

High-efficiency slide bearings, couplings and special gear units for hydropower plants.

Hydropower



EMPOWERING FORCES.



Performance

Always powerful thanks to the tried-and-true technology

Sustainability

Biodegradable oils and no wear parts

Efficiency

Durable products with few maintenance requirements

Hydropower. Number 1 in renewable energy.

Around 17% of the world's electricity supply is generated from hydropower. At the same time, around 80% of the entire regenerative produced electricity comes from this energy source. Hydropower plants are uniquely efficient at up to 90% – and they can be used as storage units for solar and wind power. RENK has already equipped several hundred hydropower machines with its pioneering technology. For a safe, economic and sustainable power generation throughout the world.

For a high level of productivity and security of supply: durable slide bearings, couplings and gear units from RENK.

Whether mini, small or medium: RENK always supplies just the right solution for any hydropower plant.

Based on RENK's high-quality slide bearing technology for turbines and generators as well as gear unit and coupling solutions for power generation. RENK's experts can support your new projects and retrofit systems.

Compared to rolling bearings, RENK's proven slide bearings offer significant advantages for the hydropower sector. Key advantages include long service life, easy assembly and monitoring, excellent damping properties as well as vibration-free, almost silent operation.

It pays off: Systems equipped with RENK slide bearings typically operate for decades without any problems or service requirements.

In addition to standard slide bearings, RENK also offers special custom solutions – for example regarding the selection of materials, axis height or special functions. Supplementary components, such as oil systems, instrumentation or turning gears are also part of the product range.

Whatever you seek to install or improve in the hydropower sector, you can always rely on one thing: With slide bearings, gear units and couplings from RENK, you can confidently master even the most difficult technical and economic challenges.

Low-emission, resource-saving and uniquely efficient when combined with modern technology: Hydropower is the natural energy source for the future.

RENK products for powerful, reliable and energy-efficient hydropower plants.

Application		TURBINES			GENERATORS and MOTORS	PUMPS
Product		Francis	Kaplan	Pelton		
Types						
SLIDE BEARINGS						
Horizontal machines						
Flange-mounted bearings	SM	•	•	•	•	•
Horizontal bearings	SC	•		•	•	•
Horizontal bearings	HG	•	•		•	•
Horizontal bearings	EF, EG, ER, EM	•		•	•	•
Thrust bearings	DN/DG and LA	•	•			
Vertical machines						
Vertical bearings	EV, V	•	•	•	•	•
COUPLINGS						
Gear couplings	VHBA, HAW, HBA	•	•	•	•	•
GEAR UNITS						
Planetary gear unit	RIV		•			
Slide bearing gear unit	PAR/PBR		•			



Horizontal bearings

Turbines, generators, motors

Flexibility

Versatile solutions for moderate and high axial loads

Reliability

Safe functionality thanks to the all-round proven design



Learn more about RENK horizontal bearings online at www.renk-ag.com/goto/X-9abfed4

Ideal for Pelton, Kaplan and Francis turbines and generators: horizontal slide bearings from RENK.

Horizontal slide bearings from RENK not only provide safety and efficiency in industrial and maritime applications, but also in power generation projects such as hydropower plants.

RENK pedestal bearings of the type SC are ideal for application with Pelton turbines thanks to the low axial loads. These pedestal bearings were optimized for stationary use as radial bearings in land-based applications and can also absorb moderate axial loads. Electrical machines are their main application area. Combined with the RENK pedestal bearing of the type HG, the SC bearing also works like a self-lubricated radial bearing for horizontally arranged Francis or Kaplan turbines.

RENK flange-mounted bearings of the type SM were developed for use as generator bearings in hydro-applications, among other things. Depending on the requirements, either hydrodynamic thrust surfaces or tried-and-true RENK RD slide shoes are integrated into the supporting body of the bearing shell to use it as a fixed bearing. Self-lubrication with natural, water or external cooling is also possible as is an external lubrication supply with cooling.

RENK pedestal bearings of the type HG are self-lubricated slide bearings for high radial and axial loads. They were primarily designed for the horizontal mounting of hydro turbines or electric machines in stationary land use.

