WATER HYGIENE WHEN TRAVELLING

WM aquatec

WM aquatec

„***Water is a friendly element*** *for those who know it and* ***know how to treat it***"

Johann Wolfgang v. Goethe

YOUR WATER IN GOOD HANDS

WHY WATER TREATMENT?

Drinking water does not necessarily mean germ-free water. All over the world, drinking water laws, despite very high quality standards, allow a certain amount of bacteria and fungi per milliliter of drinking water.

Water storage in tanks, pipes, and boilers can lead to stagnant water, which in combination with other factors, such as bio-available nutrients and heat, can lead to a rapid multiplication of bacteria. In addition, poorly maintained pipes at water filling stations on campsites and inadequate water treatment standards can cause serious problems.

SAFE WATER - WORLDWIDE!

As a general standard, in addition to the annual maintenance of the fresh water system, we recommend, water preservation. If the water quality is unknown, it should be disinfected additionally.

In principle, we at WM aquatec use technologies such as those used by public water supply companies, which provide drinking water to millions of people.

The main difference is that we have much less space available for installation of our solutions. However, we can still implement similar technologies, even in the smallest possible space - namely in your vehicle or boat.

In the field of mobile water treatment, we are happy to be your reliable partner and wish you perfect and delightful drinking water!

Yours sincerely

Würtemberger Brothers

MICHAEL WÜRTEMBERGER
CEO & Founder

STEPHAN WÜRTEMBERGER
CEO & Founder

Pre-filtration *is your very own "doorman" when it comes to water hygiene in your camper.*

PRE-FILTRATION

WHY?

Pre-filtration is your very own "doorman" when it comes to water hygiene in your camper. It's not so easy for anything to get past it. Unwanted water contaminants are held back mercilessly when the tank is filled.

Depending on the filter technology, dirt and pollutants such as sand, rust particles or even organic contaminants such as biofilm, chlorine or drug residues will never get into your fresh water system. This provides an excellent basis for perfect water quality on board.

FOR WHOM & WHERE?

Pre-filtration is an excellent basis for all those who want to use their fresh water on board for showering, brushing teeth and preparing meals. Filter elements with activated carbon, in particular, reduce harmful substances such as pesticides, heavy metals, drug residues or even chlorine and reduce bad flavors through so-called adsorption. For water quality like at home... and sometimes even better!

Pre-filtration is recommended regardless of your travel destination, whether it's in the United States, Canada, Europe, or anywhere else in the world.

OUR RECOMMENDATION

WM FILTER

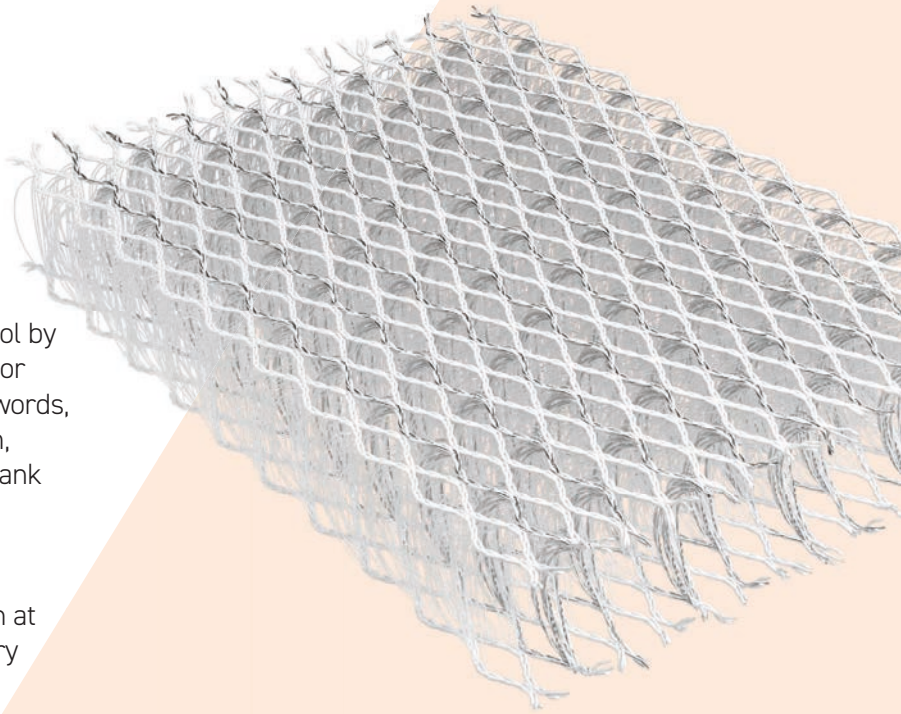
THE ROBUST FILLING FILTER

- *keeps out dirt and suspended matter such as sand, rust etc.*
- *effectively reduces pollutants such as chlorine, microplastics, pesticides, drug residues, etc.*
- *very high flow rates for fast filling*
- *incl. pre-installed activated carbon filter element*
- *tested, food safe and ready for immediate connection*
- *incl. drinking water certified brass connectors (Gardena® compatible)*

You can find our "Pre-filtration" product range starting on p.18

Water preservation *forms the basis for maintaining the water quality in the tank.*

WATER PRESERVATION



WHY?

Water preservation is essential after the entry control by your "doorman" (pre-filtration) and forms the basis for maintaining the water quality in the tank – in other words, keeping the water fresh. Without water preservation, bacteria and the like can have a free-for-all in your tank and pipes and can multiply rapidly.

You can then safely ignore the fact that bacteria can double in size every 20 minutes through cell division at suitable temperatures. This is prevented by your very own "guardian" in the entire fresh water system – your water preservation.

PATENTED TECHNOLOGY

FOR WHOM & WHERE?

For all those who want to prevent contamination of the water and the resulting slime (biofilm formation) in the tank and pipes, water preservation in the tank is a MUST HAVE. Water preservation also ultimately leads to less cleaning effort, keyword: Tank cleaning.

Water preservation is recommended regardless of your destination, whether in the United States, Canada, Europe, or anywhere else in the world. Water preservation is essential for every tank or water reservoir.

