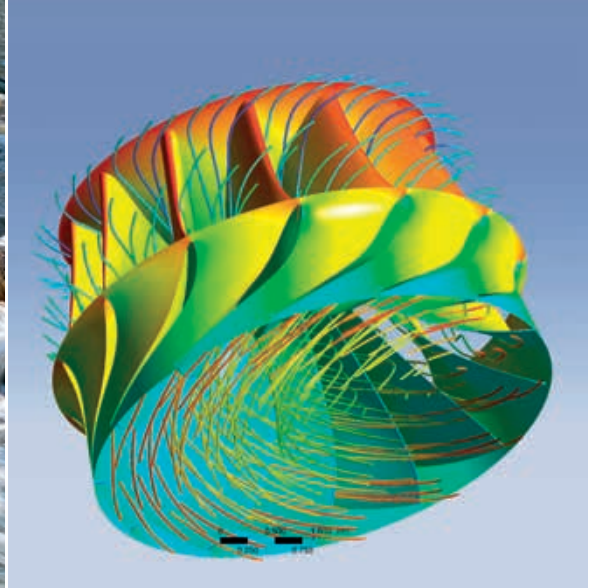




Kössler turns Water into Power





Kössler – Innovation with Experience

The application of renewable energies for eco-friendly power generation is a key concern of worldwide energy-political strategies. In this context, small hydro power plants are gaining more and more importance. With our experience and our know-how we can help you to unlock the potential that lies in the development of this form of energy generation economically and, at the same time, with minimum impact on the environment.

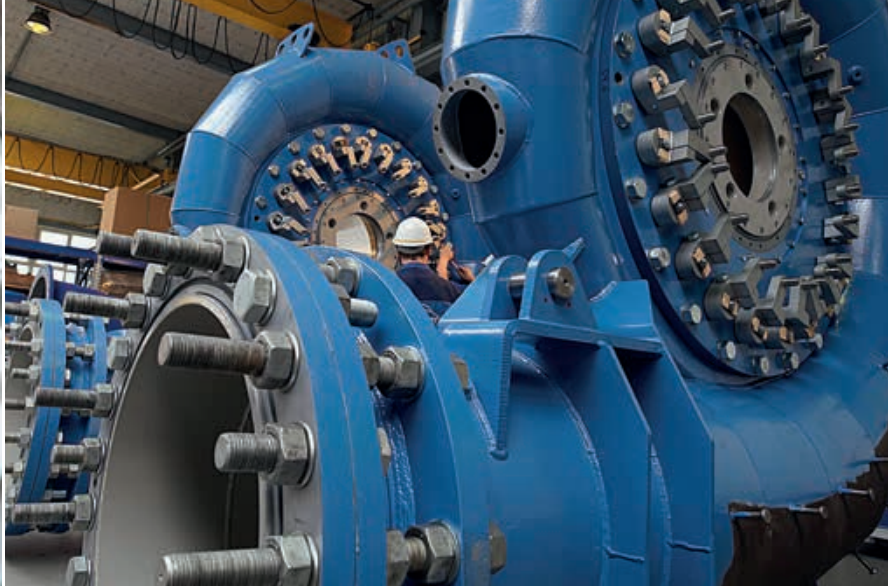
Kössler – a subsidiary of Voith Hydro

Kössler was founded in 1928 as a repair workshop for turbines and generators. Over the following years, the company increasingly concentrated on the development of new turbines and continuously increased its market share in this field. In the meantime, we are a complete supplier for small hydro power plants – including engineering, production, assembly and commissioning. Our portfolio covers the development and the production of a wide variety of turbines, as well as the automation of hydro power stations.

Since 2007, Kössler has been a subsidiary of Voith Hydro. As a result, we are able to utilize the comprehensive technological know-how of Voith. Both companies are convinced of the importance of hydro power as a renewable energy source. Long-standing experience and continuous investment in technological developments have resulted in advanced excellent products for small hydro power plants of up to 15 MW.

Voith

Voith Hydro is Group Division of Voith and, with over 5 000 employees and an order volume of more than one billion Euro per year, one of the worldwide leading suppliers in the hydro power industry. Voith sets standards in the markets energy, oil & gas, paper, raw materials and transportation & automotive. Founded in 1867, Voith employs almost 40,000 people, generates € 5.7 billion in sales, operates in about 50 countries around the world and is today an international family-owned company.



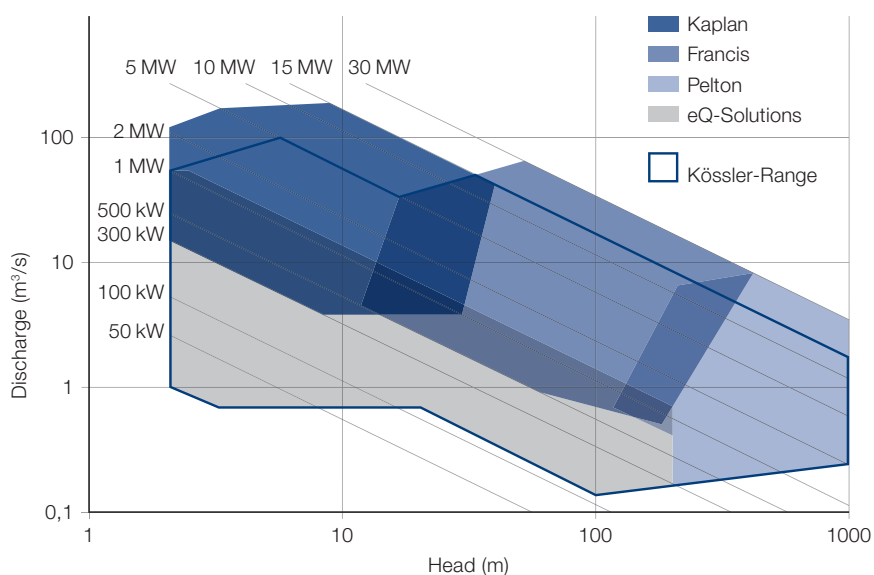
Our Corporate Philosophy

Investment in research and development are the foundations of the success of our company – now and in the future. Our activities are firmly oriented on the existing and future requirements of our customers.