- Advantages at a glance:**
- Customer-specific adjustments
 - Noise and vibrations during operation are generally low
 - Overhaul and maintenance possible on installed shafts



Pedestal bearing type SC
Bearing for generator or motor



Flange-mounted bearing type SM
Bearing for turbine, generator or motor



Pedestal bearing type HG
Bearing for turbine with axial load (Francis and Kaplan) or generator



Diversity

Always the right solution thanks to the modular system

Economic Efficiency

Less effort during installation and maintenance



Learn more about RENK slide bearings type E online at www.renk-ag.com/goto/U-f0f4664

Leading technology for electric machines, turbines, pumps, turbo compressors, fans and test benches: RENK slide bearings type E have been setting standards for decades.

RENK slide bearings type E are recognized for their exceptional quality and unique benefits and therefore became the DIN standard already in the mid-1970s and later the ISO standard. Customers can choose from a whole range of different housing types, lubrication and cooling versions as well as sealing systems.

Slide bearings type EF are especially ideal for electric machines as they make independent bearing foundations superfluous, including the alignment work. Compared to pedestal friction bearings, they allow for much shorter bearing clearances and therefore stiffer rotor designs.

Slide bearings type EG/ER are used in many mechanical engineering applications. These pedestal friction bearing housings were developed for placement on foundation structures.

Slide bearings type EM provide large-sized access points to the interior of machines and bearings, which is a crucial advantage when it comes to machine assembly and maintenance work. For sophisticated drive concepts in particular, the housing shape of the RENK slide bearing type E also forms an ideal basis for a wide range of expansion stages.

- Advantages at a glance:**
- Quieter and more cost-effective than rolling bearings for large dimensions
 - Highly flexible design
 - Simple assembly
 - Extremely low wear
 - Maintenance-free or low-maintenance
 - Resistant to penetration of dust and shocks
 - Suitable for very high speeds

Slide bearings type E

Turbines, generators, motors



Slide bearings type EF



Slide bearings type EG/ER



Slide bearings type EM



Thrust bearings

Turbines

Safety

Proven technology
for high loads

Adaptability

Intelligent integration
of customer-specific modifications



Learn more about RENK
horizontal bearings online at
www.renk-ag.com/goto/X-9abfed4

Particularly tough: RENK thrust bearings of the type D and type LA.

RENK offers special solutions for absorbing high, even shock-like, axial and radial loads, regardless of rotation and load direction.

Thrust bearings of the type D, like many bearings from other RENK types, have the tried-and-true RENK RS/RD slide shoes with a round running surface. These are supported via cup springs, thereby ensuring a uniform axial distribution of loads.

Thrust bearings of the type LA have axial parts consisting of circular segments. This type is therefore ideally suited for Kaplan and Francis turbines.

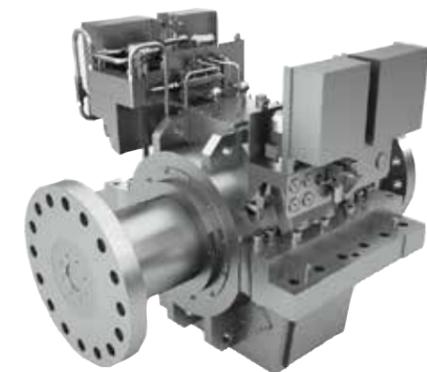
Thrust bearings of the type D and type LA can be operated self-lubricated with water cooling or with an external lubricant supply. The housing is designed as a pedestal bearing or as a saddle bearing with or without a lubricant sump.

In the standard designs, the bearing housing consists of gray cast iron. When it comes to special applications, RENK benefits from its decades of experience in developing individual solutions with welded bearing housings.

- Advantages at a glance:**
- Customer specific solutions
 - Noise and vibrations during operation are generally low
 - Overhaul and maintenance possible at installed shafts
 - Efficient condition monitoring thanks to easy evaluation of the bearing temperature
 - Available as a package with many combination options



Thrust bearings (saddle bearings) type DN/DG
Turbines



Thrust bearings type LA
Turbines



Vertical bearings

Turbines, generators, motors

Stability

Decades of experience with vertical machines

Optimization

Continuous improvement of selection, design and material



Learn more online about
RENK vertical bearings
www.renk-ag.com/goto/W-841f13b

RENK vertical bearings meet the highest standards when it comes to product quality, operational reliability, service life and effective condition monitoring.