OUR RECOMMENDATION

SILVERTEX®

AUTOMATIC WATER PRESERVATION

- *keeps water fresh automatically*
- *prevents bacterial growth*
- *reduces biofilm formation*
- *self-dosing & self-regulating*
- *pure silver ions without additives*
- *flexible material – suitable for almost all tank openings*

You can find our "Water preservation" product range starting on p. 20

Disinfection *acts as a "bouncer" and is your very own personal bodyguard against germs, bacteria and pathogens.*

WATER DISINFECTION

WHY?

Disinfection acts as a "bouncer" and is your very own personal bodyguard against germs, bacteria and pathogens that have no place in your fresh water. If bacteria and the like have crept into your fresh water system, they will be successfully eliminated or retained before you use the water - depending on the disinfection technology.

Pathogens such as Legionella or Pseudomonas, which feel particularly at home in water-carrying systems such as pipes or tanks, can really ruin your vacation...

NOMINATED
German Sustainability Award Design 2021

GERMAN INNOVATION AWARD '20 WINNER

FOR WHOM & WHERE?

If you want to experience the freedom of camping with your water on board, disinfection is essential. Whether brushing your teeth, showering, preparing food or drinking - with disinfected water, you and your loved ones can enjoy hygienically perfect water - no matter where you are around the world. Depending on the disinfection technology, your water is even disinfected fully automatically and directly when the water is drawn - without the use of chemicals.

Especially outside of the United States, Canada, and Europe, the water should also be disinfected... as well as anywhere you question the quality of the water.

OUR RECOMMENDATION

UV-C LED WATER DISINFECTION

MAINTENANCE-FREE, ENVIRONMENTALLY FRIENDLY, WITHOUT CHEMICALS

- *water disinfection – 100% chemical-free*
- *disinfection performance up to 99.999%*
- *up to 8 l/min (1.3 gallons per minute) flow rate*
- *mercury-free, due to the latest LED technology*
- *disinfection directly at the water extraction point*
- *service life: 5000 h water extraction*
- *no lamp replacement necessary*
- *maintenance-free*

You can find our "Water disinfection" product range starting on p. 22

*Without a **clean tank**, even the best drinking water will soon seem like water from a rain barrel.*

SYSTEM CLEANING & CARE

WHY?

It all starts with cleaning and maintaining your fresh water system. Without a clean and germ-free tank or pipes, even the best drinking water will soon seem like water from a rain barrel - bacteria will find plenty of food in it and multiply rapidly.

It is therefore recommended to clean, descale and disinfect tank lines, boilers, fittings, etc. at regular intervals. Descaling is an important part of "cleaning" because limescale provides a surface structure to which bacteria can easily adhere, multiply and form a biofilm.

FOR WHOM & WHERE?

Truly for everyone. You can complete a cleaning after a long camping holiday. We recommend disinfection and descaling at least once a year.

If you are on long-term trips and need to treat surface water (from lakes, rivers, or wells), you should plan to clean and disinfect the fresh water system every 3 months.

