

DA-GEN

ADVANCED OXIDATION



SWIM IN DRINKING WATER!



WHAT IS DA-GEN ?

DA-GEN is an innovative disinfection solution for your swimming pool. It is a Hydrolyser that uses advanced oxidation technology to generate free radicals (OH^* and O^*). Free radicals are highly efficient oxidants with the great advantage they do not form any harmful disinfection by-products. **In combination with our Dryden DAISY®, you get pool water in drinking water quality - crystal clear and with no chlorine smell!**

KEY PRODUCT FEATURES & BENEFITS



High performance hydrolyser
Splits water molecules into free radicals for the best disinfection



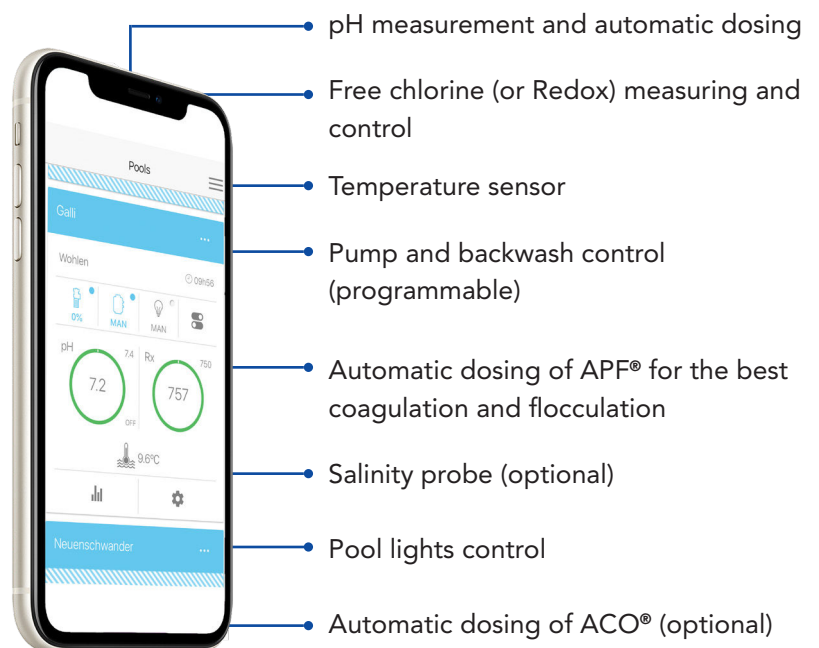
Highly efficient electrodes
Works with only 1g/liter of salt (NaCl) or Magnesium chloride (MgCl_2)



Complete controller for your pool system with integrated WiFi module (DA-GEN app / www.DA-GEN.com)



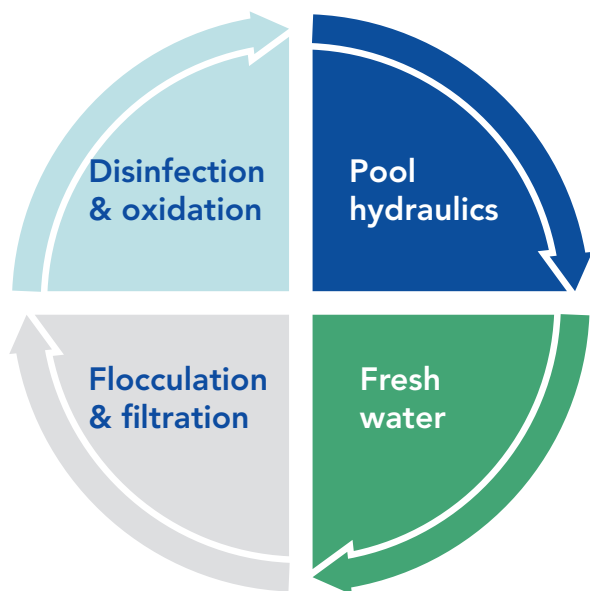
Swim in drinking water!
Combine DA-GEN with our Dryden DAISY to get pool water in drinking water quality



POOL WATER IN DRINKING WATER QUALITY

► Pool water quality depends on 4 elements :

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



1. Pool hydraulics

Your 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. We highly recommend to use variable speed pumps and 24 hour operation. You do not get only better filtration performance but also huge energy savings. In any case the pool volume should be turned over at least 3 - 4 times per day. At high temperatures and/or high bather loads, the turnover should be increased.

2. Flocculation and filtration with Dryden DAISY®

Best filtration results are achieved with Dryden DAISY® (Dryden Aqua Integrated System). With optimal filtration and flocculation using AFM® and APF®, we filter down to 0.1 micron and we eliminate the food source for bacteria. AFM® is bioresistant so unlike sand bacteria cannot grow on AFM®. **Prevent rather than kill!**

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

3. Disinfection and oxidation with DA-GEN

The most efficient oxidising agents are free radicals. These highly reactive oxygen radicals (OH^\bullet and O^\bullet) completely oxidise organic substances and don't form any harmful disinfection by-products (DBP's). Disinfection with OH^\bullet radicals is called advanced oxidation.