RENK vertical bearings in the V range are mainly used in low- to medium-speed machines with vertical designs, such as pumps, fans, turbines, or electrical machines.

Vertical bearings of the type V are complete bearings that require no additional design effort on the customer's part.

VT bearings are available as combined thrust and guide bearing with a radial and axial part. The key features of the VT bearings are the tiltable, round RENK RD slide shoes.

Depending on the operating conditions, the **VT/VG bearings** are operated with external lubrication, or integrated water coolers. In the case of external lubricant supply, the housing is equipped with an overflow chamber that always keeps sufficient lubrication in the bearing.

RENK vertical bearing inserts in the EV range were developed especially for use in high-speed machines with vertical designs, such as pumps, turbines, or electrical machines.

The key features of the **EV bearing** inserts are the tiltable, round RENK RD slide shoes that ensure a uniform axial load distribution. The radial part of an EV bearing consists of individually adjustable segments, which make adjusting the bearing clearance easy and safe.

If desired, EV bearing inserts are delivered with a lubricant container. The loss of bearing performance can be dissipated via an integrated loop tube cooler or through external cooling of the lubricant.

Advantages at a glance:

- Bearing design tailored especially to vertical applications
- Custom solutions for every need
- Complete bearings that do not require construction measures without extra design work
- Direct influence on the machine's rotordynamic behavior
- Decades of experience in the use of vertical machines
- Constant optimization of selection, design and material



Vertical bearings type V



Vertical bearings type EV

Customized solutions throughout the entire drive train of hydropower plants.

Shifting gear coupling. Engagement or disengagement. In any position.

Complete flexibility: The gear coupling from RENK has always been available in a connectable design.

The geared components can be engaged or disengaged at a standstill as well as during the synchronous operation of connected units. If necessary, operators can thus temporarily disconnect certain machines of a drive train and connect auxiliary or alternative drives, if required.

Customized couplings from RENK are available in both horizontal and vertical designs. Shifting gear couplings are usually structured in a double cardanic design. This structure allows for the compensation of radial, axial and angular misalignments of machine shafts.

Vertical and horizontal switchgear.

This coupling is delivered with a switchgear that has been specifically adapted to the requirements of the respective system. Technically, the clutch coupling control system is also ideally integrated into the entire system's existing control system

If desired, a separate control system of the clutch coupling is available.

Advantages at a glance:

- Customized designs
- Suitable for new and existing systems
- Available in a horizontal and vertical design
- Pneumatic or hydraulic switchgear



Vertical shifting coupling type VHBH



Horizontal shifting coupling type HBA

Long runtime for hydropower plants: RENK slide bearing gear units and planetary gears.

Durable high-performance solutions for maximum efficiency: RENK has also been setting standards for decades for gear unit solutions.

Slide bearing gear units of the type group RIV were once developed specifically for power generation via hydropower in the paper industry. Since 1985, this continuously optimized series has been used extremely successfully as a component of Kaplan vertical turbines.

The tremendously powerful RIV industrial gear units are available with center distances from 500 to 1,500 mm. In addition, 15 different sizes allow for optimal adjustments to customer-specific requirements.

PAR/PBR planetary gear units have been an important part of the RENK product range since the 1960s and today transmit powers of over 30 megawatts and torques of more than 4.5 million Nm.

PAR/PBR planetary gear units are primarily used in the drive trains of Kaplan turbines. The compact design, even at high transmissions, allows for a narrow turbine train with generators of very small sizes.

Typically, turbine axial bearings and second radial bearings are integrated in the gear unit. PAR/PBR gear units have plain bearings.



Learn more online about RENK products for hydropower plants
www.renk-ag.com/goto/6-e24d487

Advantages at a glance:

- Wear-free continuous operation with maximum tooth quality
- Broad product range
- Customized designs



Slide bearing gear unit type RIV



Planetary gear unit type PAR/PBR

RENK Services.

RENK offers impressive products and solutions – throughout the entire life-cycle. RENK is a driver of innovation and a strong partner in many industries. Always. And everywhere. As a one-stop solution provider, RENK offers holistic solutions and blends customer proximity with state-of-the-art technology. In this way, RENK is shaping the future – with excellent process intelligence, project expertise, and the highest quality standards for procedures and materials.