Flexibility when dealing with individual customer demands, on-schedule delivery and services across the entire service life of any power plant equipped by Kössler are our highest priority.

Kössler is the “Center of Competency” for small hydro power plants in Europe at Voith Hydro, and, in this role, makes an active contribution to the eco-friendly generation from hydropower.

Application range Kössler and VH Small Hydro Division



Competence in Small Hydro

We develop solutions that allow for high economy in the generation of electricity from hydro power for our customers.

Everything from one single source

Our innovative, standardized concepts ensure the highest possible degree of economy of the delivered plants. Our optimum price-performance ratio results from the application of state-of-the-art technologies and our targeted orientation on the specific requirements of the operators of small hydro power plants:

- Clearly defined scope of delivery
- High availability
- Trouble-free operation
- Low operating costs
- Fast pay-back period

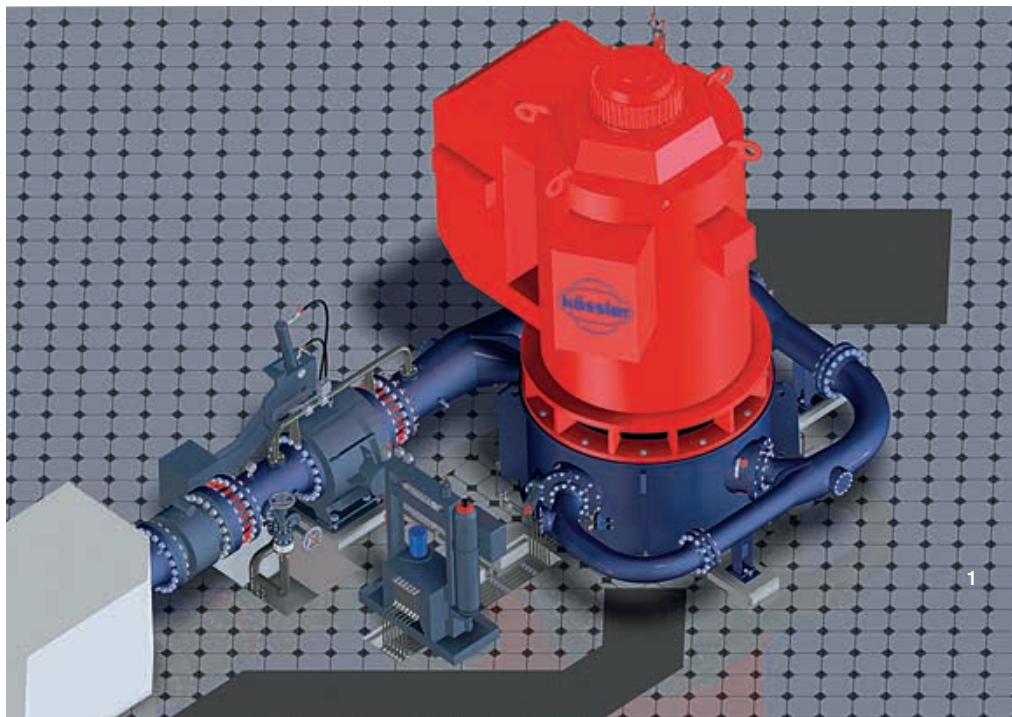
Our range of products and services:

- Standardized turbine concepts up to individual solutions
- Economical, constructive solutions with high operating safety
- Integrated designs with optimized interfaces
- Solutions that keep construction costs at the lowest possible level
- Concepts with high efficiencies and corresponding performance guarantees
- Maximum reliability due to strict quality controls
- Eco-compliant solutions
- Pre-assembly and therefore short erection times
- Competent commissioning of all systems
- Training of operating and service personnel
- After sales service

Our solutions combine all requirements on:

- Maximum safety + high availability
- Long service life + continuous further development
- Proven solutions + innovative technology
- Clear standards + maximum flexibility

- 1 3D CAD model of a vertical Pelton turbine
- 2 Model test facility for Kaplan hydraulics
- 3 CFD simulation of a bulb turbine



