

GSE AQUARIUS WATER TREATMENT SYSTEMS



AQUARIUS water purification systems are designed to protect against harmful microorganisms such as bacteria and germs.

They are manufactured to comply with Greek and European legislation regarding the mandatory safeguarding of water against harmful microorganisms, as well as the prevention of Legionella bacteria.



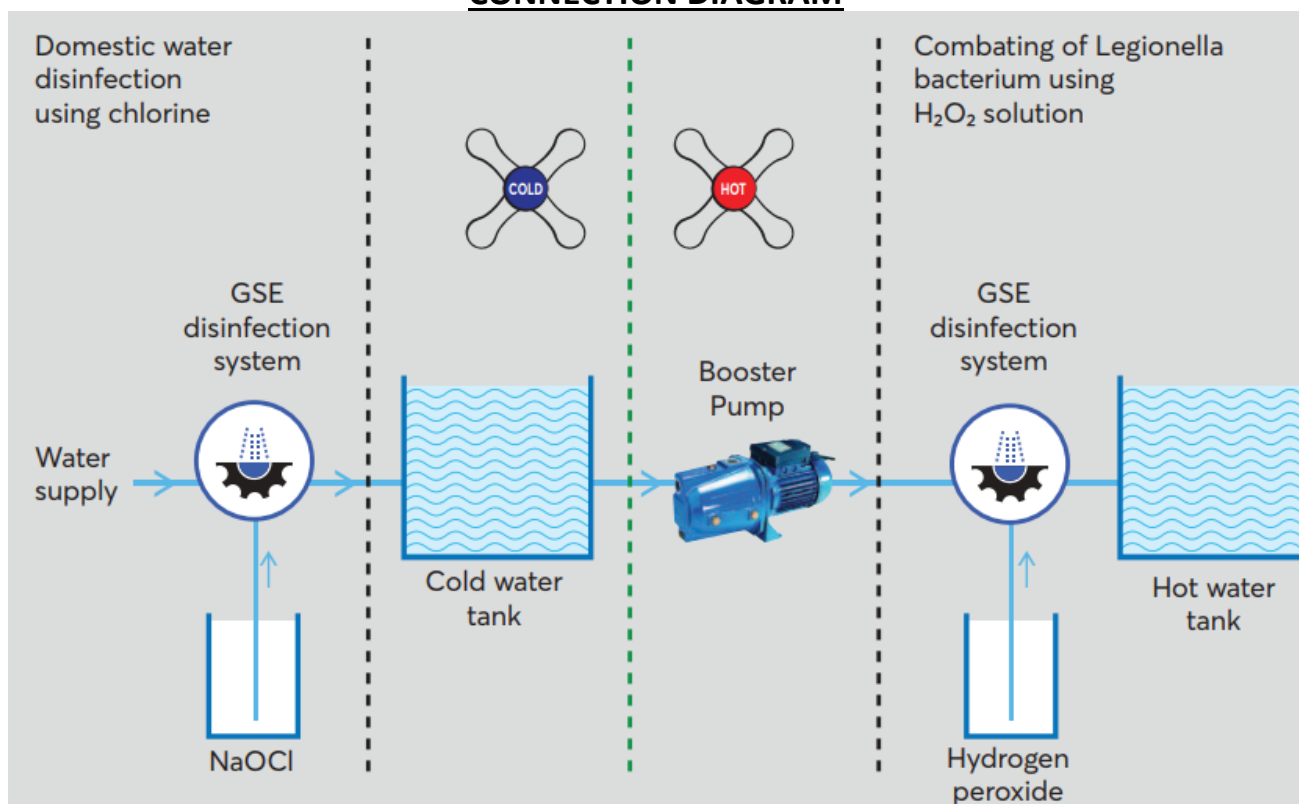
PRODUCT MODELS

MODEL	Flow Rate Range (m ³ /h)	Pulse flow meter
GSE AQUARIUS D-FM-AK 15	0.5 – 2.5	DN15-1/2" (4 pul/1 L)
GSE AQUARIUS D-FM-AK 25	1.0 – 4.0	DN25-1" (4 pul/1 L)
GSE AQUARIUS D-FM-AK 32	1.0 – 6.5	DN32-1 1/4" (4 pul/1 L)
GSE AQUARIUS D-FM-AK 40	2.0 – 10.0	DN40-1 1/2" (4 pul/1 L)
GSE AQUARIUS D-FM-AK 50	3.0 – 20.0	DN50-2" (4 pul/1 L)
GSE AQUARIUS D-FM-AK 65	5.0 – 40.0	DN65 2 1/2" (1 pul/10 L)
GSE AQUARIUS D-FM-AK 80	10.0 – 80.0	DN80-3" (1 pul/10 L)
CONTROL SYSTEM: AK300/FM 8F-4D		

SYSTEM EQUIPMENT

BASIC	COMPLEMENTARY
<ul style="list-style-type: none"> Dosing Electromagnetic Pump Pulse Flow Meter THALES AK300/FM 8F-4D Control System Dosing Pump Base Dosing Pump Float Switch 	<ul style="list-style-type: none"> Hydrogen Peroxide Tank (65kg) Sodium Hypochlorite Tank (65kg) Hydrogen Peroxide Test Kit Sodium Hypochlorite Test Kit

CONNECTION DIAGRAM



A. Water Disinfection Procedures

Domestic, hotel, and related applications require water to be free from harmful pathogenic microorganisms that may pose a risk to human health. In hotel facilities, in particular, the disinfection of cold and hot water supply networks is essential and mandated by law.

