Water Champ®
Frequently Asked Questions (FAQ)

What is your company's level of experience with induction mixing?

We have over 100 years of chlorination experience, and over 25 years with induction mixing. In 1985 Jack Gardiner developed the Water Champ primarily to feed chlorine gas for disinfection of wastewater. Since then the design has been continuously improved to be made more reliable, serviceable, and effective than ever before.

To date we have systems in operation all around the world from Australia to the UK, Korea to the United States. References are available upon request.

How does Water Champ compare to conventional methods of mixing and induction?

Conventional mixers and header/diffusers are very inefficient, require lots of additional equipment and are very high in maintenance. The capital and operating costs in comparison to Water Champ are significant. Water Champ simplifies the process, lowers costs and increases efficiencies, which in turn reduces chemical consumption costs. Off-gassing is also a big problem with conventional systems. Water Champ eliminates that problem.

What is a G-Value?

Parameter used to measure the degree of mixing achieved in a defined volume and period of time:

\[ G = \frac{P}{\mu \cdot V} \]

Where:
- \( G \) = velocity gradient, sec\(^{-1}\)
- \( P \) = power, ft-lb/sec\(^{-1}\)
- \( \mu \) = absolute viscosity, lb-ft/sec\(^2\)
- \( V \) = mix chamber volume, ft\(^3\)

G-Values are key measurement criteria used to determine mixing energy per mixing volume, and they have consistently proven to be accurate over time when used for Water Champ products. When applying this measurement, we can accurately determine the correct mixing energy within tanks, basins, channels and enclosed cylinders. Knowing this, we can ensure the right amount of energy is delivered. With Water Champ, that means the combination of horsepower and axial dispersion can be leveraged to create the instantaneous homogeneous mixing that in turn keeps chemical consumption and power costs down, and efficiencies up.

These numbers are useful to determine mixing energy required for a defined mix area, and are well recognized by Civil Engineering community for over 50 years. The recommend G-Values are in a range of 500 to 1000/sec for chlorination and dechlorination applications.
Which is superior: Axial v. Radial Mixing?

Axial mixing is superior for high-shear mixing applications such as disinfection. The direction and velocity of the water that is directed off the propeller is very important in the characteristics of mixing within what is called the mixing zone. Looking at mechanical mixers (versus hydraulic mixers) there are two major mix patterns; radial mixing is where the velocity direction is perpendicular to the rotating shaft, whereas axial mixing extends in the direction of the axis. Axial mixing creates a much better mixing zone and allows for both co-flow or cross-flow applications whereas the radial mixing geometry is only suitable for cross-flow orientation under low flow rate conditions.

The Water Champ impellers rotational speed is 3450rpm, directing the chemical into the process at a rate of 60 ft/s or greater. This axial mixing creates a “zone of influence” which is a carefully measured mixing zone that extends from the end of the Water Champ. We know the diameter and shape of this cone, and therefore are able to calculate the volume of water that is mixed over time and provide a reliable G-value for the application.

What chemicals can be fed with the Water Champ?

There are a variety of gases that Water Champ can handle in any treatment process, including… Chlorine, sulfur dioxide, carbon dioxide, air and oxygen. Water Champ can also handle a wide range of liquid chemicals including: sodium hypochlorite, sodium bisulfite, aqueous ammonia, sodium thiosulfate, metabisulfite, aluminum sulfate, ferric chloride, ferric sulfate and ferrous sulfate.

Consult us for other potential chemical feed applications.

What size Water Champ is needed for the flow rate given?

The size (Hp/kW) rating of the unit depends on several factors besides flow rate. For mixing purposes, the general rule of thumb is 0.5HP-per-MGD is used as a benchmark to size from. For example if the flow rate is 10 Million Gallons per Day, the size required would be 5 Horsepower motor. If we can optimize the location and orientation of the unit within the channel, we may be able to use power down to a factor of 0.3HP-per-MGD (up to 40% more flow).

What are the temperature limits for the system?

The Water Champ may be submerged and operated in waters from 34°F to 85°F typically. For water temperatures above this range, a different insulation class is required on the motor to avoid overheating. Consult Siemens.

The control panel ambient temperature limit is 104°F. Above that air conditioning is recommended, or locate the panel inside a temperature controlled environment. The control panel may be installed outdoors but should never be facing direct sunlight for extended periods. In these cases a shade screen or protective shade is required.

Is feeding dry Chlorine a problem?

The Water Champ was originally designed to feed gaseous chlorine under vacuum. Although gaseous chlorine that is vacuum fed from cylinders is considered a gas, there is always some
moisture content in the gas. When it is completely dry, it may corrode or burn the titanium before the outer surface has a chance to passivated, or build up the protective oxidized layer that forms when chlorine comes into contact with titanium. If this is the case, a small weep hole in the vacuum fitting on the Water Champ will draw in moisture from the process water without sacrificing performance.

**Can the Water Champ be installed in a pressurized line?**

No, the Inline Water Champs were discontinued in 2011. The current models are for submersible applications open to atmosphere, as in the case of open channel disinfection or reservoir mixing.

**How is the safety of your system ensured?**

Water Champ utilizes a Motor Protection Device to automatically detect overloads, cycling, faults, etc. This device is housed within the control panel for all system diagnostics, interlocks, controls and shutdown parameters. The control panel itself features a dead front panel to allow the operator access to the lights and switches without being exposed to the high voltage (480 VAC) supply in the panel.

The hoist used to raise and lower the units features a disc-brake mechanism that stops the winch if the operator loses grip on the winch handle.

The lifting cables are custom made from 316 SS featuring a secure locking clasp.

Thorough mixing of gas chlorine ensures no off-gassing from contact tank. Vacuum induction means that there is less risk for chemical line leakage or spraying.

Water Champ has an unmatched legacy of safe and proven performance

**What is the anticipated life of the equipment?**

The chemical induction unit is made from grade 2 unalloyed Titanium, which is machined to exact specifications and intended to last for 10 to 15 years or longer. The submersible motor has a 316 SS casing, hermetically sealed and is intended to last several years under continuous load.

Ancillary equipment (i.e. guiderails and pivot bracket) may require replacement or repair after 5 or more years of service in high concentration chlorine environments, where stress cracking may occur. This rate is reduced as much as possible by only using 316 SS and passivating all welds. Even so, the chloride present may attack the steel over time.

The life of the system in total is dependent upon the hours of operation, environmental factors, and maintenance scheduling.

*For more information, please visit us online at www.evoqua.com or call us at 1-866-507-9000 in the United States. International contact information may be found on our website, search “Water Champ”.  

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