

DA-GEN

Dryden Aqua Generator

Advanced Oxidation



DA-GEN overview

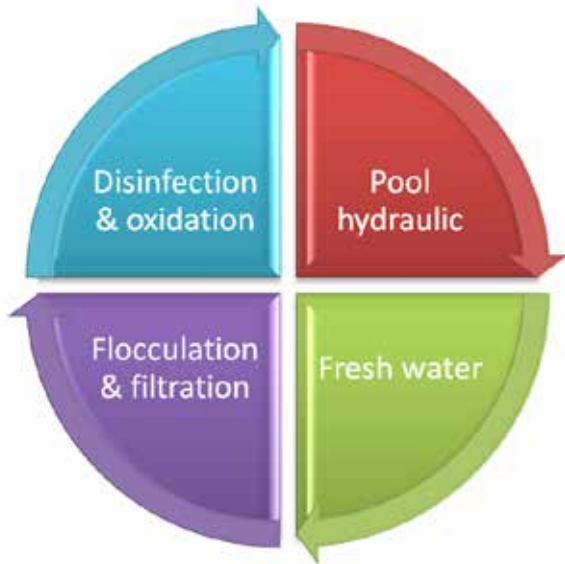
- ✓ Anodic oxidation splits water molecules into free radicals
- ✓ Free radicals are a highly efficient oxidant which disinfect water in seconds
- ✓ Because free radicals break down quickly, the DA-GEN also produces small amounts of chlorine to guarantee depot disinfection.
- ✓ Our Activator consists of natural Magnesium chloride only
- ✓ There is no need for additional oxidants
- ✓ The DA-GEN controls and monitors your pool water treatment
- ✓ In combination with DAISY, we produce pool water with the quality of drinking water!



Pool water in drinking water quality!

The quality of pool water depends on four key elements:

1. Pool hydraulic
2. Flocculation & filtration (DAISY)
3. Oxidation and pH control
4. Addition of fresh water



1. Pool hydraulic

The pool specialist is responsible for the correct design of the pool hydraulic. Key is to guarantee complete and optimal water flow throughout the entire pool, using enough inlet nozzles and allowing appropriate circulation and turnover. Turnover depends on bather load and water temperature. In general this should be about 4 hours. At high temperatures and/or high bather loads, turnover time should be reduced.

2. Flocculation and filtration with DAISY

With DAISY (Dryden Aqua Integrated System) we achieve the best filtration results. DAISY is designed in a way that pathogens can't grow therefore minimizing the need for more or stronger oxidants. Prevent rather than kill!

1. No base: due to our bio-resistant filter media AFM®, bacteria have no ground on which they can grow and multiply.

2. No food: due to optimal coagulation and flocculation in combination with AFM® filtration, we eliminate the food source for bacteria and other pathogens so they can't develop.

Consequence: With DAISY you only need a minimum of oxidizers to disinfect the few pathogens in the pool.

3. Disinfection and oxidation with DA-GEN

The most efficient oxidizing agents are the so-called free radicals. These highly reactive oxygen radicals (OH⁻ and O⁻) completely oxidize organic substances and therefore don't form any harmful disinfection by-products (DBP's). The disinfection with OH radicals is called advanced oxidation.

Oxidation potential (eV)

Fluorine (F)	2.87
<u>Hydroxyl radical (OH)</u>	2.86
Oxygen atom (O)	2.42
Ozone (O ₃)	2.07
Hydrogen peroxide (H ₂ O ₂)	1.78
<u>Chlorine (Cl)</u>	1.36
Oxygen molecule (O ₂)	1.23

Free radicals are very short-lived and disintegrate within seconds. Therefore a residual oxidant is needed to guarantee depot disinfection in the pool. Best suitable for this task is a small amount of chlorine.

Our DA-GEN produces both. With a properly sized DAISY you will only need 0.1 mg / l of free chlorine in private pools to ensure proper disinfection. This is pool water in drinking water quality – no chlorine smell and crystal clear!



