

Geiger® Fish Protection Technologies

The protection of fish and other aquatic life is a key issue when planning and operating cooling water intake structures at rivers, seas and oceans, for plants that use hydropower and for river pumping stations. The protection measures should be based on the EU flora-fauna habitat guidelines and the EPA CWA Rule 316b.



Our fish protection concepts are the result of the latest developments in mechanical and electrical engineering combined with decades of experience in screening technology. The perfectly harmonized measures ensure the sustainable use of surface water. Extensive test runs at water intake installations and under laboratory conditions prove the efficiency of Geiger® Fish Protection Technologies. In recent years, the use of up-to-date sonar techniques has proven the efficiency of electric behavioral barriers. We are the solution provider for complex systems, ensuring the highest possible benefits for open channel water intake systems, for river pumping stations and other measures in water management.

Advantages

- EPA Clean Water Act Rule 316b-compliant
- Optimum protection of fish and other aquatic life
- Unique, advanced systems offering site-specific solutions
- Single source for all components ensures compatibility
- Proven, well-engineered solutions
- Low maintenance
- Full technical support for design parameters right from the planning stage
- Optimum results via computer simulation proven on existing water intake structures
- Extremely gentle return of fish, other aquatic species and microorganisms

Behavioural Barriers

The most effective fish protection measure is to prevent fish from entering the screening area using behavioral barriers. The combination of a proper civil structure design and the Geiger® Fish Repelling System ensures that nearly all fish larger than 8 - 10 cm, as well as smaller fish are prevented from entering the plant water intake.

The arrangement and design of the first cleaning step (coarse screening) must allow enough space for small fish and larvae that have passed through the fish repelling zone. A special control system with defined stop positions and a slowly ascending cleaner carriage, allow the fish to pass the coarse screen.

Fields of Application

Geiger® Fish Protection Systems can be installed in all water intake plants with a high population of fish, such as:

- Water intake systems for power stations
- Desalination plants
- Pumping stations
- Pump storage plants

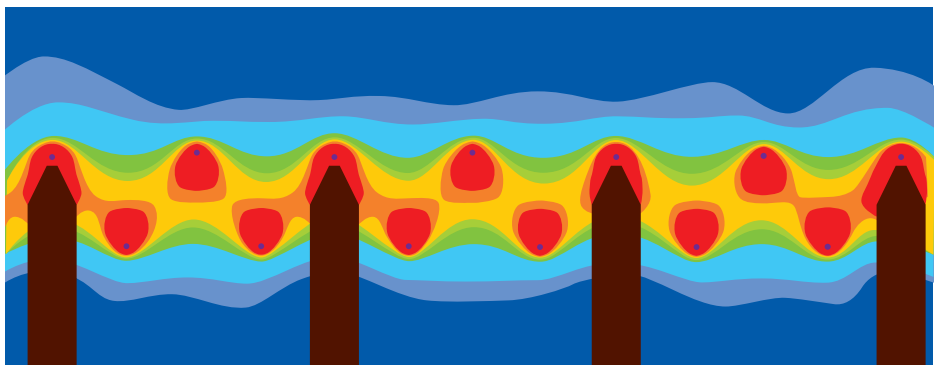
- Hydro-electric power plants
- Industrial plants
- Flooding plants

The specific requirements of a particular plant are carefully considered during the planning phase. For example, the water quality (its conductivity, temperature), the depth, the flow conditions.

Geiger® Fish Repelling System: The New Generation

- Electric field as a behavioral barrier, especially on rivers / lakes
- Optimum repelling effect thanks to individually-planned solutions
- Homogeneous build-up of the repelling field by computerized calculation of all parameters
- Very efficient thanks to anti-parallel pulsed current and automatic voltage control
- Continuous measurement of the repelling field
- Proven, well-engineered technology
- Low energy consumption due to optimum pulse shape
- Very low maintenance requirements and easy to service
- Full technical support including computer simulation of the repelling fields right from the beginning of the planning stage

To optimize our Fish Protection Systems, we recommend the use of Geiger® Fish Immobilisation Systems. This technology briefly prevents fish from swimming by emitting a sequence of short electrical impulses, ensuring that the fish can be transported gently and without stress.

