



Zero Gravity Pump

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TurnKey_Flow Through Facility

Our Zero gravity pump can enable flow rates in any range, and compared to traditional pumps, they are zero differential (displacement) pumps that reduces complexity and components.

With up to 90% energy efficiency when lifting water, our pump will have a huge impact on sustainability, motor-sizes, maintenance schedules etc. for any flow through system.

Our technology enables simple, fully automated aquaculture-facilities

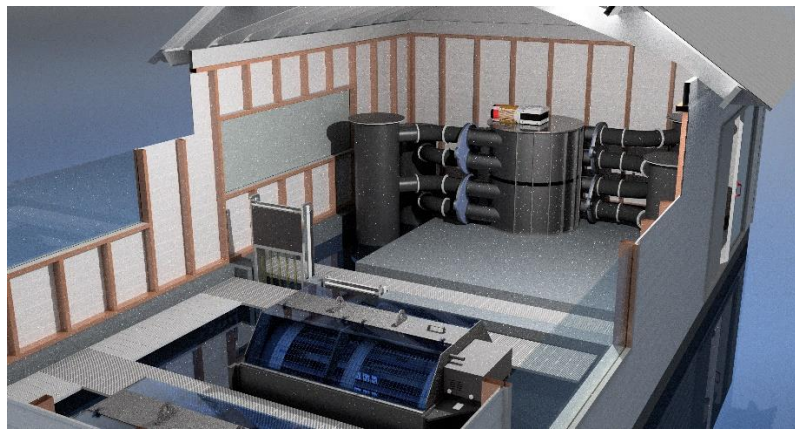


Figure 1 – A simple illustration of a fully automated Flow through system

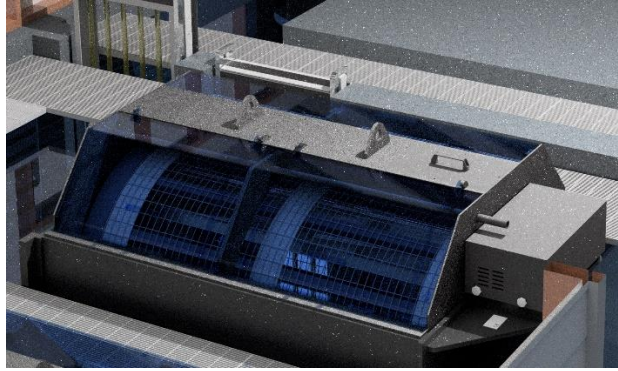
Components

The turn key solution have few components and they are all fitted for a 100 m3/hour facility. This is the standard size, but can be scaled to any size as a multiple of 100 m3.

Main components for our turn key solution:

Zero Gravity Pump		
100 m3 Tank		< 5 mBar pressured drop
Drum filter	Optional	< 10 mBar pressure drop
UV disinfection	Optional	< 1 mBar pressure drop
Pipe assembly		< 20 mBar pressure drop
Inlet aerator	Optional	Areation and lift generation on inlet
Priming pump		For redundancy and priming
Solar panels	Optional	Disconnected from energy grid

Drum filter



Description

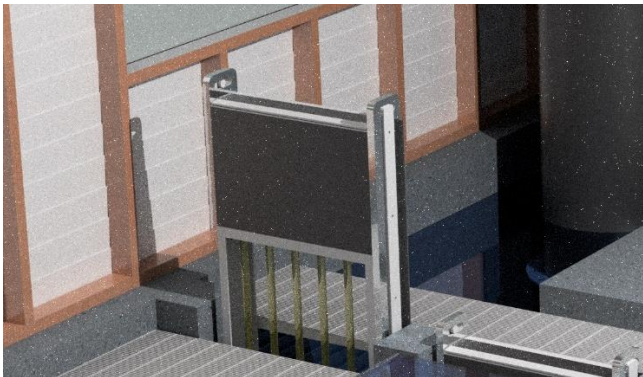
For a turnkey solution, the drum filter is one of the optional components, and depending on mesh sizes the filter is not influencing flow much. Pressure differential can be as low as 10 mBar or lower.

It will be placed in the pump-shed at the inlet of the facility, before the pump, and it will be submersed in the sea.

The drum filter may be an optional choice if other cheaper filter solutions like simple sump filters are chosen.

The cost of this drum filter will be 10-15% of the total cost of the facility.