Pool water in drinking water quality!

Benefits at a glance

- ✓ Best oxidation with free radicals - no chlorine smell and harmful disinfection by-products
- ✓ Safe, low-cost and ecological disinfection
- ✓ Fully automatic water treatment control and remote access with integrated WIFI Module
- ✓ Pool water in drinking water quality

How does the DA-GEN work?

For the hydrolytic break down of water molecules, the formation of free radicals and the production of the appropriate amount of free chlorine, we require a conductivity of 1.0-1.5 mS. Conductivity depends on the quantity of minerals in the water. Normally, conductivity of pool water is not sufficient and therefore needs to be raised. With the use of the DA-GEN, we we have developed an Activator based on magnesium chloride (MgCl₂) to raise conductivity. Our Activator is much more efficient than salt (NaCl). In addition it removes phosphates from the water and therefore facilitates better filtration.

The lower the concentration of chloride, the more free radicals and fewer chlorine atoms are being produced. Because we want to maximize the production of free radicals and minimize the production of chlorine for depot disinfection, we are minimizing water conductivity to the lowest possible degree.

Usually we only need 1kg of DA-GEN Activator per 1 m³ of pool water volume. This also has the benefit that chloride levels will stay below 600ppm, the corrosion limit for V4A (316) stainless steel.

In order to properly manage this process, we recommend the use of the DA-GEN in combination with automatic free chlorine and pH control. Only then, appropriate disinfection with a minimum of free chlorine of 0.1 mg / l can be guaranteed. The result is pool water in drinking water quality!



All our DAGEN are equipped with a Wi-Fi module. This enables you to monitor and track your pool water quality 24/7 if you wish to do so.

What is the difference to salt chlorination?

1. Low level of chloride concentration: only 400 - 600ppm => no corrosion of stainless steel (V4A)

Traditional salt chlorination systems need high levels of sodium chloride (NaCl) to produce chlorides. This requires 3 000 - 5 000 ppm of salt. High concentrations of chloride cause stainless steel to corrode. This applies especially for systems with low pH and high chlorine levels.

2. Automatic control for free chlorine and pH

Most salt chlorination systems are not automatically controlled, which means pH and chlorine levels are often either too high or too low. However, a neutral pH is very important for efficient oxidation and functional flocculation. This is why we recommend the use of the DA-GEN in combination with automatic free chlorine and pH control.

3. Specially coated, highly efficient and mono-polar electrodes

The DA-GEN is equipped with specially coated, mono-polar electrodes. This is why the DAGEN can operate at such low levels of conductivity while still producing large amounts of free radicals. The lower the conductivity, the more free radicals and fewer chlorine atoms are being produced, but this strains the electrodes. The life time of our electrodes is approx. 10'000 hours. We guarantee a minimum of 5'000 hours. Only with DAISY the oxidation demand can be reduced by up to 80% compared to conventional systems which more than compensates for the increased strain on the electrodes.

4. Special DA-GEN Activator

To increase conductivity we don't use normal salt (NaCl). Instead we use a special Activator on the basis of natural magnesium chloride added to pool water. Our activator is also much more efficient than salt: the DA-GEN will need 3-5 times less magnesium chloride than salt for traditional salt chlorination systems.



DA-GEN plus DAISY = DAISY+

Only in combination with DAISY can the DA-GEN be effectively used as described. Then only DAISY can lower the oxidation demand of a pool by up to 80% and work with a free chlorine level of 0,1 mg / l in private pools.