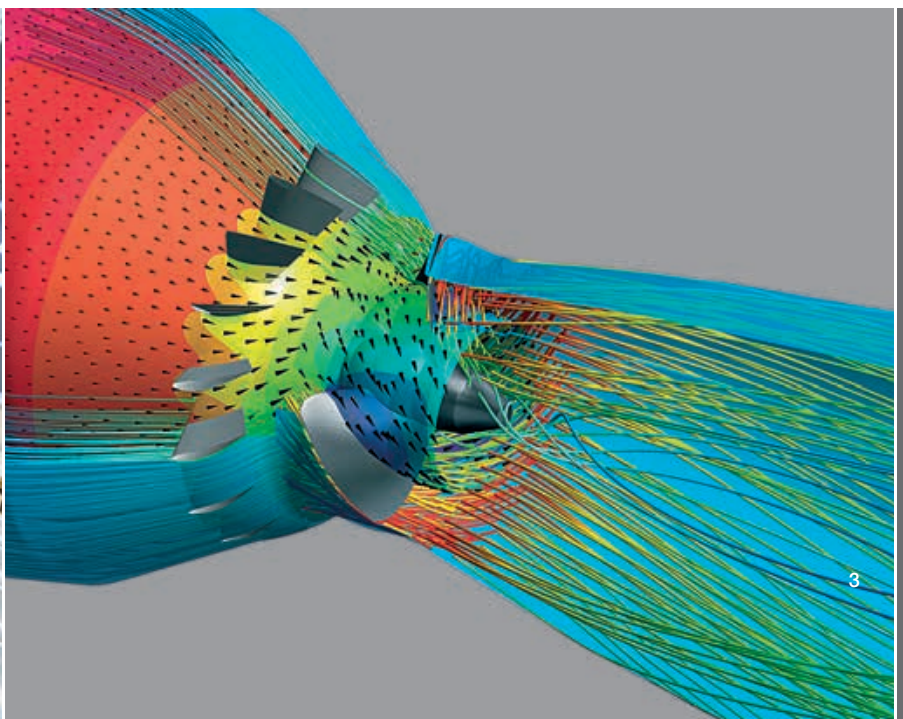
Research and Development

The names Kössler and Voith have always been synonymous with comprehensive research and development activities in the small hydro market.

Through our affiliation with Voith Hydro Kössler has access to the experience, competency and the facilities of the “Brunnenmühle” test laboratory. The Voith research and development department has been developing solutions for hydro power for more than 100 years as a pioneering institution in this particular field. The solutions and the expert know-how of this research laboratory are available to all units as “Central Technology” within a global network.

The Brunnenmühle applies the highest standards to all model tests carried out on its premises, and it is considered a guarantor for the development of state-of-the-art research and development tools and processes. Not just for large turbines but also for small hydro.

Kössler markets





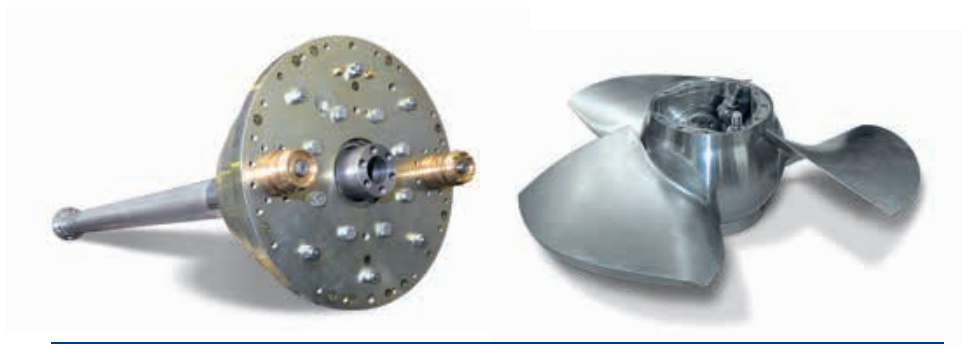
First-Class Production Quality

The long-standing experience and the high craftsmanship of our employees make sure that we always meet our own strict quality standards and those of our customers. The Kössler team is firmly committed to innovative development technologies and high-end, precise production with outstanding results.

Our design engineers use the latest analytic tools, 3-D CAD systems and CAM products. More than half of our thoroughly skilled employees work in the production and service area. With their expertise and their long-standing experience they ensure the exact im-

plementation of all developed concepts: from the selection of the best materials, precise production with CNC machines of the latest generation to internal quality control and professional on-site assembly.

Kössler has been planning and producing at its location in St. Georgen, Austria, since its inception. Our customers are able to personally monitor the progress of their orders directly at our plant.



Highly qualified employees and state-of-the-art technology ensure maximum production quality

Kössler is certified to the principles of the quality management system ISO 9001:2000. Specifically trained and audited employees are responsible for ongoing quality assurance.

All products are controlled on the basis of strict quality standards – which can always be expanded in accordance with customer requests. The consistent adherence to the quality regulations of the latest EN, DIN and IEC norms is a matter of course for us.