UVC Desinfection



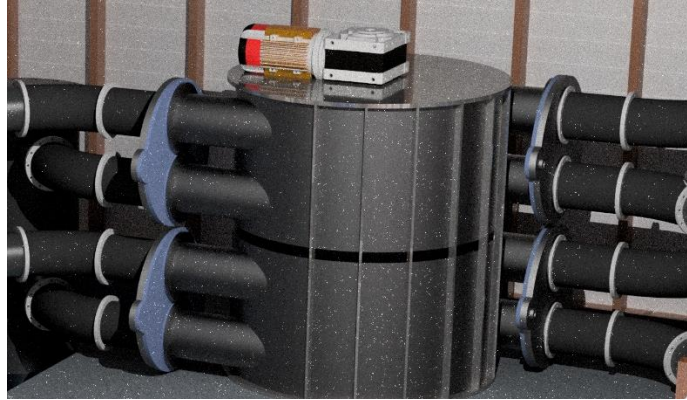
Description

The UVC desinfection is another optional component. It is placed at the inlet of the facility, and requires approximately 2 kW of power.

The cost of this is low, but for FTS systems with high volumes the energy consumption can be substantial!

UV filtration is often a requirement in RAS facilities, but for FTS systems these filtration devices do not have the same purpose. FTS systems or hybrid FTS systems are not reusing water with possible contamination since they normally are only considered an extension of the sea!

Pump



Description and Energy use

The pump can be delivered in a pump-shed as a stand-alone component together with a sump filter, for applications considered a pure FTS system.

For a pump delivering 100 m³/hour it will have a theoretical energy usage of maximum 1 kW, probably lower. This is configurable based on pump housing sizes and pipe sizes between tank, pump and sea.

For fully automated FTS systems, this is a stand-alone system that can be run on Solar panel with battery support and UPS backup.

Solar panels



Description

For a totally stand-alone solution we can deliver optional solar panel systems for your pumping solution.

The energy-calculations are based on the minimal possible energy generation from a solar panel array at the location, meaning that if the maximum pump power is 1 kW the solar panel must deliver a minimum of 29kW during sun-hours (4-6 hours), for continuous operation during nights and winter-time.

This solution is also demanding a battery package and a generator for redundancy.

Tank

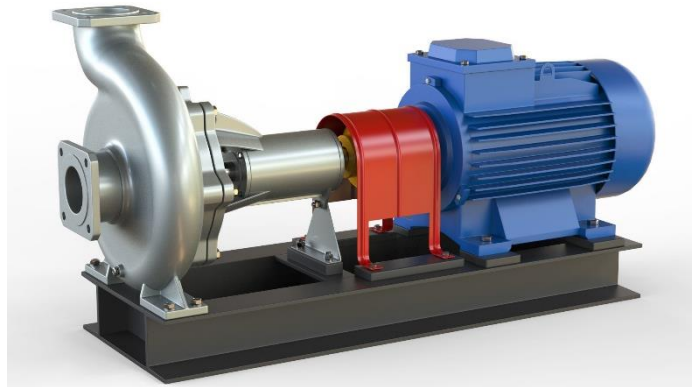


Description

The tank consists of both the tank and piping. The only configuration for the tank is size, height, and diameter, and can be customized for the purpose.

Choosing high diameter piping between the tank pump and sea, the friction is reduced and the pump-energy usage will be lower.

Priming pump



Description

If the primary Zero Gravity Pump is redundant (two to three) the priming pump can be a very small traditional centrifugal pump coupled in parallel with the input stage of our Zero Gravity Pump. It can be dimensioned to be a tenth of the required flow, or based on how long you would be comfortable with when you are filling the system with water.

For a whole day (24 hours priming cycle), the flow specifications for the priming pump is Total Volume divided by 24.

Aerator



Description

Diffusion aerators is an optional installation, on the inlet to the tanks after the pump. >

The aerators will increase flow, and reduce back-pressure from the pipework and tanks and increase the pumps efficiency.

At the same time the aerators will provide perfect oxygen conditions for the fish in your tank.

Control system



Description

A fully automated FTS systems is fairly simple to control. The pump control system is fully integrated and does not have any interfaces towards optional equipment.

Optional remote monitoring and control systems integrating equipment like drum-filters, UV filters or aerators are mainly monitored as running or not running, just with simple current-monitors or video, and will have regular maintenance schedules.

The pumps are low power pumps and have a much lower maintenance schedule than traditional pumps, except for the valves that require an exchange and cleaning schedule.
