions ("From water to wire") for electromechanical equipment cover the full production and service spectrum for the entire performance range, with special concepts being developed. The results of these concepts are:

- Everything from a single source
- Minimized coordination of interfaces
- Reduced erection work sequences
- Short delivery and commissioning times
- Consistent software and hardware solutions
- Optimized and compact power house dimensions
- Highest possible efficiencies



Greater efficiency – Pumps and turbine service

Find out more about
ANDRITZ pumps service



Optimization / Modernization / Operating reliability

The conditions of your plant have changed, but your pumps and turbines are still operating as previously and therefore, wasting energy? Would you like to optimize your system to reduce costs? With ANDRITZ, you will have a competent partner for these and numerous other services at your side.

Service and maintenance have a long tradition at ANDRITZ and complement the product portfolio. The century-long expertise is reflected not only in a service portfolio with innovative solutions and advanced products that can be optimally adapted to the respective customer needs, but also in a specially trained staff. ANDRITZ has specialized in the servicing of pumps and turbines to achieve improved efficiencies and adaptations to changed operating points of the installed pumps and turbines. A large potential for savings can already be achieved by improving the efficiency of 20 percent of the installed pumps and turbines. Our service team provides prompt, professional, and reliable assistance – also for other manufacturers' products. Book our service package and you can be sure of the best operating reliability for your systems in the long term. We conduct an expert assessment together with you, thus creating transparency and making an op-

timum solution possible that is tailored to your needs. After examining your plant, we determine its savings potential and realize it by improving the efficiency of the pumps and turbines installed. Additionally, this individual solution lowers your maintenance costs. You do not have to think about personnel, nor about maintenance schedules or utilities. Assembly is conducted according to defined schedules and with assistance from our trained personnel.

AN OVERVIEW OF OUR SERVICES

- Supply of original spare parts
- Deployment of trained personnel
- Installation and start-up
- Inspection
- Repairs, overhauls, maintenance
- Machine assessment by an expert for early fault detection
- Consulting and modernization
- Performance and vibration measurement
- Fault and damage analyses
- Feasibility studies
- Energy consulting for pumps, turbines and systems
- Preparation of maintenance schedules
- Service and maintenance agreements
- Automation and Electrical Power Systems
- Electronic equipment
- Training



Always a flow ahead - Research and development

Our affiliate ASTROE enjoys an internationally renowned reputation for its hydraulic developments and investigations. The high efficiency of the ANDRITZ pump and turbine series is ensured by Computational Fluid Dynamic (CFD) calculations and extensive testing carried out in our company owned laboratory.

Continuously increasing demands by customers in our operating industries emphasize the significance of R&D in the constant optimization of products and services. Today, efficiency, flexibility, and reliability over an extended lifetime are the major challenges of the market.

Our commitment to research and development forms the basis for our advances in hydraulic machine manufacturing. With ASTROE, center for hydraulic engineering and laboratory, we have an internationally renowned institute for hydraulic development work at our disposal. We are currently developing and testing our pumps and

turbines at five locations in Austria, Germany, Switzerland, and China. Our test stands are among the most accurate in the world. By networking these research and development centers, we provide a continuous transfer of know-how within the ANDRITZ GROUP for the benefit of our customers. The main tools for R&D are numerical simulation methods as well as experimental measurements in the laboratory and on site. State-of-the-art equipment, highly precise measuring instruments as well as the latest simulation technologies, and powerful software form the basis of the high technical quality of the pumps and turbines from ANDRITZ.



Smart pumps used as turbines

ANDRITZ has launched its IIoT activities already back in 2005 and its basic activities in the automation sector began as early as 1984. Now, the company has combined its innovative, industrial IoT solutions, which are field proven in many reference plants, under the technology brand "Metris – Foresee digitally". Metris technologies include latest state-of-the-art Industrial IoT solutions (IIoT) as well as any kind of smart digital services. These can be fully tailored to individual customer requirements and unite our clients' physical and digital worlds.

With regard to IIoT solutions for pumps and turbines, ANDRITZ has set a key focus on ensuring continuous and sustainable operational reliability and performance of pumps, turbines and plants ever since. ANDRITZ delivers highly sophisticated condition monitoring solutions for pumps and turbines. These solutions can be standard software packages or tailored to specific customer request. Special sensors are installed at the pump for this purpose and take measurements continuously. All data can be analyzed within the software or exported to various file formats. Limits and alert notifications with a traffic light system approach are also provided. The data is stored in an ANDRITZ Metris database. Metris cloud's data are accessible by both the client and ANDRITZ condition monitoring experts, which enables 24/7 service for the customer. Finally, ANDRITZ also provides optimization modules for pumps.

and turbines in plants as well as remote control options for locally installed platforms

Thus, ANDRITZ is taking pump, turbine and plant operations to the next level. By monitoring an intuitive human-machine interface of the control system that is equipped with groundbreaking digital and visual technology, highly efficient workflows make the future calculable and enable proactive action through the analysis of data. Thereby, ANDRITZ IIoT technologies become the basis for Internet of People (IoP) solutions by connecting our customers' specialists among each other as well with ANDRITZ experts. This value-adding interrelation results not only in a professional preparation of the collected data improving the plant's performance, but moreover enables our customers to practice successfully applied business intelligence.

IoP

ANDRITZ connects people through VR, AR, OPP, IDEAS and many other tools. ANDRITZ IoP reduces costs and risks for our clients, while at the same time sustainably supporting and developing their valuable workforce.



INNOVATION SINCE 1852

The internationally renowned ANDRITZ GROUP has been building pumps for more than 170 years. We offer innovative and targeted solutions with pumps and complete pumping stations. Our longstanding experience in hydraulic machine manufacturing and complete process know-how form the basis of the high standard of ANDRITZ pump engineering. Our quality and high-efficiency products as well as our understanding of customer requirements have made us a preferred partner for pumping solutions worldwide. ANDRITZ offers everything from a single source – from development work, model tests, engineering design, manufacture and project management, to after-sales service and training. We also perform complete start-up on site and guarantee our customers the best support. Our declared goal is your complete satisfaction. See for yourself!

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