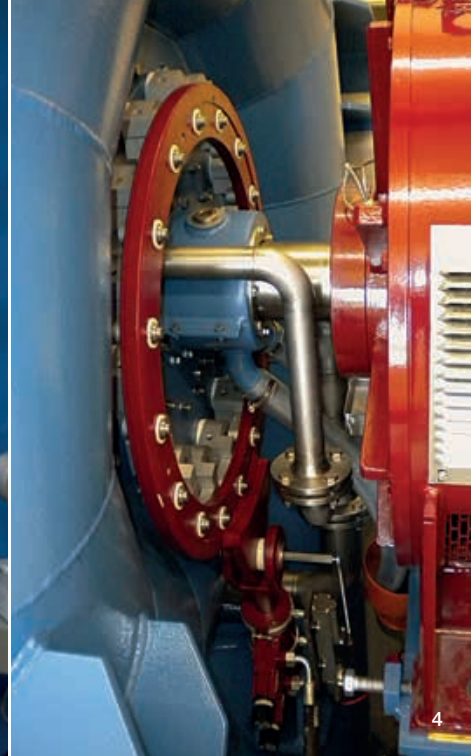
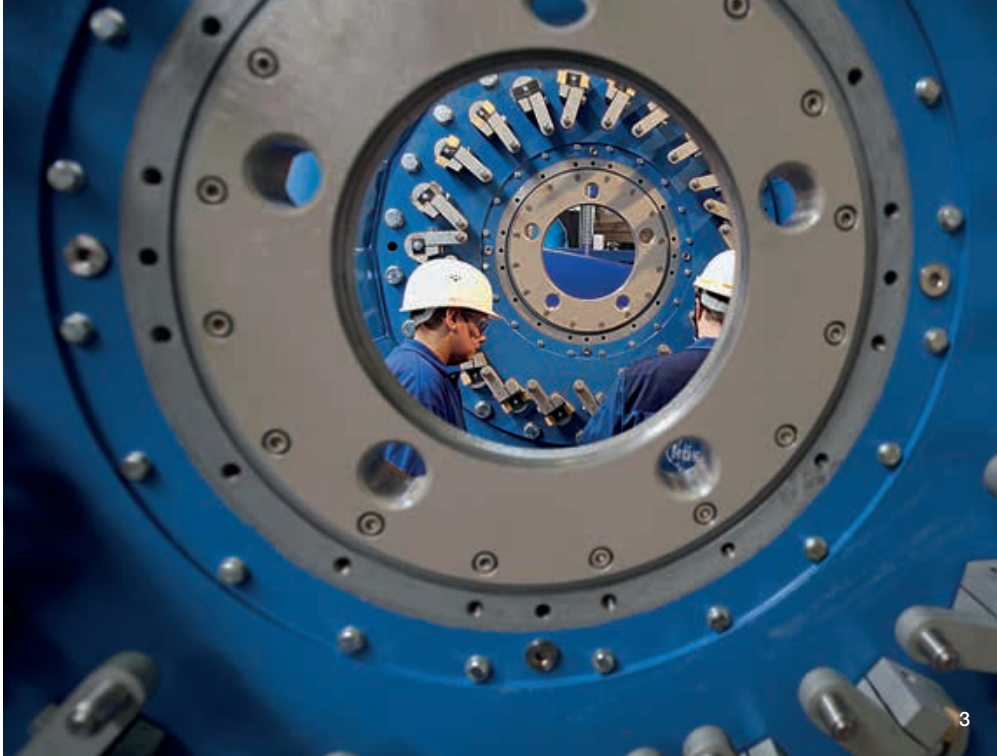
Francis Turbines

Reliable turbine for low to medium heads.

Francis turbines are primarily used in run-of-river power stations and pumped storage power plants with medium flow volumes. They stand out by optimum efficiency and high speed ranges.

Kössler develops and produces Francis turbines as spiral turbines, which can be used both in horizontal and vertical design.

The runner is often installed directly to the generator shaft, which results in optimum compactness and low maintenance requirements.



- 1 Francis runner – latest design
- 2 CNC-controlled production
- 3 Works assembly
- 4 Installed plant

Technical Information

Types:	Spiral turbines for medium to large heads. Designed as horizontal or vertical shaft spiral case turbines.
Output:	up to 15 MW
Heads:	up to 250 m
Runner diameter:	up to 2.5 m





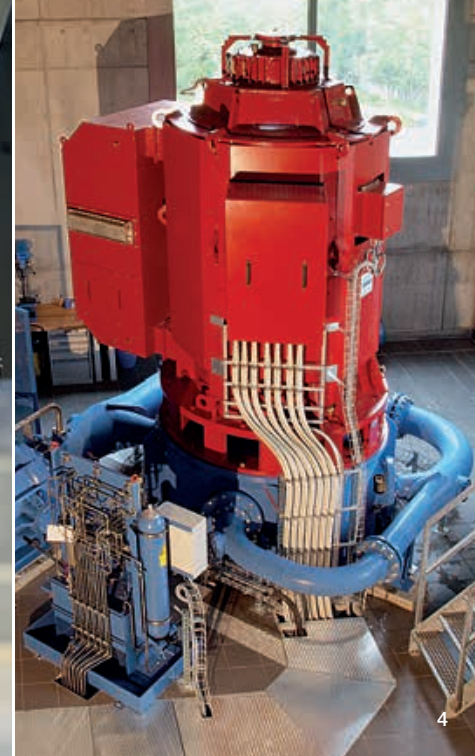
Pelton Turbines

The ideal turbine type for large heads.

Pelton turbines are mainly used for applications with large heads and low water volumes. This turbine type can achieve optimum efficiencies even with fluctuating water supplies, since the number of nozzles can be individually adapted.

Pelton turbine buckets are frequently subjected to load changes and abrasion. In order to achieve maximum robustness of the runner buckets, we use specially milled Pelton runners and complex production methods, for example hard coating.

Be it horizontal or vertical design, one or up to six nozzles, internal or external control: Kössler develops, designs and produces the Pelton turbine that is most suited to individual requirements – and ideally complies with the existing operating conditions.