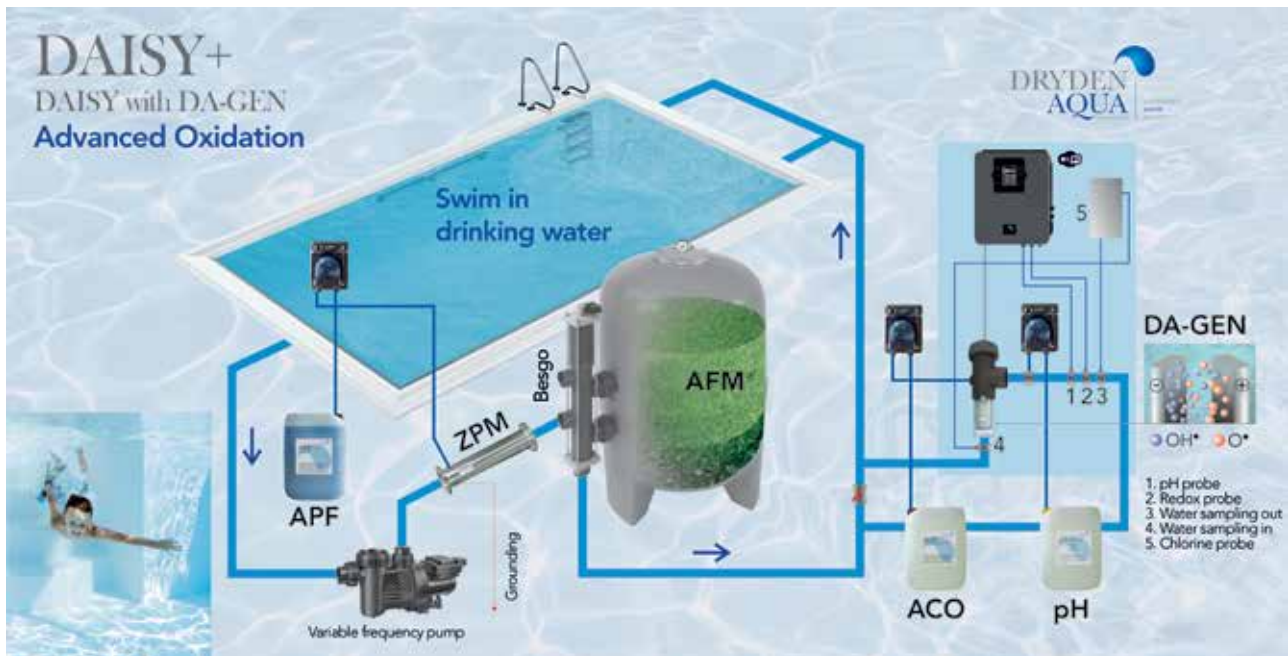
DAISY+ consists of 4 steps:

- 1. Best filtration performance with bio-resistant filter media AFM®**
- 2. APF and ZPM** guarantee best coagulation and flocculation. In combination with AFM® we achieve a particle removal to 0.1 micron. Everything that is filtered out doesn't need to be oxidized therefore reducing the oxidation demand.
- 3. Catalytic oxidation with ACO in outdoor pools:** ACO generates free radicals using the natural UV light of the sun. It therefore reduces the need for chlorine further. In addition, ACO protects chlorine from photo-oxidation of the sun, increasing the half-life of chlorine by a factor of 4.
- 4. Hydrolysis with DA-GEN:** Disinfection with free radicals (Advanced oxidation) and a minimum of free chlorine for depot disinfection.



The Dryden Aqua generator DA-GEN - conclusion

The DA-GEN is the perfect solution for a safe, cost effective and eco-friendly water treatment of your pool. In combination with DAISY and appropriate pool hydraulic the DA-GEN will produce pool water in drinking water quality!



Who is Dryden Aqua?

We are a marine biological company specializing in water quality and innovative, sustainable treatment technologies. Our unique knowledge combination and detailed understanding of the biological as well as physio-chemical reactions has enabled us to develop a highly innovative range of products for aquaria and swimming pools. Therefore we became leader in water treatment for public and private swimming pools.

Our mission is: crystal clear and healthy water without the smell of chlorine. Today more than 100'000 pools worldwide are using our system.