OUR RECOMMENDATION

DEXDA® CLEAN ACTIVE

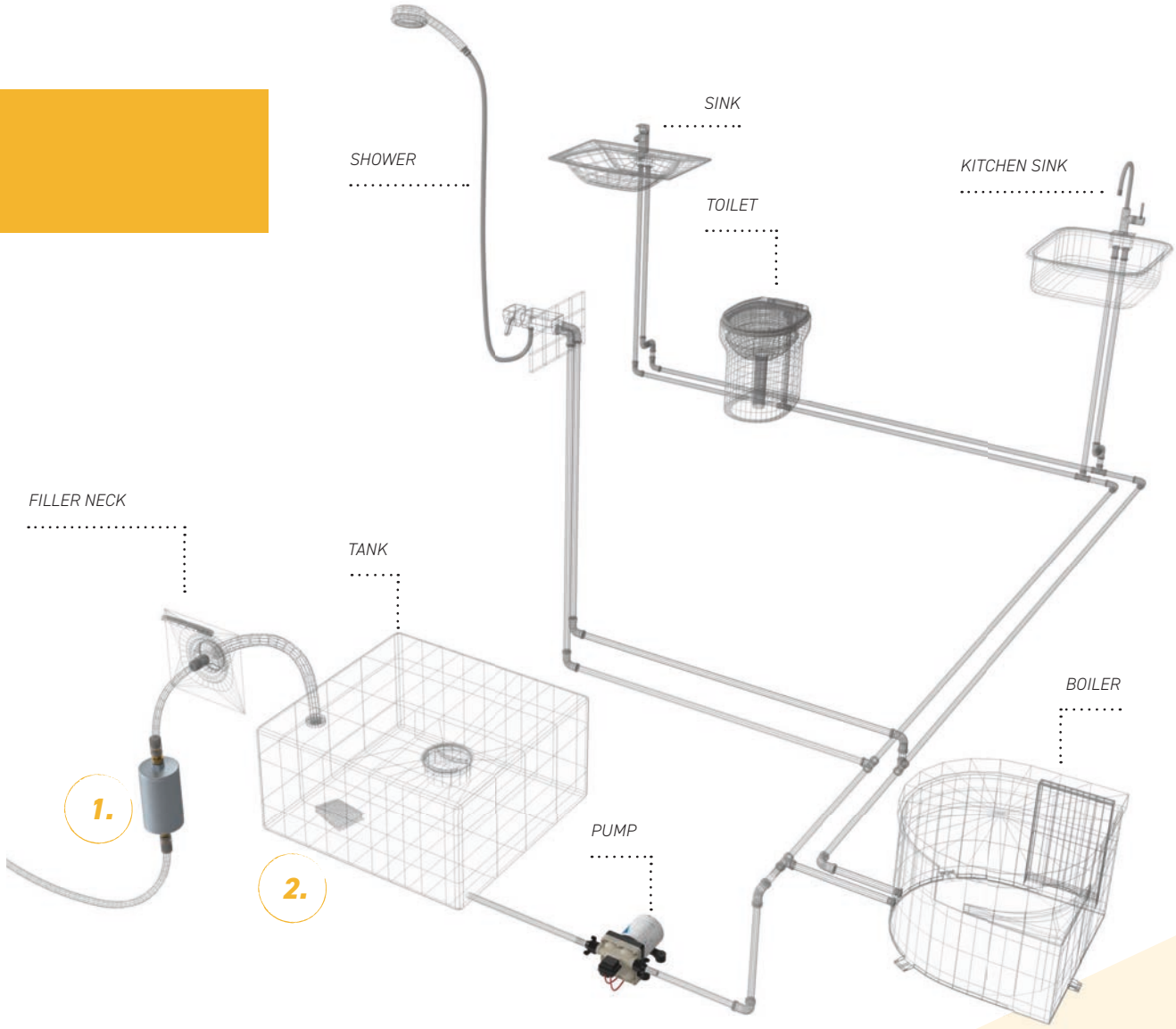
EFFECTIVE CLEANING WITH ACTIVE OXYGEN

- *removes dirt from the fresh water system*
- *emoves biofilm in the tank & pipes*
- *easy to use*
- *hard on dirt – gentle on the material*
- *for up to 6 applications (with 40 liter tank)*
- *highly effective cleaning through active oxygen*
- *no repeated rinsing necessary*
- *for fresh and gray water tanks*

You can find our "System cleanng & care" product range starting on p. 24

„HOLIDAY“ EQUIPMENT

Keeping water fresh
can be so easy.



Example of a fresh water system on board

SET
AVAILABLE

1. **PRE-FILTRATION** WITH THE WM FILTER

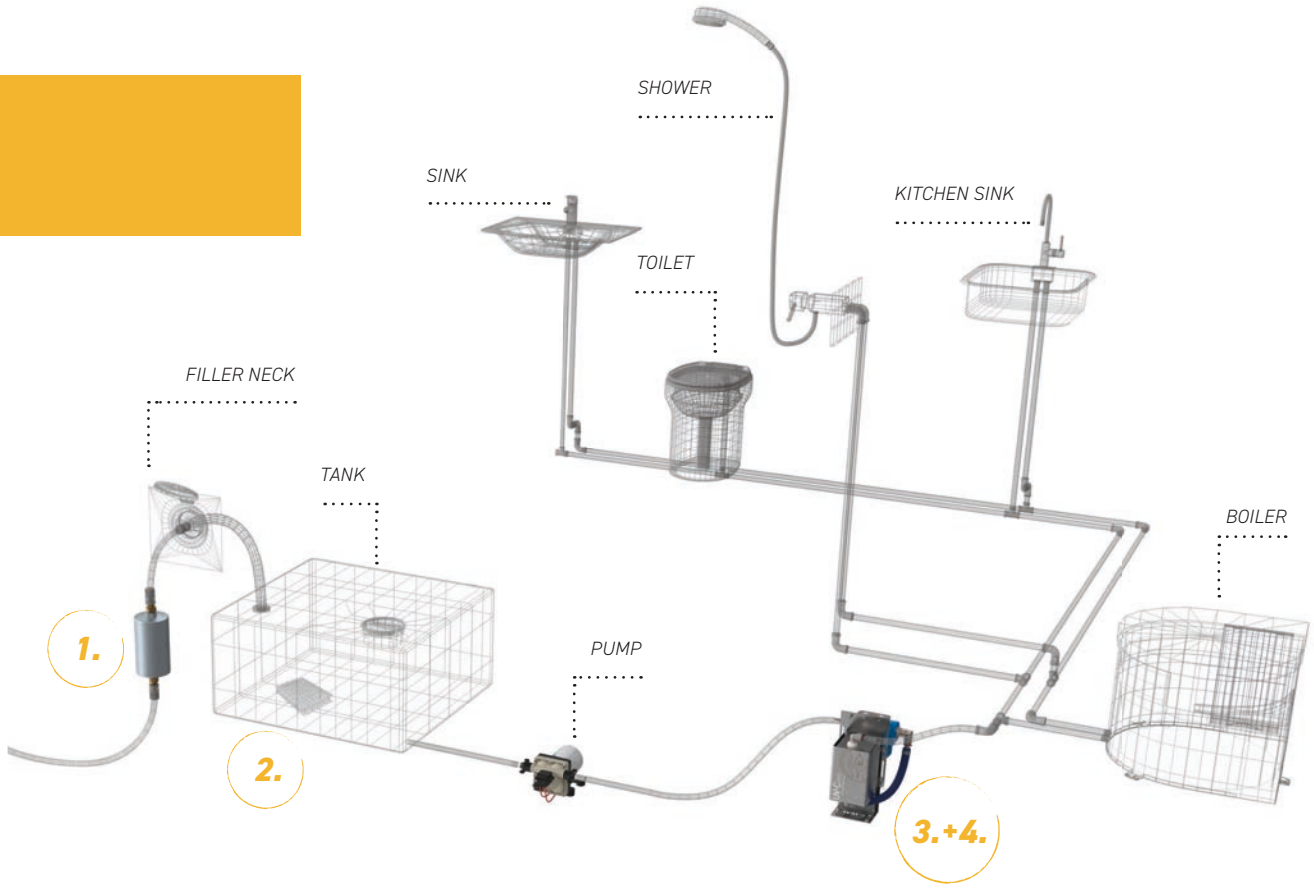
Pre-filtration with the **WM filter** not only retains contaminants such as sand, rust or microplastics, but also reduces pollutants and flavorings due to adsorption on the activated carbon. These pollutants include pesticides, heavy metals, drug residues, hormones and chlorine.

2. AUTOMATIC **WATER PRESERVATION**

The automatic preservation of the water with every new tank filling using the proven **Silvertex®** silver ion technology, keeps the water fresh and at the same time reduces germ growth and biofilm formation in the entire fresh water system.

„ADVENTURE“ EQUIPMENT

*The freedom to have **top drinking water quality** on board anytime and anywhere.*



Example of a fresh water system on board

1. OPTIONAL: PRE-FILTRATION
WHEN FILLING THE TANK

Pre-filtration with the **WM filter** not only retains contaminants such as sand, rust or microplastics, but also reduces pollutants and flavorings du to adsorption on the activated carbon. These pollutants include pesticides, heavy metals, drug residues, hormones and chlorine.