A1. Water Disinfection using Chlorine

Chlorination has proven to be the most effective method of disinfecting drinking water, provided that chlorine concentrations are controlled to avoid health issues. The amount of chlorine added must be sufficient to ensure a chlorine residual reaches even the most remote points of the water supply, at specific concentrations as defined by relevant Greek and international regulations (Appendix 1).

A2. Legionella Control Using Hydrogen Peroxide Solution

Given the critical need for comprehensive disinfection of both potable water and its distribution networks, the application of effective disinfection techniques and methods is essential for eliminating the majority of harmful microorganisms. Among these, Legionella bacteria are a particularly significant health threat. Equally important is addressing contamination points within the water supply system, aiming to eliminate the sources of contamination while ensuring the protection of public health.

Maintaining high temperatures for hot water and low temperatures for cold water is a fundamental technique in combating Legionella bacteria. However, operating at temperatures above 60°C may pose scalding risks. Heating water to around 80°C, in addition to increasing energy costs, does not ensure complete effectiveness throughout the entire water distribution network. The temperature may significantly decrease before reaching distant points.

One of the most effective methods of addressing this issue is the application of hydrogen peroxide solution in appropriate concentrations. This method ensures the presence of residual hydrogen peroxide, even at the most remote points of the water distribution network, in accordance with Greek and international regulations (Appendix 1).

The advantages of hydrogen peroxide include ease of use and its odorlessness. It is also a strong oxidizing agent with excellent antibacterial properties, without leaving any residual impact on the network. Additionally, it is volatile and safe (Appendix 2).

B. System Description

Both disinfection methods are supported by the automated systems GSE THALES AK300/FM 8F-4D , which regulate dosing through an integrated intelligent automatic control system. This allows for real-time monitoring of water flow (via the pulse flow meter) and precise injection of the required amount of chlorine or hydrogen peroxide (via the metering pump).

GSE AQUARIUS, through its advanced automated system, allows for the measurement and recording of up to 8 different cold and/or hot water flows, while enabling the simultaneous control of up to 4 metering pumps. Additionally, users can monitor system operations either locally via the logical controller's screen or remotely via a PC.

Water sampling should be conducted by accredited laboratories, which will then carry out the analysis of the samples.

GSE supports hotels with a series of auxiliary actions to systematically monitor water quality and prevent potential issues:

1. Creation of a **specialized file** for the hotel, which includes the dedicated water use logbook, the Legionella logbook, and the swimming pool logbook, if applicable. These logbooks describe the existing water supply and disinfection system, if available, and include water data recording tables and sampling records.
2. **Training** of the hotel's technical supervisor in the application of procedures and the use of the systems.
3. Provision of auxiliary materials, such as **colorimetric indicators** for measuring chlorine and pH levels.



C. APPENDICES

Appendix 1: Circulars of the Greek Ministry of Health regarding water quality monitoring and prevention of Legionnaires' disease.

1. *"Protection of Public Health from the SARS-COV-2 Coronavirus in water supply and sewage systems"* 14/3/20 Ref. No: Δ1(δ)/ΓΠ16481.
2. *"Prevention of Legionnaires' Disease"* 29/07/2019 Ref. No: Δ1(δ)/ΓΠ οικ. 56075.
3. *"Water quality monitoring for human consumption within the internal water supply networks of hospitals, clinics, health centers, nursing homes, tourist facilities, hotels, prisons, and military camps"* 9/1/2019 Ref. No: Δ1(δ)/Γ.Π.οικ.1474.

Appendix 2: Documentation on the use of hydrogen peroxide

Hydrogen peroxide has proven effective against a wide range of microorganisms, including bacteria, yeasts, fungi, viruses, and spores.

An accelerated 0.5% hydrogen peroxide solution exhibits bactericidal and virucidal activity within 1 minute, while neutralizing fungi and mycobacteria in 5 minutes. A stabilized 7% solution achieves a log₁₀ reduction of 5 (LRV – log₁₀ reduction value) in 5 minutes. Additionally, hydrogen peroxide shows antiviral activity against rhinoviruses. Specifically, a 3% solution inactivates three rhinovirus strains in 6 – 8 minutes, with the time required increasing as the concentration decreases. Finally, concentrations ranging from 6% to 25% are recommended for sterilization.

For water treatment, hydrogen peroxide concentrations of 35% or 50% are used. The corrosiveness of the treated water depends on the amount of dissolved oxygen produced. The peroxide reacts rapidly and decomposes without creating by-products.

The disinfection mechanism is based on the release of oxygen radicals and the increase in oxygen concentration in the water. Contaminants are decomposed by the free radicals, while hydrogen peroxide eliminates proteins through oxidation.

Hydrogen peroxide does not produce residues or gases and dissolves completely in water. However, due to its strong oxidizing action, it reacts with various substances, requiring specific safety measures during transportation. In water, the recommended concentration at remote points ranges between 0.5 – 1 mg/l. The measurement of residual hydrogen peroxide concentration is performed spectrophotometrically or using colorimetric indicators, with the corresponding margin of error. For disinfecting non-porous surfaces, the required contact time ranges from 2 to 10 minutes, depending on the concentration.