

# DA-GEN

Dryden Aqua Generator

Advanced Oxidation



## DA-GEN overview

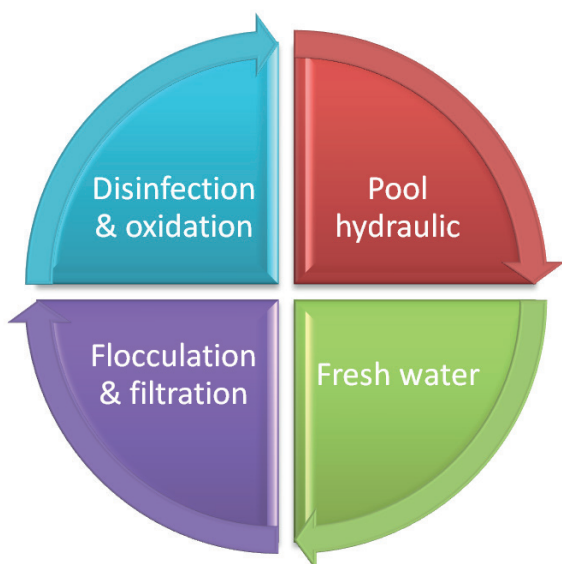
- ✓ Anodic oxidation splits water molecules into free radicals
- ✓ Free radicals are a highly efficient oxidant that disinfects water in seconds
- ✓ Because free radicals break down quickly, the DA-GEN also produces small amounts of chlorine to guarantee residual disinfection
- ✓ The DA-GEN controls and monitors your pool water treatment
- ✓ In combination with DAISY, we produce pool water in drinking water quality!



# Pool water in drinking water quality!

The quality of pool water depends on four key elements:

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



## 1. Pool hydraulics

The pool specialist is responsible for the correct design of the pool hydraulics. The 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 the turnover should be about 4-6 hours for private pools. In any case the pool volume should be turned over at least 3 times per day. At high temperatures and/or high bather loads, the turnover should be increased.

## 2. Flocculation and filtration with DAISY

Best filtration results are achieved with DAISY (Dryden Aqua Integrated System). With optimal filtration and flocculation using AFM® and APF, we eliminate the food source for bacteria and the ground on which they can grow.

**Prevent rather than kill!**

**Result:** The oxidation demand is 50 to 80% lower in comparison to other systems.

## 3. Disinfection and oxidation with DA-GEN

The most efficient oxidising agents are the so-called free radicals. These highly reactive oxygen radicals (OH• and O•) completely oxidise organic substances and, in contrast to Chlorine, don't form any harmful disinfection by-products (DBP's). Disinfection with OH radicals is called advanced oxidation.

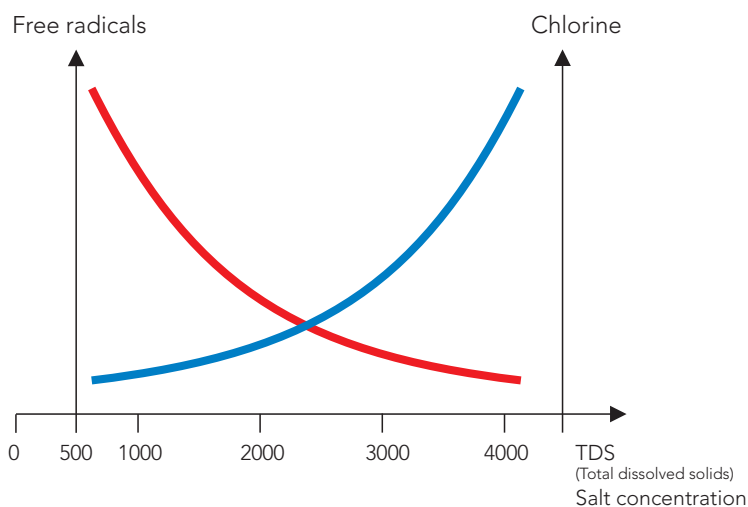
### The strength of DA-GEN reaction products

	in eV
Hydroxyl radical (OH•)	2.86
Atomic Oxygen (O•)	2.42
Ozone (O <sub>3</sub> )	2.07
Persulfate (K <sub>2</sub> S <sub>2</sub> O <sub>8</sub> )	2.00
Percarbonate (2Na <sub>2</sub> CO <sub>3</sub> · 3H <sub>2</sub> O <sub>2</sub> )	1.80
Hydrogen Peroxide (H <sub>2</sub> O <sub>2</sub> )	1.78
Chlorine (Cl)	1.36

Free radicals are very short-lived and disintegrate within seconds. A more stable oxidant is therefore needed to guarantee residual disinfection in the pool. The oxidant best suited to this task is a small amount of chlorine.

Our DA-GEN produces a small amount of chlorine in addition to free radicals. With a properly sized DAISY only 0.1 mg / l of free chlorine is necessary to ensure proper disinfection in private pools.

**Pool water disinfected in this way is of drinking water quality – crystal clear and with no chlorine smell!**





## Pool water of drinking water quality!

### Benefits at a glance

- ✓ Best oxidation with free radicals
- ✓ Safe, low-cost and ecological disinfection
- ✓ Fully automatic water treatment control and remote access with integrated WiFi module
- ✓ Pool water of drinking water quality

### How does the DA-GEN work?

For hydrolytic cleavage of water molecules to free radicals and production of the appropriate amount of free chlorine, we require water with a certain conductivity. Conductivity depends on the quantity of minerals in the water (TDS).