2. AUTOMATIC
WATER PRESERVATION

The automatic preservation of the water with every new tank filling using the proven **Silvertex®** silver ion technology, keeps the water fresh and at the same time reduces germ growth and biofilm formation in the entire fresh water system.

3. DIRT AND POLLUTANT
RETENTION

Especially in Southern Europe and outside of Europe, the water is often heavily chlorinated or contains many odor and taste compounds. These are retained through adsorption on the activated carbon. Since the pre-filtration already includes an **activated carbon filter**, you have double retention here. At the same time, the filter with a 10µm fineness protects the subsequent UV disinfection unit from dirt and suspended particles.

4. WATER DISINFECTION
WITH UV-C LED DISINFECTION UNIT

Maintenance-free, environmentally friendly and without chemicals. Fully-automatic water disinfection happens directly at the water source in a flow-through process using innovative **UV-C LED** technology. No lamp change required.

3 + 4
ALSO AVAILABLE
TOGETHER AS
KLW
(COMPLETE SOLUTION
WATER HYGIENE)

EXTREME CASE: **SURFACE WATER TREATMENT**

Of course, the possibility of being able to treat surface water into drinking water offers limitless freedom. But be careful! There are one or two challenges:

- higher levels of dirt such as turbidity, microorganisms, sediments etc.
- much higher levels of bacteria such as viruses, bacteria, fungi, yeasts (pathogens can also be present here)
- more organic contaminants such as particles detached from biofilm or odors and flavors from e.g. biological decomposition

The following diagram shows you how WM aquatec deals with these special challenges and which smart technologies are used here.

Worst-case assumption:
1,000,000,000 CFU per 1 ml / 0.03 fl oz.
(1 billion colony forming units per 1 ml / 0.03 fl. oz. of water)

Example of a fresh water system on board

1. PRE-FILTRATION
WHEN FILLING THE TANK

The **3-filter rack with pump** automatically draws in the water and conveys the filtered water directly into the water tank, thus ensuring supply even when far from civilization. Dirt, turbidity and single-cell organisms such as amoebae, which cannot be killed with a disinfectant, are removed. An additional connection offers the possibility of treating tap water via the system.

Germ reduction 90%

→ 100,000,000 CFU per 1 ml / 0.03 fl oz.

2. FIRST
DISINFECTION STAGE

DEXDA® Plus is the disinfectant for safe drinking water. It fights pathogens: viruses, germs, fungi & bacteria (e.g. Legionella, E. Coli etc.) and represents an excellent first disinfection stage in the treatment of surface water. The active ingredient sodium hypochlorite is also used by public water supply companies

Germ reduction 99,99%

→ 10,000 CFU per 1 ml / 0.03 fl oz.

3. AUTOMATIC
WATER PRESERVATION

Silvertex® protects the water in the tank automatically against (re-)contamination and thus effectively prevents biofilm formation (slime formation). Each time the tank is refilled, silver ions are automatically added to the freshly filled water - in an automatic and self-regulating process. This keeps the water fresh for up to 6 months.

Water preservation

→ ≤ 10,000 CFU per 1 ml / 0.03 fl oz.

4. DIRT AND POLLUTANT
RETENTION

The **activated carbon filter** removes pollutants and flavors which are retained and bound by adsorption on the activated carbon filter. These include, for example, pesticides, heavy metals, drug residues or chlorine. At the same time, the filter with a filter fineness of 10 µm (0.01 mm / .0004") protects the downstream disinfection technologies such as the UV-C LED water disinfection unit or sterile filters from dirt and suspended particles.

5. WATER DISINFECTION WITH
UV-C LED DISINFECTION UNIT

The UV disinfection unit from WM aquatec is the first fully automatic water disinfection unit of its kind, specially designed for use in long-distance motorhomes. It switches on automatically when water is drawn and guarantees hygienically perfect water worldwide with disinfection rates of up to 99.999 % ! The award-winning UV-C LED water disinfection unit is maintenance-free, environmentally friendly and contains no chemicals.

Germ reduction 99,9% @ 8 l/min (1.3 gal/min)

Germ reduction 99,99% @ 5l/min (2.1 gal/min)

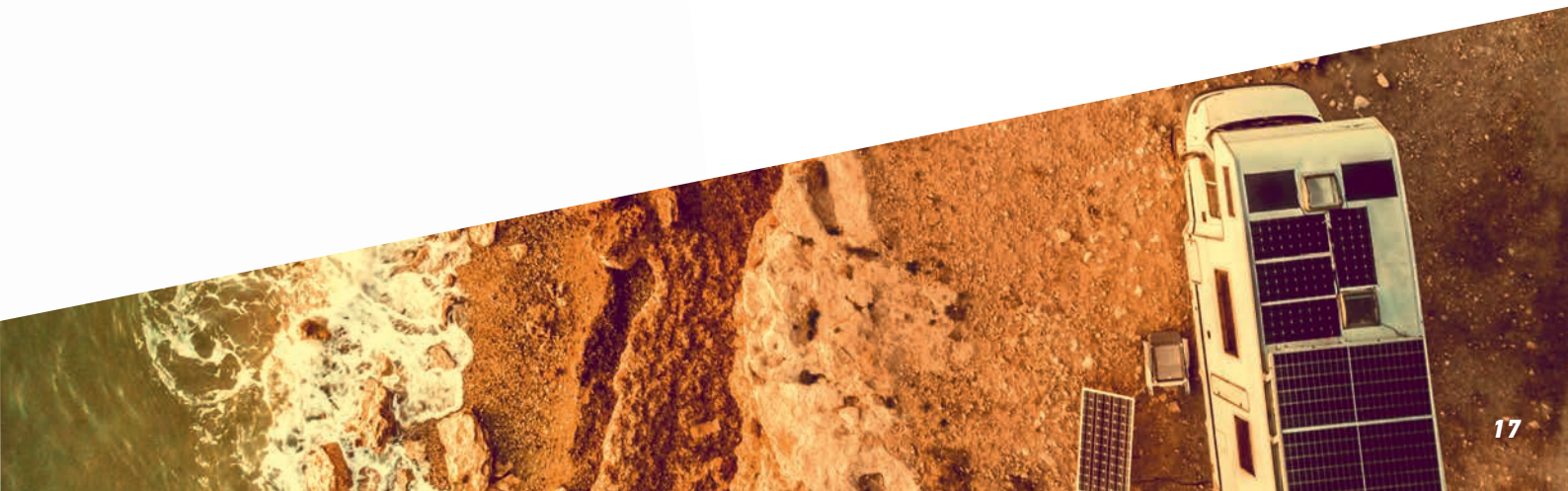
→ 10 CFU per 1 ml / 0.03 fl oz.