- 1 Pelton runner
- 2 Horizontal Pelton turbine
- 3 CNC-controlled production
- 4 Installed multi-nozzle Pelton turbine

Technical Information

Types:	Horizontal or vertical construction with one to six nozzles.
Output:	up to 15 MW
Heads:	up to 1 200 m
Runner diameter:	up to 2.5 m





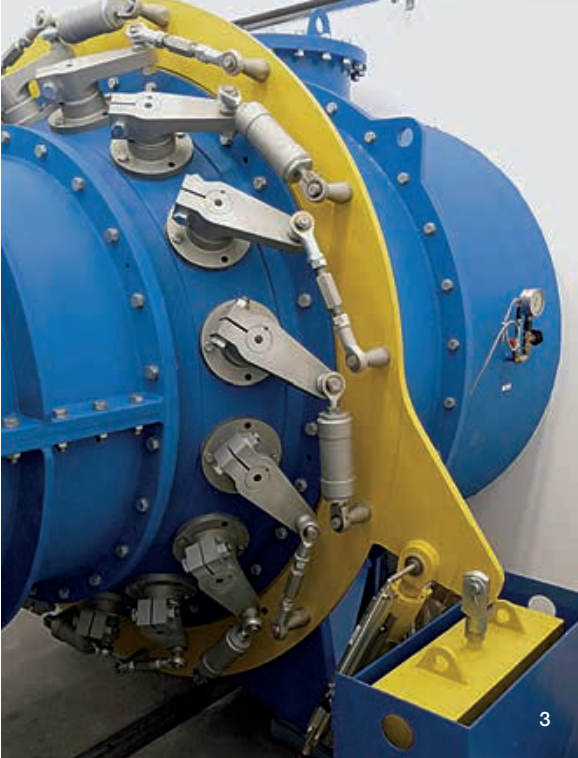
Kaplan Turbines

The optimum turbine for low-pressure applications with high water volumes.

Based on the Francis turbine, Victor Kaplan designed the Kaplan turbine between 1910 and 1913, with Voith using it for the first time in 1922. It is primarily installed in plants with low heads and larger water volumes. This turbine type can also be applied as a run-of-river power station.

Since the guide vane and the runner can be controlled separately, Kaplan turbines are able to utilize even strongly fluctuating water supplies. This control technology ensures very high efficiencies.

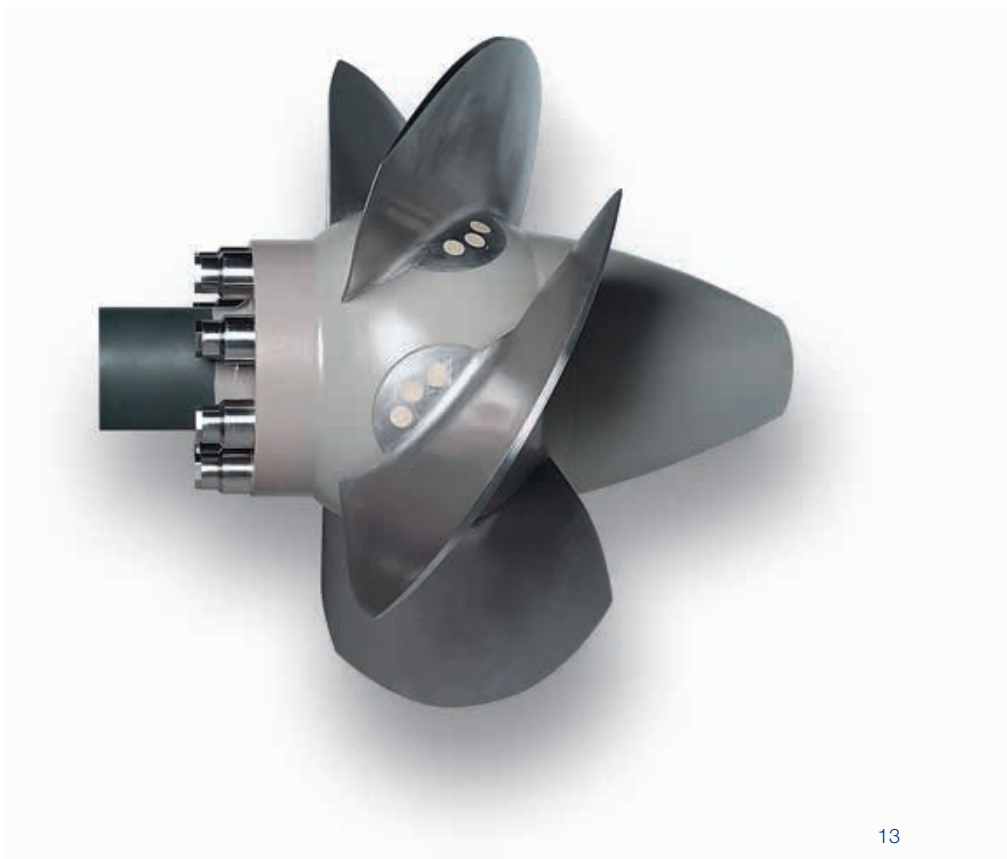
Kössler supplies Kaplan turbines in vertical design in concrete with a steel spiral or as horizontal bulb turbines in a wide variety of shapes with three, four, five or six blades. The drive to the generator occurs preferably via a direct connection or, in certain cases, via flat belts or gearboxes.



- 1 Kaplan runner
- 2 Dynamic balancing
- 3 Bulb turbine
- 4 Assembly

Technical Information

Types:	Bulb turbines, vertical Kaplan turbines and Kaplan spiral turbines
Output:	up to 5 MW
Heads:	up to 35 m
Runner diameter:	up to 3 m





StreamDiver™

Innovative turbine technology is setting new economical and ecological standards.

All over the world there are run-of-river schemes with low heads whose high energetic potential could so far not be utilized. The StreamDiver™ ideally combines the demands on economy and ecology needed by these plants.

The innovative technical concept of the StreamDiver™ ensures minimum maintenance and service work. As it can be directly installed into a weir system, its installation can even render conventional power station structures unnecessary. Construction technology and peripheral equipment can thus be reduced to an absolute minimum.

