

Small Scale Alphasen Dose Pump Setup and Operation Manual

'Small Scale' relates to potable drinking water disinfection for a farm house or an individual holiday home/Bach

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Alphasen Starter Kit Contents and Price

Peristaltic Dose Pump
Water meter
Power filter
ORP meter
PPM test strips
10L Alphasen
1 spare peristaltic pump tube.

All for the cost of NZ\$1608.69 + GST and freight or NZ\$1850.00 incl GST + Freight.

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ALPHASAN START UP OPERATIONS.

Equipment supplied;

240 volt dosing pump complete with suction and discharge hose; water meter with pulse drive facility and probe; PVDF injection nozzle with inbuilt back flow preventer.

Customer is to provide a 10 amp RCD protected power point and the necessary "T" fitting in the water line to the house for installation of the injection nozzle.

Set up dosing pump, water meter and pulse drive connection and injection nozzle as per instructions included with the equipment. Do not connect end of hose into injection nozzle yet.

Turn on power supply and switch dosing pump to manual mode.

Place suction hose in your 10 litre bottle of Alphasan.

Activate manual mode and prime pump until Alphasan appears at end of hose and there are no air bubbles coming out.

Place end of hose in measuring vessel.

Ensure dosing pump is set to the previously calculated dosing rate.

Turn on water tap in house and accurately run 10 or 20 litres of water into a bucket.

This action should activate the dosing pump and there will be Alphasan pumped out into your little measuring jug. The volume in the jug should correspond with the volume of water in the bucket to give a maximum of 0.8ppm maximum.

Continue with this calibration test until the required 0.8ppm is achieved.

Once the correct level is achieved connect the end of the hose into the injection nozzle.

Check all connections are correct and secure and that there is no leaks in the hose line joints.

Take your ORP (oxygen reduction potential) meter and starting at the closest tap to the point that the Alphasan is being injected run the water into a jug or bucket. Hold the ORP meter so that the tip is in the water until the ORP meter starts showing an increase in the ORP millivolts reading. Continue this for a minute or two then shut off the tap. Empty the bucket repeat this at all cold water taps moving to the furthest away tap in the line. The purpose of this is to "charge" the pipework with the Alphasan treated water so that it will degrade and kill of any biofilm in the pipe work through the house.

NB. It is essential that for the first 3 days you run the tap first to flush out any dead biofilm and bacteria that may have sloughed off the inside of the pipework. This is critical for water that is used for drinking or personal use i.e. teeth cleaning, drinking, food preparation and food washing.

It is recommended that at the same time each day a sample of water is taken from a designated tap and a reading is taken of the ORP and this is recorded. A reading should also be taken with a Chlorine dioxide ppm test strip to check and measure the ppm level of the CLO₂ in the water. As the biofilm is destroyed along with the bacteria and viruses that were hiding in the biofilm, there will be an increase in the ORP level as the "draw down" effect on the Alphasan decreases.

This operation should be done for the first week and then the injection pump dose level should be adjusted according to the level of the ppm test strips to give a reading of 0.8ppm

Alphasan - What is it?

Alphasan is pure chlorine dioxide gas that has been entrained into an aqueous solution using a proprietary process developed by Alpha Environmental, Richmond, Nelson, New Zealand.

The Ex-factory concentration of pure chlorine dioxide gas is approximately 1000 parts per million.

Note: -

Chlorine dioxide (Alphasan) contains zero chlorine. The two chemicals are not related or similar in any way.

Compared to chlorine, **Alphasan**: -

1. Is less effected by PH variability
2. Is less effected by mild turbidity
3. Is less effected by organic matter loadings
4. Is less effected by water temperature.

Chlorine can only inactivate the list below if the dose rate is too high for human water consumption.

With Alphasan used at normal safe World Health Organization approved dose rates the following can be inactivated provided the CT factor is applied.

5. inactivates protozoa and oocysts
6. inactivates legionella
7. inactivates many Virus including Norovirus
8. inactivates Cryptosporidium and Giardia
9. inactivates fungi and mould, spore formers and biofilm producers
10. inactivates bacteria such as E coli and salmonella

To repeat - Alphasan inactivates all of the above provided the dose pump installation takes into account the CT factor.

In addition Alphasan oxidizes and removes soluble iron and manganese. These metals will collect as oxide flakes in the base of the final filter housing.

The life of the final filter cartridge is extended many times. Zero biofilm (slime) accumulation and blocking.

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A short history of chlorine dioxide and why it took 200 years to become widely and safely available.

Chlorine Dioxide was discovered by Sir Humphrey Davy in 1811.

Chlorine dioxide was first utilized as a drinking water disinfectant midway through the 20th century.

The reason for the slow acceptance of chlorine dioxide is that for 190 years it had to be manufactured - on site - next to the site it would be consumed.