6. FINAL DRINKING
WATER PROCESSING

The final touch to the best possible drinking water quality: The **combo filter element** combines filtration, adsorption and disinfection. The activated carbon filter removes pollutants and flavors which are retained and bound by adsorption on the activated carbon filter. These include, for example, pesticides, heavy metals, drug residues or chlorine. The downstream sterile filtration with 0.15 µm filter fineness guarantees a bacterial retention of over99.9999%.

Germ reduction 99,9999%

→ 0 CFU per 1 ml / 0.03 fl oz.



WM FILTER

THE ROBUST FILLING FILTER

- very high flow rate
- food & drinking water compliant
- includes activated carbon filter element
- reduces contaminants such as chlorine, pesticides, pharmaceutical residues, microplastics, etc.
- retains dirt particles like sand and rust
- Gardena® compatible
- housing made of anodized, food-grade aluminum
- 10-year manufacturer's warranty

WATER FILTER SET "MOBILE EDITION"

THE PLASTIC VERSION

- prevents dirt from entering the fresh water tank
- protects pump, boiler and fittings from sand, rust, suspended matter etc.
- drinking water certified
- incl. a PP sediment filter with a fineness of 1 µm
- very high flow rate
- incl. replacement O-ring seal and filter key

PP-FILTER CARTRIDGE (SIZE S)

- filter fineness: 1 µm
- retains dirt particles like sand and rust
- compatible with WM Filter and Mobile Edition

ACTIVATED CARBON FILTER CARTRIDGE (SIZE S)

- filter fineness: 10 µm
- reduces contaminants such as chlorine, pesticides, pharmaceutical residues, microplastics, etc.
- compatible with WM Filter and Mobile Edition

MAGNETIC HOLDER UNI

- includes 2 neodymium magnets for extremely strong hold
- suitable for sensitive, painted surfaces
- load capacity up to 8 kg
- very robust

DRINKING WATER COMPLIANT FILLING HOSE

- available in various lengths
- drinking water compliant
- Gardena® compatible
- includes practical attachment loop for hanging

PRODUCT RANGE **PRE-FILTRATION**

3-STAGE CASCADE FILTRATION WITH BYPASS

FOR PERMANENT INSTALLATION IN THE VEHICLE - VARIOUS VERSIONS AVAILABLE

- ready to use and compact
- 3-stage cascade filtration
- flow rate: up to 2000 liters/hour (approx. 528 gal/hour)
- treatment of surface water and tap water (fresh water)
- High-quality stainless steel mounting angles
- Gardena® compatible
- with bypass for tap water filtration

EXTREME CASE

SURFACE WATER TREATMENT

3-UNIT FILTER RACK WITH PUMP

COMPACT FILTRATION SYSTEM WITH INTEGRATED PUMP

- ready to use and compact
- 4-stage cascade filtration
- flow rate: up to 2000 liters/hour (approx. 528 gallons/hour)
- treatment of surface water
- and tap water (fresh water)
- high-quality stainless steel housing
- Gardena® compatible
- includes floating intake
- with stainless steel pre-filter sieve

More information

PATENTED TECHNOLOGY

QUALITY SINCE 2010 - ***MORE THAN 1M PRODUCTS SOLD***

SILVERNET FLEX

PROTECTS WATER FROM RECONTAMINATION

- keeps water fresh for up to 6 months
- flexible material: suitable for almost all tank openings
- recommended change once a year
- preserves up to 40,000 liters of water (approx. 10,567 gallons) depending on the model
- pure silver ions without additives
- no nanosilver

FLEXIBLES *MATERIAL*

QUALITY SINCE 2010 · WM aquatec · more than 1 million products sold

SILVERTEX®

AUTOMATIC WATER PRESERVATION

- keeps water fresh for up to 6 months
- flexible material: suitable for almost all tank openings
- recommended change once a year
- preserves up to 40,000 liters of water (approx. 10,567 gallons) depending on the model
- pure silver ions without additives
- no nanosilver

SILVER IN DRINKING WATER?

Bacteria and pathogens can double every 20 minutes under suitable environmental conditions through cell division. This is where water preservation with silver ions comes into play - these have a microbicidal effect and are, for example, recommended by the European Standard EN 15030 as the only method for drinking water preservation. Contrary to some misinterpretations by „silver opponents," there has been no credible scientific study to date that has demonstrated a harmful effect on the human body at the recommended concentrations.

You can find more information in our interview starting on page 26.

PRODUCT-RANGE **WATER PRESERVATION**

DEXDA® ONE

WITHOUT **CHLORINE**

EFFECTIVE PROTECTION AGAINST CONTAMINATION

- keeps water fresh for up to 6 months
- for all tank or container sizes
- includes practical measuring cup for precise dosing & a dropper for smaller doses
- preserves 1200 liters of water (approx. 317 gallons)
- no nanosilver

DEXDA® COMPLETE

2 IN **1**

2 IN 1 - DISINFECTION AND PRESERVATION

- keeps water fresh for up to 6 months
- for all tank or container sizes
- includes practical measuring cup for precise dosing & a dropper for smaller doses
- disinfects & preserves up to 5000 liters of water (approx. 1321 gallons) depending on the model

HYGIENE-TRIO

THE COMPLETE SET FOR AN ENTIRE CAMPING SEASON

The Hygiene Trio is a complete set for water hygiene for an entire camping season. Depending on the model suited to the tank size, it includes the disinfectant cleaner DEXDA® Clean, the descaler KXpress, and Silvertex® for automatic preservation of fresh water.