The StreamDiver™ is a compact turbine with an output of up to 800 kW per unit, which can be used for modular extensions as a minimum-flow turbine or as an alternative to existing small hydro plants. Apart from economical aspects, the development of the StreamDiver™ focusses strongly on ecological considerations. The bearings of this new development are water-lubricated. As a result, the compact turbine can be operated without any oil or grease.

Advantages of the StreamDiver™

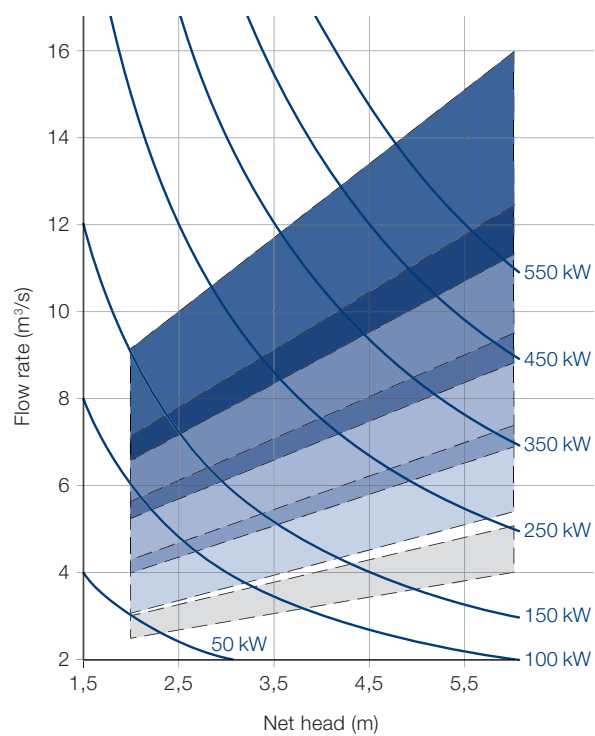
- Particularly economical solution due to minimum operating and maintenance costs
- Ideally suited for low heads
- Easy integration in existing weir systems or transverse structures
- Ecologically advantageous due to water-lubricated bearings and therefore oil and grease-free operation
- Fish-friendly runner contours
- Low structural requirements and universal applicability



- 1 Oil-free bearings
- 2 Works assembly
- 3 Quality control
- 4 Assembly
- 5 Possible installation



Application areas of the StreamDiver™ modules





1



2

eQ-Solutions

Standardized turbine solutions for economical applications in the lower output range.

eQ-Solutions stand for compact Francis, Pelton and Kaplan turbine solutions in the output range of up to 1 200 kW. Standardized solutions are supplied in proven Kössler quality with a view to material selection, production and operating safety for man and machine – with a strong focus on essential functions and equipment. Owing to their technically mature design, the construction of these turbines can be deliberately kept uncomplicated and compact.

This concept opens up totally new application opportunities, where small turbines had so far been regarded as unsuitable for economical reasons. The applied turbine hydraulics are identical with those used for larger plants. For this reason, we can guarantee outstanding performance data and high investment security. All components and production stages are of course subject to our strict quality control.

Wherever possible, the turbines, generators and auxiliary units are pre-assembled in our works. This results in short delivery times and low on-site assembly requirements. Experienced customers may even install the systems themselves.

eQ-Solutions: developed for economical applications in the lower output segment. And produced in the quality, for which Kössler has been renowned for decades.



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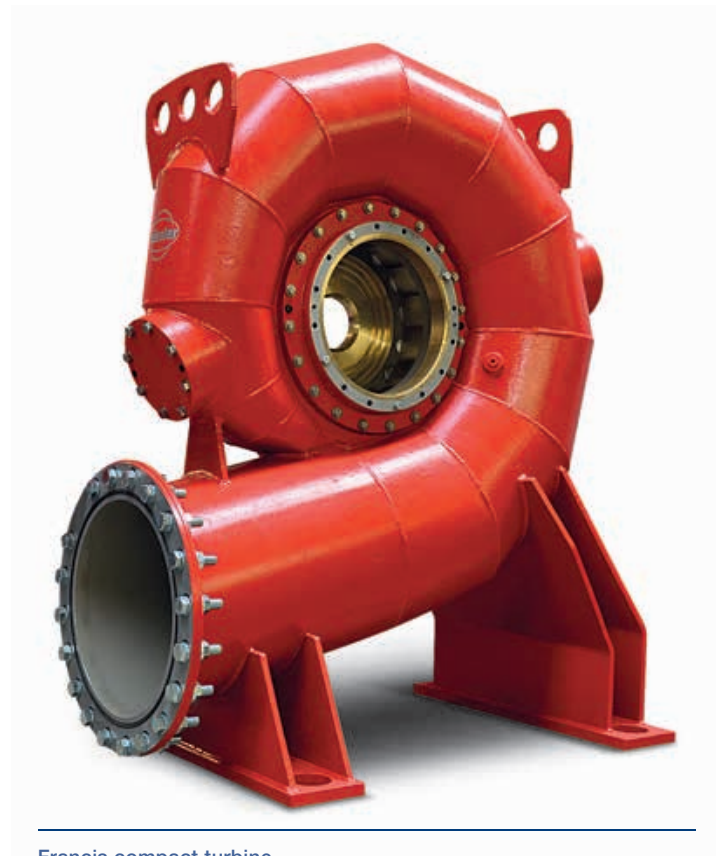


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- 1 Kaplan runner of an 80 kW turbine
- 2 Pre-assembled single-nozzle Pelton turbine
- 3 Kaplan compact turbine
- 4 Francis spiral turbine ready for shipment

Advantages of eQ-Solutions

- Standardized series
- Concentration on essential functions
- Proven high quality, production and safety standards
- Shorter delivery times
- Low assembly requirements
- Guaranteed performance values due to the application of proven turbine hydraulics



Francis compact turbine



Turn-key Hydro Power Stations

Turn-key solutions for electro-mechanical equipment:
Kössler develops, plans and manufactures the entire product range
for small hydro power plants.