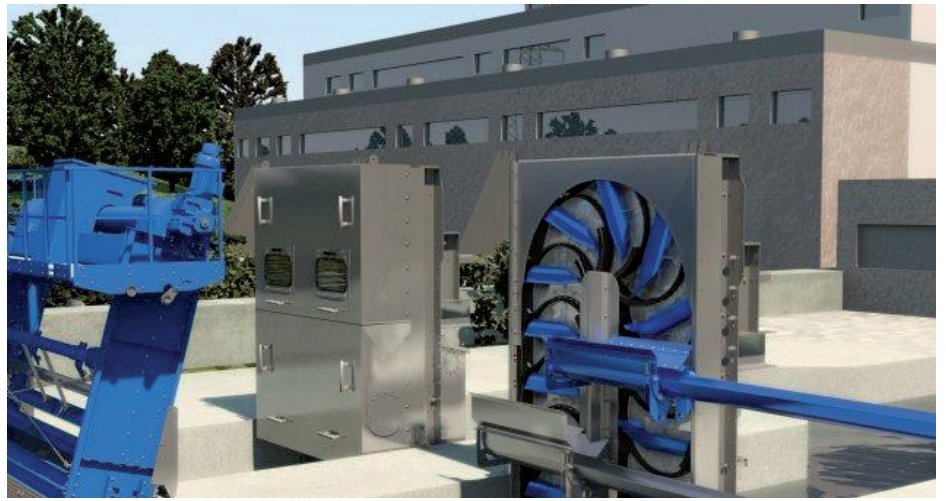


Geiger® Fish Immobilisation System

- This system is a supplement to the Fish Return Systems for Geiger MultiDisc® Screens and Geiger® Travelling Band Screens.
- For a short while the fish are prevented from swimming by the emission of short electric pulse sequences
- The fish cannot escape from the fish buckets any more
- A very gentle and stress-free return of the fish is ensured

Geiger MultiDisc® with Separate Fish Return System

Picture on the right:
Geiger MultiDisc®
with Separate Fish
Return System



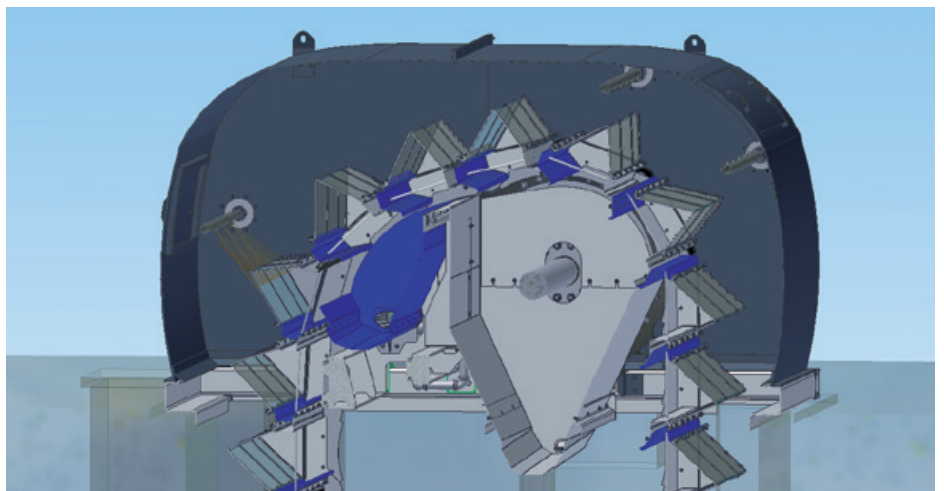
Picture below:
Geiger MultiDisc®
with Fish Buckets