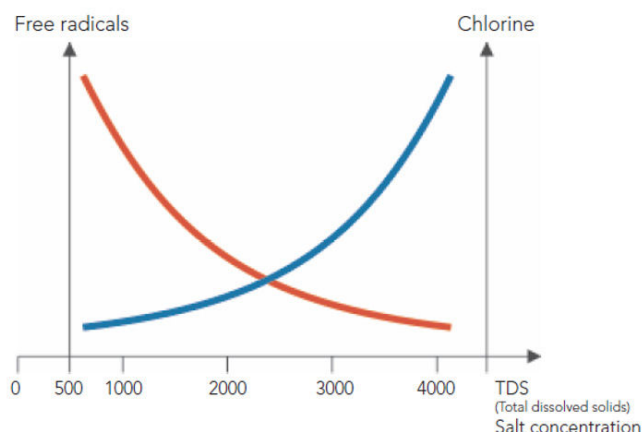
THE STRENGTH OF FREE RADICALS

	in eV
Hydroxyl radical (OH^\bullet)	2.86
Atomic Oxygen (O^\bullet)	2.42
Ozone (O_3)	2.07
Persulfate ($\text{K}_2\text{S}_2\text{O}_8$)	2.00
Percarbonate ($2\text{Na}_2\text{CO}_3 \cdot 3\text{H}_2\text{O}_2$)	1.80
Hydrogen Peroxide (H_2O_2)	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 Dryden 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!



BENEFITS AT A GLANCE

- ▶ Best disinfection with free radicals
- ▶ Safe, low cost and ecological disinfection
- ▶ Fully automatic water treatment control and remote access with integrated WiFi module
- ▶ Healthy and beautiful pool water in drinking water quality

How does the DA-GEN work?



For splitting water molecules into 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 salinity (TDS), the more free radicals and other oxygen compounds and the fewer chlorine atoms are produced.

As we want to use mainly free radicals for disinfection and a small amount of free chlorine for residual disinfection, we maintain the salinity (TDS) at the lowest possible level. **With a salinity (TDS) of only 800 – 1500 mg/l (0.8 – 1.5kg/ of salt per m³), the DA-GEN will produce a lot of free radicals and enough chlorine for residual disinfection.**

Instead of using only regular salt (NaCl), we recommend the use also **25-50% of magnesium chloride (MgCl₂)**. Our so called DA-GEN Activator not only raises the salinity to the desired level, it increases the hardness of the water and it also removes phosphates from the water. Phosphates are nutrients for algae and bacteria. Usually only about 1kg of salt (NaCl) and or DA-GEN Activator (MgCl₂) per m³ of pool water volume is required. This small amount of minerals also ensures that chloride levels (Cl-) remain below 600ppm, which is the corrosion limit for stainless steel 1.4571 (316).

▶ **We also recommend to operate the system at a pH of 7.4 and an alkalinity of > 100mg/l to have a neutral LSI (Langelier Saturation Index) and to minimize the corrosion risk.**



All DA-GENs are equipped with a Wi-Fi module to monitor and protocol your pool water quality 24/7 on your mobile phone or your computer : www.DA-GEN.com

The DA-GEN must always be used in conjunction with automated free chlorine (or ORP) and pH control in order to properly manage the process properly. Only with the free chlorine sensor you can regulate the free chlorine value at exact value you want. ORP is influenced by the load and the pH. That for we recommend to use free chlorine control if you want to swim in drinking water with 0.1 mg/l of free chlorine. For public pools we recommend free chlorine, ORP, pH and conductivity.

How does the DAGEN differ from salt chlorination?

1. Chloride concentration below 600ppm => less corrosion risk of stainless Steel

Traditional salt chlorination systems need high levels of salt (NaCl) to produce chlorine, usually between 3 – 5 kg per m³ of pool volume. This brings concentrations of chlorides (Cl-) to 2000 to 3000 ppm, which will heavily corrode stainless steel even high quality. The corrosion risk is increasing in combination with a low pH, low alkalinity 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. A neutral pH is very important for efficient oxidation and proper flocculation. This is why we run 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.

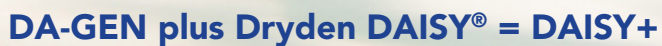
3. Low salinity => more radicals

The DA-GEN is equipped with specially coated, mono-polar electrodes. This allows to operate the DA-GEN at such high Amp's that in combination with low level of salinity water molecules (H₂O₂) are splitted and a large amounts of free radicals are produced.

4. Always in combination with Dryden DAISY®

Dryden DAISY® is the only system that will allow the DA-GEN to be used in the described manner with such a low salinity. Only DAISY® can lower the oxidation demand of a pool by up to 80%. The lower the salinity to more free radicals are produced but also the lower is the chlorine production. In a DAISY we only need 0,1mg/l of free chlorine in a private pool. **Never use DA-GEN without a well dimensioned DAISY®!**





DAISY+ consists of 4 steps:



Coagulation and flocculation with APF®. Removes dissolved pollutants. In combination with AFM® we achieve a particle removal to 0.1 micron.



Advanced oxidation with DA-GEN
Disinfection with free radicals and a minimum of free chlorine for residual disinfection.