Maintenance

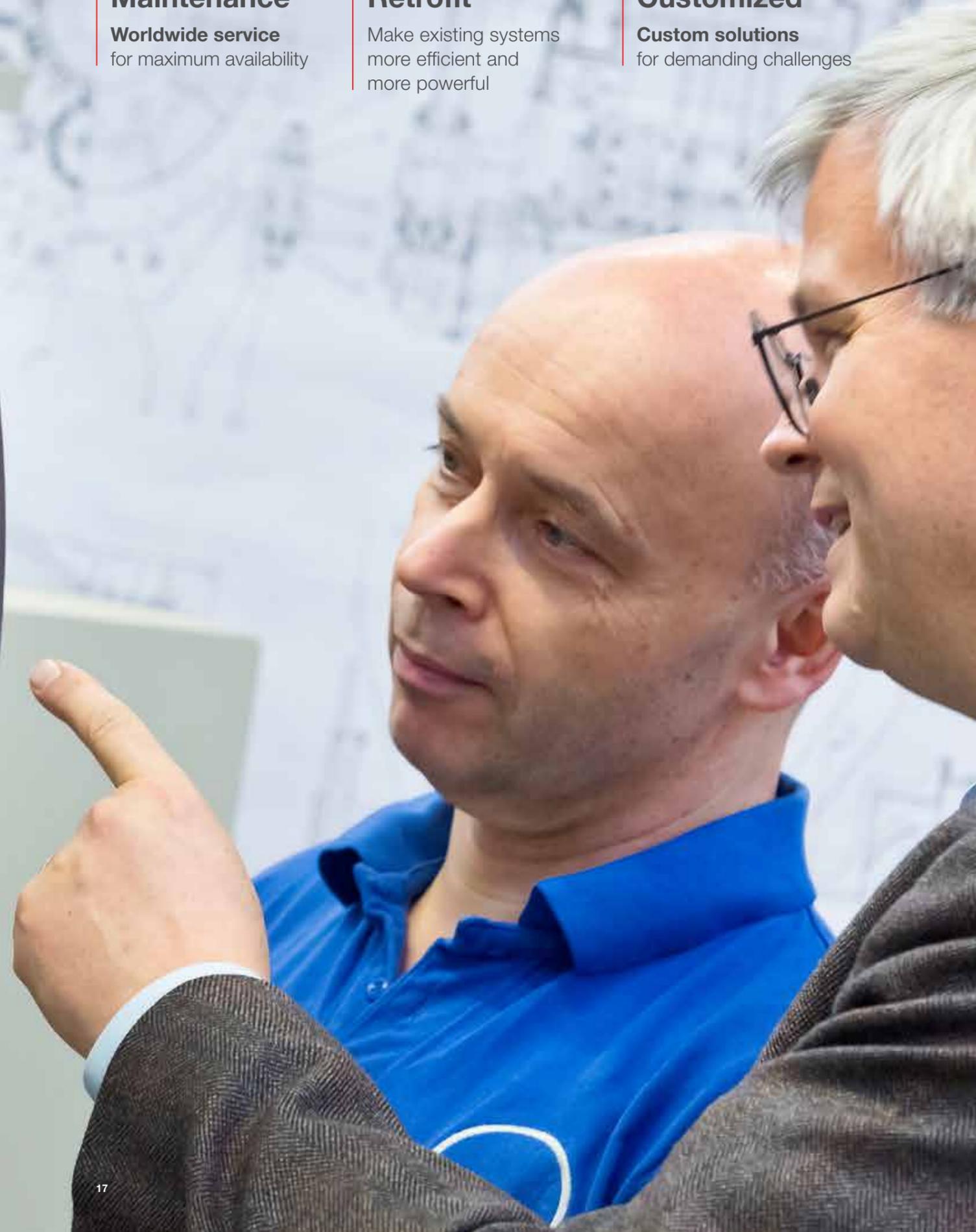
Worldwide service
for maximum availability

Retrofit

Make existing systems
more efficient and
more powerful

Customized

Custom solutions
for demanding challenges



RENK life-cycle. Successful solutions for all systems.