The Hygiene Trio is available for tank sizes up to 60, 100, 160, 320, and 500 liters (approx. 16, 26, 42, 84, and 132 gallons respectively).

DEXDA® PLUS

WITHOUT **SILVER**

DEXDA® COMPLETE

2** IN **1

FIE-100 FILLING- & INLINE FILTER

NOTE: Filling a medium to large tank with the FIE-100 requires time. With a filter fineness of 0.0001 mm (approximately 0.0000039 inches), the flow rate is lower, but it provides high retention rates. As an alternative chemical-free disinfection technology for larger tanks, we recommend our UV-C LED water disinfection unit.

DISINFECTION OF TANKS, PIPES & DRINKING WATER

- combats all pathogens
- disinfects contaminated water
- also for tank and system disinfection
- sodium hypochlorite – without silver (ions)
- simple, precise dosing
- suitable for all tank and container materials

2 IN 1 - DISINFECTION AND PRESERVATION

- keeps water fresh for up to 6 months
- for all tank or container sizes
- includes practical measuring cup for precise dosing & a dropper for smaller doses
- disinfects & preserves up to 5000 liters of water (approx. 1321 gallons) depending on the model

DRINKING WATER DISINFECTION – 100% CHEMICAL-FREE

- compact microfiltration
- removes pathogens like bacteria and fungi physically, almost 100%
- ensures hygienically flawless water
- perfectly suited for filling/refilling the fresh water tank
- Gardena® compatible

PRESSURE DIAPHRAGM PUMP

- high delivery rate with
- pulsation-free operation
- very quiet
- up to 11.6 liters/minute flow rate (approx. 3 gallons/minute)
- with adjustable bypass regulation
- adjustable pressure switch
- drinking water compliant materials
- compatible with UV-C LED water disinfection unit and sterilization filters from WM aquatec

FIE-100 FILTER REPLACEMENT SET

Filter replacement set for FIE-100 filling & in-line filter consisting of: Filter cartridge including seals, hygiene gloves & caps.

PRODUCT-RANGE **WATER DISINFECTION**

COMPLETE SOLUTION WATER HYGIENE “KLW”

More information

THE ALL-ROUND CAREFREE PACKAGE

Contents:
- 1x DEXDA® Clean Disinfection Cleaner
- 1x KXpress Descaler
- 1x Silvertex® for automatic water preservation
- 1x UV-C LED Water Disinfection Unit
- 1x Filter Housing (Size S) including activated carbon filter, pre-mounted on stainless steel floor mounting angles

UV-C LED WATER DISINFECTION UNIT

COMBO FILTER ELEMENT

(Size M)

HOUSING & VARIOUS CONNECTORS AVAILABLE ONLINE

PROVIDES HYGIENICALLY FLAWLESS WATER

- combination of sterile filtration
- and activated carbon block (5µm)
- removes pathogens by 99.9999%
- removes sand, rust, suspended particles, etc.
- high retention of pollutants (pesticides, heavy metals, chlorine, etc.)
- ready for immediate use

100% FREE OF CHEMICAL ADDITIVES THANKS TO UV-C LED RADIATION

- fully automatic disinfection - at the point of water withdrawal
- disinfection efficiency up to 99.999%
- flow rate up to 8 liters per minute (approx. 2.1 gallons per minute)
- mercury-free, devoid of harmful
- disinfection by-products
- low energy consumption
- simple to upgrade or install
- maintenance-free – no need for lamp changes
- operational lifespan: 5000 hours of water usage
- monitors temperature, operational life, power supply, and provides alerts

NOMINATED
German Sustainability Prize Design 2021

GERMAN INNOVATION AWARD '20 WINNER

DEXDA® CLEAN

CHLORINE DIOXIDE: PROFESSIONAL CLEANING & DISINFECTION AGENT

- disinfects the fresh water system
- removes biofilm from tank & pipes
- highly effective chlorine dioxide solution
- no need for multiple rinsing
- for tank sizes up to 60, 160, and 500 liters (approx. 15, 42, and 132 gallons)

KXPRESS

DESCALE WITHOUT RESIDUES

- descales the fresh water system
- for tanks up to 160 and 500 liters (approx. 42 and 132 gallons)
- eliminates unpleasant odors
- with the active ingredient from lemon
- features a child-proof cap
- also suitable for coffee machines and other household appliances

DEXDA® CLEAN ACTIVE

EFFECTIVE CLEANING THROUGH ACTIVE OXYGEN

- easy to use
- cleans the entire fresh water system
- highly effective through active oxygen
- removes biofilm from tanks & pipes
- tough on contamination – gentle on materials
- good for up to 6 applications
- no need for multiple rinsing
- suitable for fresh and grey water tanks

PRODUCT-RANGE **SYSTEM CLEANING & CARE**

HYGIENE-TRIO

THE COMPLETE SET FOR AN ENTIRE CAMPING SEASON

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STANDARDS FOR THE HYGIENIC OPERATION OF THE FRESH WATER SYSTEM

When should I perform **cleaning, disinfection**, and/or **descaling**?

The maintenance of the fresh water system plays a crucial role in ensuring hygienic operation. We recommend the following cleaning and disinfection intervals to guarantee hygienic safety:

Cleaning with DEXDA® CLEAN ACTIVE

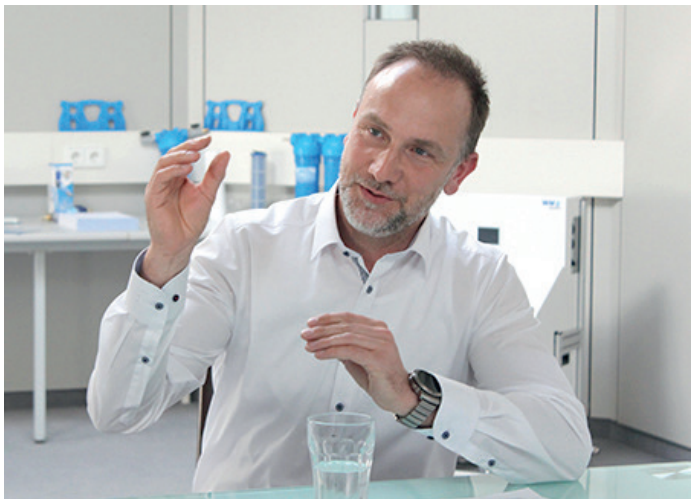
Cleaning the tank and pipes is recommended after vacations whenever the water is not preserved – meaning bacteria have multiplied in the fresh water system or if you place great importance on maintaining a clean fresh water system.