A successful project requires more than first-class technical equipment. On-time and cost-efficient project implementation can only work through optimum cooperation of all parties concerned. And this applies to every single interface of the project.

This is why Kössler offers turn-key solutions for its customers. We supply you right from the start with initial concepts, developments, design, production, quality control and project management up to assembly and commissioning – everything from one single source.

Thanks to decades of experiences, we always find the appropriate complete solution even for specialized tasks, and we implement this solution professionally. Up to the handover of the turn-key plant. And afterwards we accompany you all the way with our services.



As far as generators and electrical engineering are concerned we closely cooperate with reliable companies whose product portfolio provides an ideal supplement to our complete solutions and who have proven themselves as competent project partners on numerous occasions.

Range of turn-key solutions

- Support during the concept phase
- Development, design, production and assembly of electro-mechanical systems including accessories
- Quality assurance and works control
- Complete project management
- AMB (After Market Business)

Digital Turbine Controller DTC 300

The new digital controller generation ensures safe, reliable and economical operation of your small hydro power plant.

Maximum economy and safety of small hydro power plants can only be ensured if turbine, electric equipment and steel hydro structures optimally interact with each other.

For this purpose, Kössler has developed the digital turbine controller DTC 300. It provides all functions for water level control, speed control and optimized efficiency and stands out by highest user friendliness.

Depending on the complexity of the entire plant, the DTC 300 can also perform other control tasks. Through a data interface it can be integrated into the overall power station automation system.