These 19th and 20th century chlorine dioxide plants had a tendency to automatically dismantle themselves (Blow up). This was due to inherent problems with the chemical mixing getting out of balance.

In the early 21st century many chemical companies have invented ways to make on-site generation of chlorine dioxide gas obsolete.

Alphasan is the unique result of one of these 21st century inventions. Alphasan has the chlorine dioxide gas safely entrained within water. Alphasan is safe to courier, retail and use. Alphasan was determined by ERMA in 2007 to be NON HAZARDOUS under the HSNO regulations and does not require approval. Advice from the NZ EPA is that this status remains valid and current.

The suction pipe of the dose pump is simply inserted into the Alphasan container. No dilution or mixing required.

Whereas the 19th / 20th century generation plants produced chlorine dioxide gas that only lasted minutes, correctly stored Alphasan has a shelf life of at least 9 months. There are in excess of 10000 municipal water treatment plants in Europe and the USA relying on Chlorine dioxide for disinfection control and the reduction of THM's and AOX's.



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The importance of Ct values (minute.mg/L)

C t Value simply means disinfectant CONTACT to the target microbes with calculated TIME.

Some of these infectious microbes take more Contact / Time to inactivate than others.

Alphasan used for disinfection of potable drinking water for human consumption should not exceed 0.5 parts per million (PPM)

Infectious microbes not inactivated by 0.5ppm Alphasan contact will require to be in contact with the Alphasan for a longer time.

This is achieved by utilizing larger delivery pipe diameters. This allows the Alphasan gas the required time to oxidize the targeted infection source.

The weaker the dose-ppm - the longer the contact-time must be.

(photo of large diameter reticulation)

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Setup planning that maximizes Ct Value

How to maximize your Ct value

From a planning perspective this is simple

- Plan your dose pump mounting installation as far away from your drinking water consumption draw-off point as possible
- Use large diameter pipes between your dose pump and the consumption draw off point.
- A non-return valve should be fitted to the water reticulation pipe upstream (before) the dose pump injector. Alphasen is a gas. And if that gas is not contained it will have a tendency to disinfect your neighbour's supply. The Alphasen gas must only be able to transport itself where you intend. The non-return valve improves the CT factor by at least 25%.

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Dose pump flow sensor

The Alphasan Small Scheme starter kit comes complete with an affordable flow meter.

Connect your dose pump to a water meter which outputs an electrical pulse. As the pulse is in direct proportion to flow draw the dose pump is synchronized to water draw. Meaning perfect stable selection of Alphasan disinfection. This pulse water meter generates a pulse signal to the



Injection pump every ½ litre of water passing through the meter. This ensures even mixing.

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Select the best site for mounting the dose pump.

UV light is the natural enemy of Alphasan. Therefore treat ALL light as a natural enemy.

1. Select the darkest coolest corner of your shed
2. A power point needs to be handy
3. If this location is remote from your water main - this is good. Bring the water to your dose pump in normal diameter pipe - send the disinfected water back to your supply main via a 50mm pipe. Enhanced Ct value results.

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Dose Pump Setup

- Mount the dose pump on the wall following the manufacturer's instructions
- Encase the Alphasen container inside two black plastic rubbish bags then place everything inside a cardboard box. This deals with light degradation.
- Mount and connect the chosen flow sensor following the manufacturer's instructions
- The 6mm hose between the dose pump and the injection valve MUST be black.
- If the supplied injection valve is made of clear plastic it must be covered with black adhesive tape
- Plug in the pump and prime the pipes (remove all air) following the manufacturer's instructions

Proceed following the Alphasen Starter Pack Operation Instructions



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Frequently asked questions

Q What is the short history of chlorine dioxide disinfection of drinking water?

A In the 1950's the biocidal capability of chlorine dioxide, especially at high pH values, was known. For drinking water treatment it was primarily used to remove inorganic components, for example soluble **manganese** and **iron**, and to remove tastes and odours and to reduce chlorine related disinfection byproducts.

Q Can Alphasan disinfection be used alongside other disinfectants?

A Yes. For drinking water treatment chlorine dioxide can be used both as a disinfectant and as an oxidizing agent. It can be used for both pre-oxidation and post-oxidation steps. By adding Alphasan in the pre-oxidation stage of surface water treatment, the growth of algae and bacteria can be prevented in the following stages. Alphasan oxidizes floating particles and aids coagulation process and the removal of turbidity from water. Many municipal plants, having pre-oxidation with chlorine dioxide - dose the final drinking water with chlorine in order to achieve Free Available Chlorine (FAC) in their reticulation. Not a factor for Alphasan Small Scale dose use.

Q Is there a list of the bacteria, protozoa, virus and mould that Alphasan inactivates?