The lower the conductivity, the more free radicals and other oxygen compounds and the fewer chlorine atoms are produced. As we want to maximise the production of free radicals and minimise the production of chlorine for residual disinfection, we maintain water conductivity at the lowest possible level. With a conductivity of only 1.0 – 1.5 mS, the DA-GEN will produce enough free radicals as well as enough chlorine for residual disinfection.

Instead of using regular salt (NaCl), we recommend the use of the Dryden Aqua Activator based on Magnesium Chloride (MgCl<sub>2</sub>). Our Activator not only raises conductivity to the desired level, it also improves filtration and assists in removal of phosphates from the water. Phosphates are required for algae and bacteria to feed. Only 1kg of DA-GEN Activator per cubic metre of pool water volume is required. This small amount also ensures that chloride levels remain below 600ppm, the corrosion limit for V4A (316) stainless steel.

In order to properly manage this process, the DA-GEN should always be used in conjunction with automated free chlorine and pH control. Only then, appropriate disinfection with a minimum of free chlorine of 0.1 mg/l can be assured.



All DA-GENs are equipped with a Wi-Fi module, enabling monitoring and surveillance of pool water quality 24/7.

### How does Hydrolysis differ from salt chlorination?

#### 1. Low level of chloride concentration below 600ppm => no corrosion of V4A/316 Stainless Steel

Traditional salt chlorination systems need high levels of sodium chloride (NaCl) to produce chlorine, usually between 3 – 5 kg of salt per m<sup>3</sup> of pool volume. This leads to high chloride concentrations of 2000 to 3000 ppm that will corrode even high quality stainless steel. This applies especially in systems with a low pH and high chlorine levels.

#### 2. Perfect 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 always in combination with automated free chlorine and pH control. Only this will guarantee pool water of drinking water quality: always enough – but never too much.

#### 3. Low conductivity => more radicals

The DA-GEN is equipped with specially coated, mono-polar electrodes. This is why the DA-GEN can operate at such low levels of conductivity while still producing large amounts of free radicals.

#### 4. Always in combination with DAISY

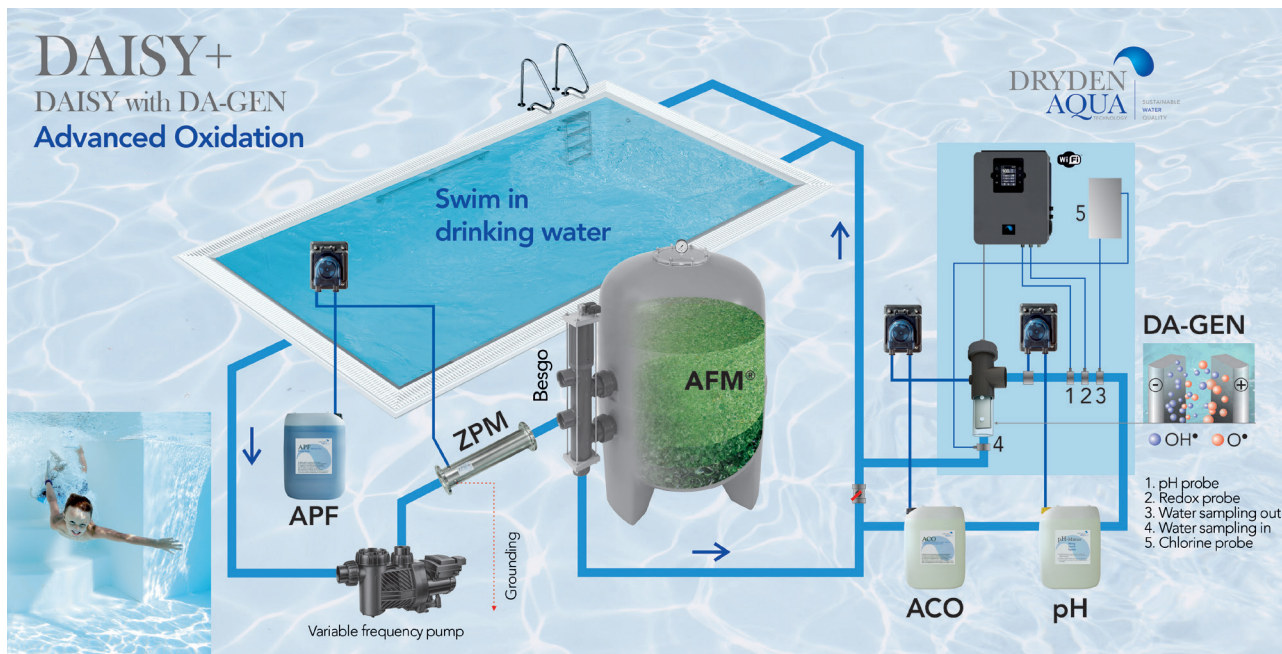
DAISY is the only system that will allow the DA-GEN be used effectively as described. Only DAISY can lower the oxidation demand of a pool by up to 80% and work with a residual free chlorine level of 0.1 mg/l in private pools.



# DA-GEN plus DAISY = DAISY+

DAISY+ consists of 4 steps:

1. **Best filtration performance with bio-resistant filter media AFM®:** The performance of AFM® is at least twice as good as sand.
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 oxidised.
3. **Increasing of the disinfection power of the sun:** 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. **Advanced oxidation with DA-GEN:** Disinfection with free radicals and a minimum of free chlorine for residual disinfection.



## Who is Dryden Aqua?

We are a marine biological company specialising in water quality and innovative, sustainable treatment technologies. Our unique knowledge combination and detailed understanding of the biological as well as physico-chemical reactions has enabled us to develop a highly innovative range of products for aquaria and swimming pools. We therefore became leaders 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.