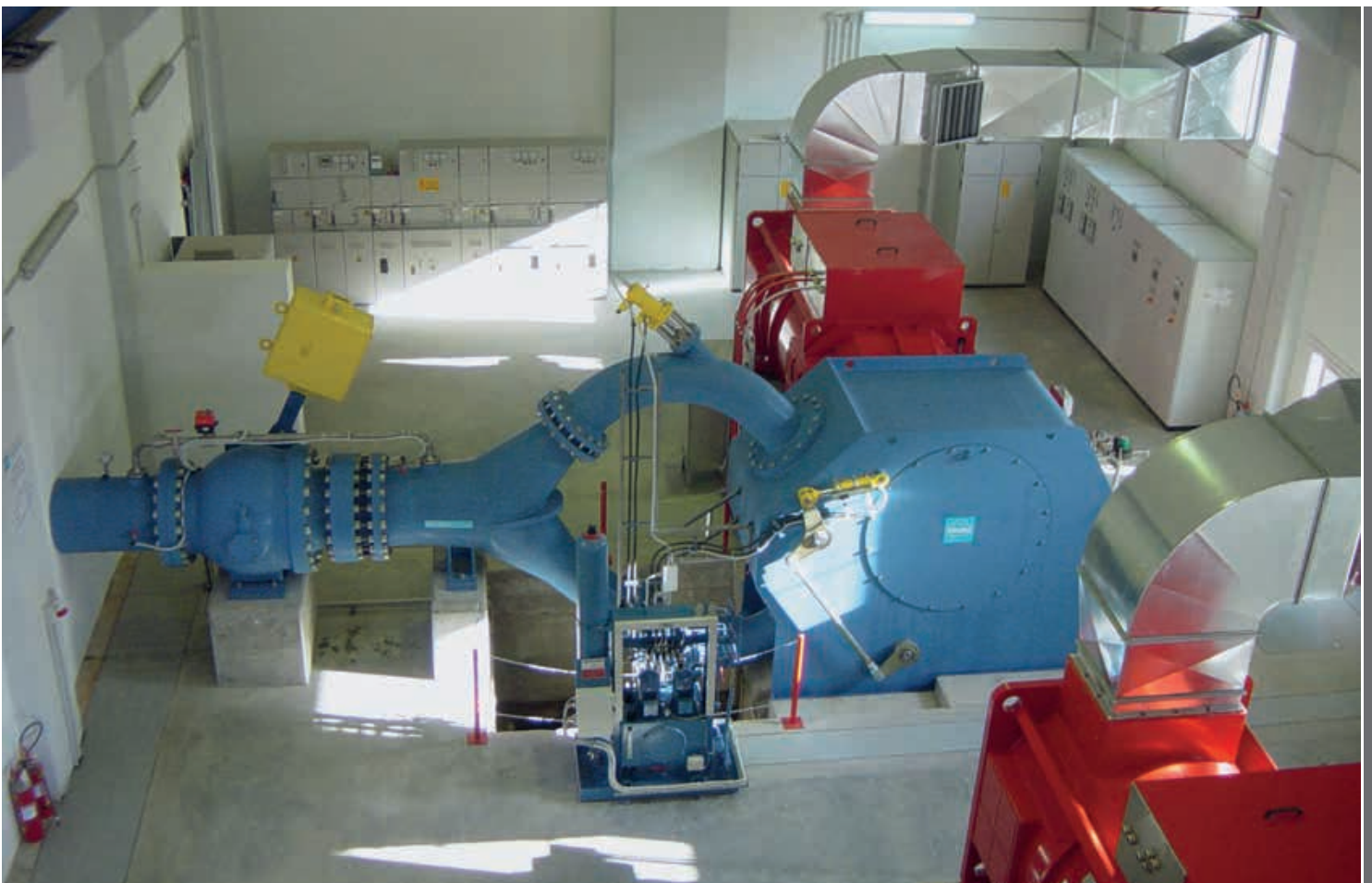


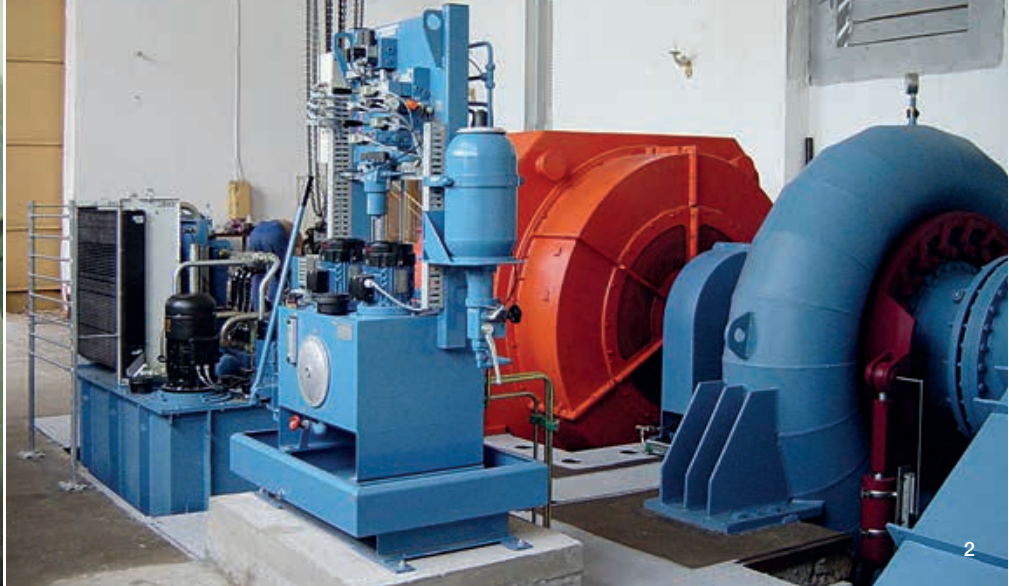
Advantages of the DTC 300

- On-site operation or via remote control
- Easy handling and clear HMI visualization
- Starting automatic, parallel mains mode and isolated power station mode
- Automatic shut-down with normal and fast-acting shut-down option
- Reliable operation also in unmanned power stations via remote control and failure analysis
- Fast, cost-effective failure search and elimination and/or program modifications via remote maintenance by Kössler
- Easy implementation into superordinate control technology systems via numerous interfaces



Front view of the DTC 300





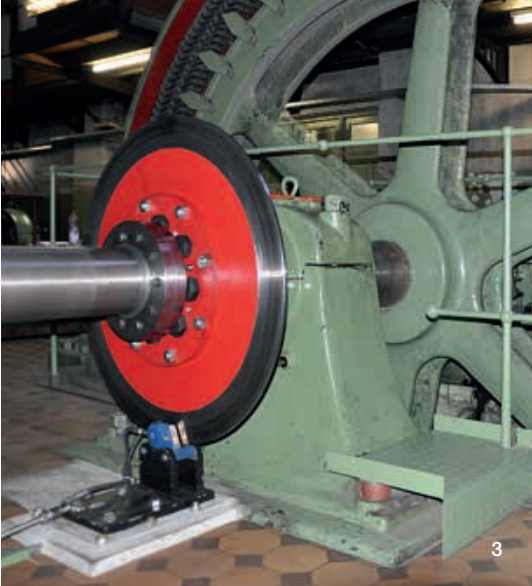
Service, Maintenance and Upgrades

For Kossler, customer service does not end with the handover of the plant. We accompany you with our service specialists – across the entire life cycle of your power station.

After Market Business (AMB) covers the full service of everyday operation, annual maintenance, provision of original spare parts and fast assistance in the event of failures. We know that standstill of a hydro power station means financial loss. Therefore we react promptly, flexibly and efficiently whenever required in order to keep downtimes as low as possible.

Seven days a week, from seven o'clock in the morning until seven o'clock in the evening, we are available for you in the event of a power station failure. 777 is therefore the number of our direct service line. Alternatively, you may also contact us on helpdesk@koessler.com. Highly qualified mechanical and electrical engineers provide telephone support for fault elimination and arrange fast service assignments.

The latest control systems from Kossler allow remote diagnosis of your power station. For older plants we recommend retrofitting a remote maintenance module. If failures cannot be externally eliminated despite these facilities, our service technicians are quickly on site, in order to ensure that operation can be resumed as quickly as possible.



- 1 Francis twin-turbine after general overhaul
- 2 Automation of Francis spiral turbine
- 3 Power station modernization
- 4 Spare runner
- 5 Assembly of a fully overhauled turbine

Depending on their construction and their operating conditions, power stations have life cycles spanning many decades. Therefore, Kössler also offers individual service for general overhauls of older plants. A conversion to lubrication-free bearings, the restoration of the original hydraulic contours and special coatings can, for example, significantly increase life cycles and efficiencies.

A performance and efficiency analysis by Kössler will point out existing potentials and improvement possibilities. Due to our affiliation with Voith we are regularly informed about the latest developments in the field of hydro power. And of course we utilize this expertise also for small hydro power plants.

Kössler service offers comprehensive solutions: from maintenance in current operation to emergency services and upgrades. With our range of services we ensure productivity – also for your small hydro power plant.



Historic display instruments

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