- Only one flow pattern, hence lower head loss and no turbulence created by flow turning
- Fish buckets on each screen panel
- As fish may become adhered to steel alloy surfaces, the fish buckets are specially coated with a sliding composite material
- No moving machine parts that may cause risk of injury to the fish
- Fish buckets are emptied gradually on the upstream side
- Design-optimized fish buckets to avoid turbulences
- Intensive cleaning of the screen panels with spray water only when descending, i.e. after the fish buckets have been emptied
- The option of separating the contents of the fish buckets and the sprayed-off screenings
- Mesh size 1 - 10 mm

Geiger® Travelling Band Screen: Special Design with Fish Buckets

- In-to-out flow pattern with specially shaped screen panels and integrated fish buckets
- Fish bucket at each screen panel
- Possibility to use wedge-wire profile for the gentle treatment of fish and fish larvae
- Design-optimized fish buckets to avoid turbulences in the fish buckets
- Mesh size 1 - 10 mm
- The fish buckets can be emptied into an additional collective fish trough
- No moving machine parts that may cause risk of injuries for the fish
- Intensive cleaning of the screen panels with spray water only when descending, i.e. after the fish buckets have been emptied
- Possibility to separate the screenings from the fish buckets



Geiger® Fish-Friendly
Travelling Band
Screen

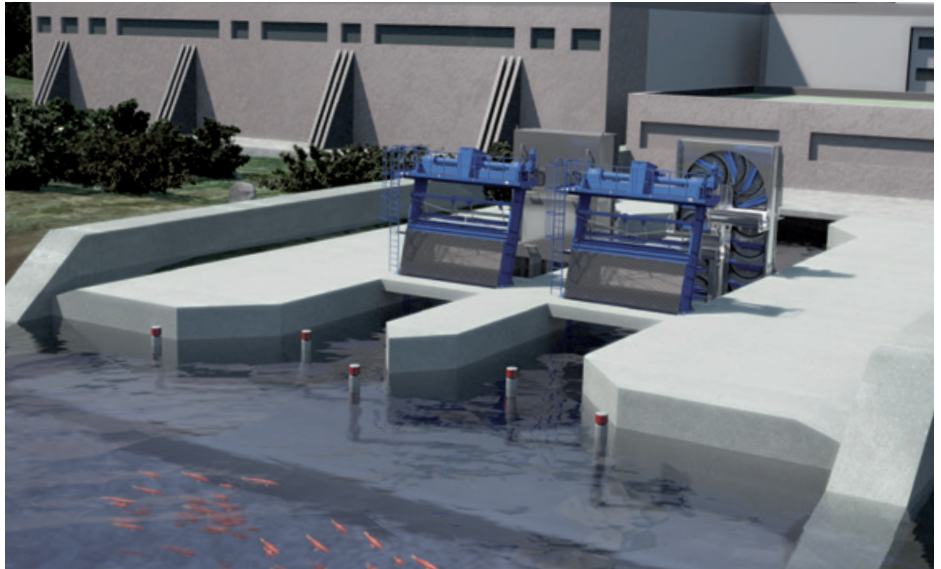
Recommendations

For plants with two or three screening stages, we recommend the use of the Geiger MultiDisc® with fish buckets as a fine screen. Fish, larvae and other microorganisms are filtered without the danger of dewatering. The fish are transported upwards and gently poured into a trough.

In case of centre-flow channel designs, we recommend installing the patented Geiger® in-to-out

Travelling Band Screen with specially shaped panels and special meshing that provides a gentle and safe escape for fish, larvae and microorganisms. The screening panels can be constructed from either meshing or from wedge wire, depending on the targeted species. The fish buckets are emptied into a separate trough that joins the primary debris trough without exposure to the high pressure spray system.

Typical Open Water Intake with Fish Repelling System, Bar Screen and Geiger MultiDisc® with Fish Return Systems



River Power Plant with Electric Fish Repelling System



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