Disinfection/cleaning with DEXDA® CLEAN

Disinfection is generally recommended before or after vacation, as well as at least once a year.

Descaling with KXpress

Descaling should be performed once a year to remove limescale deposits from the boiler and any metallic components in contact with water. For long-term travel or when treating „surface water", it should be done 2-4 times a year.



Interview with Michael Würtemberger, engineer in environmental technology and Managing Director at WM aquatec GmbH & Co.KG.

Why is the quality of fresh water on board important - even if I don't drink water?
I am often asked this question. Basically, it should be understood that microorganisms reproduce faster at increasing temperatures, and drinking water regulations allow for a certain amount of microorganisms in water. For instance in Germany, according to current national drinking water regulation and high quality standards, 100 CFU (colony-forming units: bacteria, fungi, yeasts, etc.) per 1ml of water are permitted in drinking water. Bacteria start reproducing at around 10 C, and by 25 C their growth rate is already tripled. In general, water boilers in motorhomes are used at temperatures between 40 and 60 °C. This makes sense from an energy point of view, but not from a hygienic point of view. According to one of the recent studies of the Helmholtz Centre for Infection Research (HZI) in Braunschweig, it was shown that Legionella reproduces at temperatures between 50 and 60 C. If you have a robust immune system and drink water infected with Legionella, the risk of infection is very low. However, it is different in the shower. With the fine water mist produced by the running water from the shower, you can inhale aerosols containing Legionella. Long term, this can have harmful effects and cause serious infections, e.g. legionellosis (pneumonia).

"Even if you only use the water for washing dishes, I think a basic level of water hygiene should be ensured."

Should the danger represented by the presence of Legionella in the fresh water system be assessed?
The health consequences of legionella in fresh water systems can be drastic and should not be underestimated. In Germany, for example, about 32,000 people contract pneumonia caused by legionella every year, with a mortality rate of about 6%. That is about 1920 deaths per year [2]. For comparison: in 2020, there were 2,724 traffic fatalities in Germany [3].

So what is your advice for the hygienic use of the fresh water system?
My practical recommendation is to carry out a basic cleaning of the fresh water system at least once a year and to preserve the water. In Southern or non-European countries where water may have higher germ counts, an additional disinfection of the water is recommended.

I am often asked why it is still necessary to clean the fresh water system when the water is preserved. The explanation is quite simple: the water loaded with silver ions is largely protected against germs - but it is technically impossible to guarantee that the entire system is 100% germ-free.

Just think of the filler neck or other parts of the fresh water system that are not constantly in contact with water, but are constantly damp due to the evaporation of the water. These are excellent conditions for germs to multiply, which over time can form a biofilm in the tank and pipes. This in turn increasingly contaminates the entire system.

This is not only disgusting and unappetizing but can also be very unpleasant to smell. Depending on the degree of contamination and the type of germs or bacteria, this can also have adverse health effects.

What about silver a a preservative?
Thousands of years ago, people were already aware of the special properties of silver. Even Alexander the Great considered it essential to carry the drinking water needed for various campaigns in silver containers to ensure its purity. Traditions from that time already describe the magical, healing properties of silver.

Today, people take a more sober view - they now speak of silver and the antimicrobial effect as a result of the oligodynamic effect. In drinking water, silver ions (Ag+) have a microbicidal (germ-killing or germ-inhibiting) effect. This makes it possible to preserve drinking water and protect it from re-germination in the long term. Water loaded with silver ions can even be protected against re-germination for up to 6 months [4].

„In drinking water, silver ions (Ag+) have a microbicidal (germ-killing or germ-inhibiting) effect. This makes it possible to preserve drinking water and protect it from re-germination in the long term."

Which active ingredients are useful for preservation?
In the case of silver, it is the positively charged silver ions that latch onto the microorganisms (e.g. pathogens such as legionella, E. coli, etc.) and disrupt the metabolism of the bacteria or lead to cell death through over 30 different mechanisms of action. There, mainly thiol and carboxyl groups form relatively stable compounds with the silver ions [5], which lead to a loss of the ability to multiply after several minutes or to cell death as a result of metabolic breakdown. Products based on chlorine or hydrogen peroxide, which cannot be "bound" in water, evaporate and are thus unsuitable for preservation.

What are the limit values according to the national drinking water regulation?
The World Health Organization (WHO) recommends a maximum silver ion concentration of 0.1mg silver (100µg) per litre of drinking water, and this value is the consensus internationally. In Germany, silver is no longer mentioned in the drinking water regulation since the end of 2017 (the value was also 100µg/l). However, this has no relevance for campers or motorhome renters. The list exclusively regulates the treatment substances for public water supply companies.

Is silver in drinking water a health hazard?
So far, no scientific study can be reported that has proven a harmful effect on the human organism at the above-mentioned concentrations. This is mainly due to the fact that silver ions, which are absorbed into the human organism, leave the human body again via faeces or are excreted [6]. I would be happy to illustrate the harmlessness with an example calculation:

IS WATER HYGIENE REALLY IMPORTANT?

Imagine drinking 2 litres of water every day for 70 years with 0.1mg (100µg) of silver per litre of drinking water (internationally recognised maximum concentration of silver in drinking water). This would correspond to a total amount of 5g of silver within 70 years (0.0001g/l * 2l/day * 365days/year * 70 years). A report by the World Health Organisation (WHO) shows that the value of 5 grams of ingested silver does not have a toxic effect in the human body, precisely because a large part is excreted again via the stool. Thus, even a lifelong consumption of 2 litres of drinking water with the maximum recommended silver ion concentration of 0.1mg/litre of drinking water does not have any adverse health effects [7]. If you now break this down to the few "camping days", one is very likely to even only be in the milligram range of ingested silver in the 70 years of water consumption.