Consultation, production, control: Custom solutions from the start.

Expertise and experience – always applied appropriately and with commitment: The perfect basis for reliable and profitable systems.

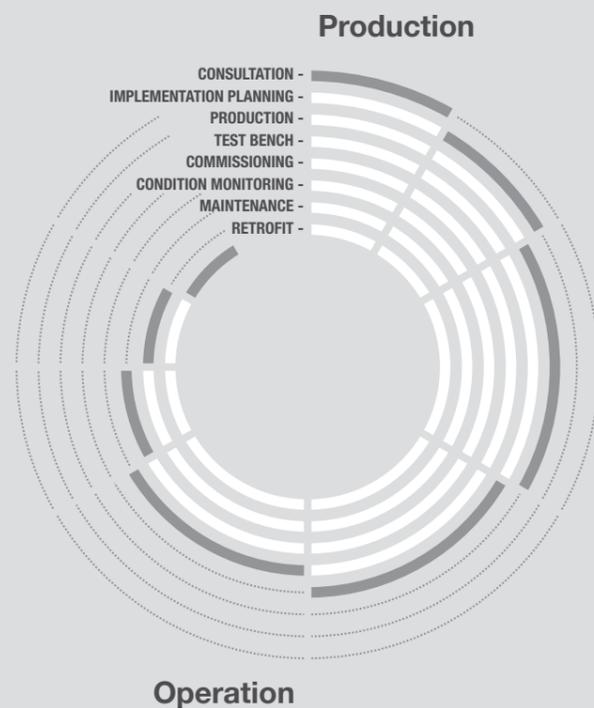
The RENK life-cycle ensures success and efficiency – for every system. Operators benefit from our unique expertise. Experts accompany every project step-by-step. They advise, plan, manufacture and optimize with modern testing systems. This results in superior system solutions: application-specific, innovative, future-proof.

Commissioning, condition monitoring, maintenance – ensuring economic efficiency.

Intelligent maintenance strategies result in savings and increased efficiency.

Systems must be available. Always and in every environment. The RENK life-cycle offers the ideal prerequisites before the first work cycle even begins. It forms the solid foundation for individual systems that analyze and continuously optimize ongoing operations in real-time. Longer service life of components and longer maintenance intervals ensure maximum utilization of systems.

RENK is a driver of innovation and a strong partner. The unique RENK life-cycle makes us the ideal one-solution provider for holistic and reliable solutions from a single source.



Durability

Extended system service life through expert maintenance

Speed

Optimal availability thanks to 24/7 service



Learn more online about **RENK services**
www.renk-ag.com/goto/4-ac306ae

More than maintenance: On-site service, retrofits and genuine parts.

Maintenance from RENK means service without compromise – anywhere, anytime. RENK takes care of planning and executing all the tasks involved in new assemblies, commissioning, inspection, and maintenance work. Our qualified assembly and commissioning personnel also carry out standard upgrades and overhauls. In this way, RENK guarantees a reliable operation of all systems.

Optimal planning, the availability of qualified personnel, and the necessary parts and tools ensure that all work runs smoothly. You can depend on the work being performed professionally and on time, and know that you will receive a transparent breakdown of costs. Thanks to our expertise, we offer quick service to guarantee the maximum availability of your systems.

All-round services. For maximum system availability.

On-site service: Many repairs can be carried out directly on the system. Our competent service fitters have the necessary certificates to be able to work on site.

Examination and repair: If it is not possible to repair the system directly, we will analyze and optimize it at our plant. Afterwards, it will be as good as new.

Retrofit: Upgrades can increase the efficiency and thus the value of existing systems – and can often be carried out on site by our specialized personnel. This saves money and optimizes operation.

Genuine parts: RENK parts are unmatched in terms of their performance, functionality and quality. Genuine parts offer critical advantages with regards to efficiency and success.

RENK maintenance. Services:

- On-site service
- Inspection and repair
- Retrofits
- Original parts



Maintenance around the world. RENK works accurately and successfully. Our experts stand for expertise and reliability at every location.

Follow the QR code and learn more about RENK solutions for hydropower plants online.



Learn more about
RENK products online.
www.renk-ag.com/goto/6-e24d487

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