A Yes the list is long. Alphasan is a powerful disinfectant for bacteria and viruses. The byproduct, chlorite (ClO_2^-), is a weak bactericidal agent. In treated water Alphasan is active as a biocide for at least 48 hours, World Health Organization testing confirms that its activity exceeds chlorine by 2.5 times. **Inactivation is not constant for all microbes - which means the CT value must always be considered.**

Q There is much mention of biofilm. Does Alphasan remove biofilm?

A Yes. Biofilm is slime. Alphasan kills and removes biofilm. Because Alphasan is a gas it penetrates the biofilm and prevents the growth of bacteria in the drinking water distribution network. It is also active against the formation of bio film in the distribution network. Bio film is usually hard to defeat. It forms a protective layer of polysaccharides over pathogenic microorganisms. Most disinfectants cannot reach those protected pathogens. However, Alphasan removes bio films and kills pathogenic microorganisms. Alphasan also prevents bio film reformation, because it remains active in the system for a long time.

Q How many parts per million (ppm - same as mg/L) Alphasan should be dosed for biofilm and oxidation control?

A For the pre-oxidation and reduction of organic substances between 0,5 and 2 mg/L of Alphasan is required at a contact time between 15 and 30 minutes. Turbidity, temperature, PH and organic matter loadings also determines the required contact time. This question and answer is of no relevance to the Small Scale Alphasan Dose pump user.

Q Once the system has settled down, all biofilm destroyed and flushed away - how many parts per million should be dosed?

A The World Health Organization states that adequate disinfection can be achieved with concentrations between 0, 2 and 0,4 ppm (mg/L) . The residual byproduct concentration of chlorite is very low and there are no risks for human health. A minimum of 4 log reduction should be achieved.

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Q Please explain more about the ORP meter?

A The Alphasan Small Scale kit contains an EZDO Model 6041 Oxidation Reduction Potential (ORP) meter. This reads in millivolts. Fresh Alphasan will read ORP approximately 950+mV.

To explain further - from Wikipedia: -

Reduction potential (also known as redox potential, oxidation / reduction potential, ORP) is a measure of the tendency of a chemical species to acquire electrons and thereby be reduced. Reduction potential is measured in volts (V), or millivolts (mV). Each species has its own intrinsic reduction potential; the more positive the potential, the greater the species' affinity for electrons and tendency to be reduced. **ORP is a common accurate measurement for water quality.**

Q Why is UV disinfection sometimes unreliable?

A UV disinfection is 'spot' disinfection. There is zero residual disinfection within the downstream reticulation. Should the downstream reticulation be contaminated with biofilm, reinfection will occur. Furthermore UV lamps degrade. Even though the UV lamp still glows, too often the required UV is no longer emitted. Resulting in low grade disinfection.

Q Is there a problem if Alphasan disinfection mixes with Free Available Chlorine?

A No. In fact the World Health Organization publish papers that recommend municipal water disinfection utilizing both chlorine dioxide and chlorine.

Q Is UV disinfection compatible with Alphasan disinfection?

A Absolutely. Very compatible. If you already own a UV plant, it makes sense to run it in parallel with Alphasan, thus offering redundancy in the event of one-or-the-other plant failure.

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Hazard Declaration



Te Pou Oranga Kai O Aotearoa

NEW ZEALAND
nzfsa
FOOD SAFETY AUTHORITY

8 November 2010

Alpha Distributors
PO Box 3581
Richmond
NELSON

Trade Name: Alphasan
Description: Water Treatment Compound
Code: C 61

Approvals:
This compound is approved for use in premises processing all animal product except dairy, operating under the Animal products Act regime.

This approval is under the following regulations and notices, subject to the conditions stated in this approval:

1. Regulation 11(4)(b) of the Animal Products Regulations 2000 and Regulation 18(4)(b) of the Animal Products (Regulated Control Scheme - Limited Processing Fishing Vessels) Regulations 2001
2. Clause 4(1) of the Animal Products (Specifications for Limited Processing Fishing Vessels) Notice 2005, Clause 3(1) of the Animal Products (Specifications for Products Intended for Human Consumption) Notice 2004, clause 4(1) of the Animal Products (Specifications for Products Intended for Animal Consumption) Notice 2006

Conditions:

1. This is permitted in potable water.
2. The final concentration of the active element, at the point of use, shall conform to the limits stated in directives on potable water.

This approval may be withdrawn at any time due to unapproved directions for use, or unsatisfactory performance, or any change in product formulation or manufacturer.

The product must be used in accordance with the manufacturer's instructions and specifications. The label may include a statement to the effect that the product is approved for use in premises registered under the Animal Products Act regime. Any statements made, however, must include the approval code and must be limited to the following unless otherwise specified:

NZFSA Approved C 61(All animal product except dairy)

Agricultural Compounds & Veterinary Medicines Group
South Tower, 86 Jervois Quay, PO Box 2835, Wellington, New Zealand Telephone 64 4 894 2550 Facsimile 64 4 894 2566 Website www.nzfsa.govt.nz