Also, the cities of Atlanta, Denver and New York have always had a natural silver content of 200 - 300µg/l. No adverse effects on the health of the affected population were found there, even with continuous consumption of silver amounts at the above-mentioned concentration [8].

„So far, no scientific study can be reported that has proven a harmful effect on the human organism in the above-mentioned concentrations."

What is the fundamental difference between preservation and disinfection?

Preservation is the prevention of the multiplication of microorganisms over a longer period of time. However, this requires the water be initially of drinking water quality. Disinfection is based on the assumption that there is a high microbial load in the water, which is then reduced by adding disinfectants to make the water drinkable.

Chlorine-containing products often have a specific odour/taste - is there an alternative?

Yes, there are. But the first thing to do here is to take a step back to distinguish the technologies. Basically, there are two main categories. There is chemical disinfection, as is the case with chlorine, for example, or physical disinfection, which does not require the use of chemical products. As a chemical alternative to chlorine, the active ingredient chlorine dioxide should be mentioned here, which has considerable advantages over chlorine. For example, when chlorine dioxide is used, less harmful organic disinfection by-products such as THM (trihalomethanes) are formed, and it is also stable and effective at higher pH values. Here, chlorine loses its disinfection effect quite quickly [9].

Physical disinfection technologies naturally have the clear advantage here that no chemical additives are used. Sterile filters with a filter fineness <0.2µm (less than 0.0002mm), for example, have excellent bacterial retention. However, a clear disadvantage on the one hand are the running costs due to the 6-monthly filter changes, which must be strictly adhered to from a hygienic point of view, as well as the flow losses to be expected due to the filter fineness of the filter cartridges. UV systems, on the other hand, are a very convenient variant of physical disinfection. Here, the water flows through a water disinfection unit directly when the water is withdrawn, thus providing freshly disinfected water.

„Physical disinfection technologies naturally have the clear advantage here that no chemical additives are used."

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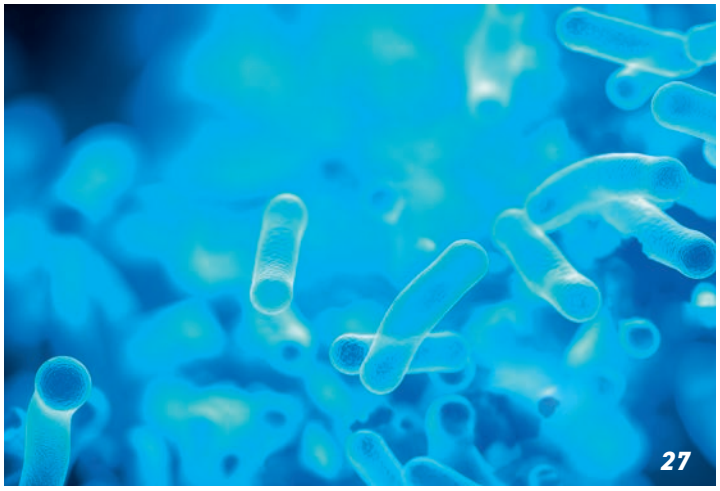

COMPARISON OF THE DIFFERENT WATER TREATMENT TECHNOLOGIES

Technology / Use	Pre-filter	Active carbon filter	Silver ions	UV system	Sterile filter	Sodium hypo-chlorite (chlorine	Chlorine dioxide	Tooth cleaning tabs	Citric acid
Dirt retention	✓	✓	✗	✗	✓	✗	✗	✗	✗
Reduction of biofim in tanks/ pipes/ hoses	✓	✓	✓	✓	✓	✓	✓	✗	✗
Inactivation/ Retention of pathogens (bacteria, germs) in water	✗	✗	✓	✓	✓	✓	✓	✗	✗
Inactivation / Retention of pathogens (viruses) in water	✗	✗	✓	✓	✓	✓	✓	✗	✗
Eliminates / reduces pollutants in water	✗	✓	✗	✗	✗	✗	✗	✗	✗
Preserves (conserves) water	✗	✗	✓	✗	✗	✗	✗	✗	✗
Eliminates biofilm and disinfects the clear water system	✗	✗	✗	✗	✗	✓	✓	✓	✗
Descales the clear water system	✗	✗	✗	✗	✗	✗	✗	✓	✓
Mentions	Tap water: 1-10 µm filter fineness. Surface water: min. 3-stage filtration	Elimination / adsorption depends on the contact time of the water	In accordance with DIN EN 15030 (water preservation)	Applies to UV forced flow systems	Filter fineness ≤ 0,2 micron	Better as a drinking water disinfectant than for system disinfection	Possibility of use together with the descaler	Not suitable due to essential oils and required amount (one tablet per 250ml)	Can be used together with chlorine dioxide

✓ appropriate/suitable ✓ conditionally appropriate/suitable ✗ not appropriate /suitable

COMPARISON OF DISINFECTION TECHNOLOGIES

Technology / Characteristics	UV-C (UV-C LED water disinfection unit)	Sterile filter	Chemical disinfection
Acquisition costs	high	medium	low
Operating costs	none	medium	low
Maintenance or change interval	none	medium	high
Flow loss	low	medium to high	none
Disinfection performance	medium to high (flow rate dependent)	medium to high (no viruses)	medium to high (germ/bacteria dependent)
Inactivation/retention bacteria, germs	yes	yes	yes (germ/bacteria dependent)
Inactivation/retention of viruses	yes	no	yes
Inactivation/retention Single-celled organisms (e.g. amoebae)	yes	yes	no
Disinfection by-products	none	none	medium
Taste and odour nuisance	none	none	low to medium
Sensor-based function monitoring	yes	no	no
Automatic disinfection	yes	yes	no

CONCLUSION

The table above shows very clearly that, depending on the quality of the raw water and the demands on the water to be treated (industrial water or drinking water), a combination of different technologies makes sense. Particularly when treating surface water, it should be ensured that at least a 2nd stage of disinfection is taken into account in order to guarantee an effective disinfection for all pathogens (bacteria, viruses, protozoa, etc.). Which technologies or combination of these you ultimately decide on also depends on the willingness to invest in such a system, the running costs and the individual need for comfort and security.

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