



# Filtration of water

**EUROWATER**  
PURE WATER TREATMENT

# Pressure filters for treatment of water

For more than 70 years, EUROWATER has developed, manufactured, and marketed complete water treatment plants employing air and water backwashed pressure filters.

## Water treatment

No matter if you need drinking water or water for commercial or industrial use, the water must undergo some kind of treatment before the water has the required quality. The complexity of the treatment clearly depends on the state of the water supply, groundwater and surface water, and on the final application. The below model gives you an idea of the different water treatment steps needed to change the water from groundwater to ultra-pure water.

## From groundwater to drinking water

One of the most important uses for water is drinking water. The required water quality is obtained in a pressure filter with individually composed layers of filter media for example for neutralization of aggressive carbon dioxide or for

collection of iron, manganese, ammonium, and mechanical impurities. In order to dimension a filtration plant, the quality of the inlet water must be known. EUROWATER offers to make the necessary water analysis – free of charge.

## From drinking water to "pure water"

Probably every manufactured product uses water during some part of the production process. Industrial water use includes water for such purposes as fabricating, processing, washing, diluting, cooling, heating, or transporting a product, incorporating water into a product, or for sanitation needs within the manufacturing facility.

EUROWATER is in a position to carry out projects within any industry and field of application.

Visit [eurowater.com](http://eurowater.com) to learn more about EUROWATER and our products.

## The impurities of water

### Inorganic salts/common ions

Iron, manganese, ammonium, calcium, magnesium, sodium, bicarbonate, chloride, sulphate, fluoride, and nitrate

### Dissolved organic compounds

Naturally occurring: humic acid  
Contaminating: pesticides, phenols, solvents, oil, and petrol

### Particles

Sand, rust, and colloids

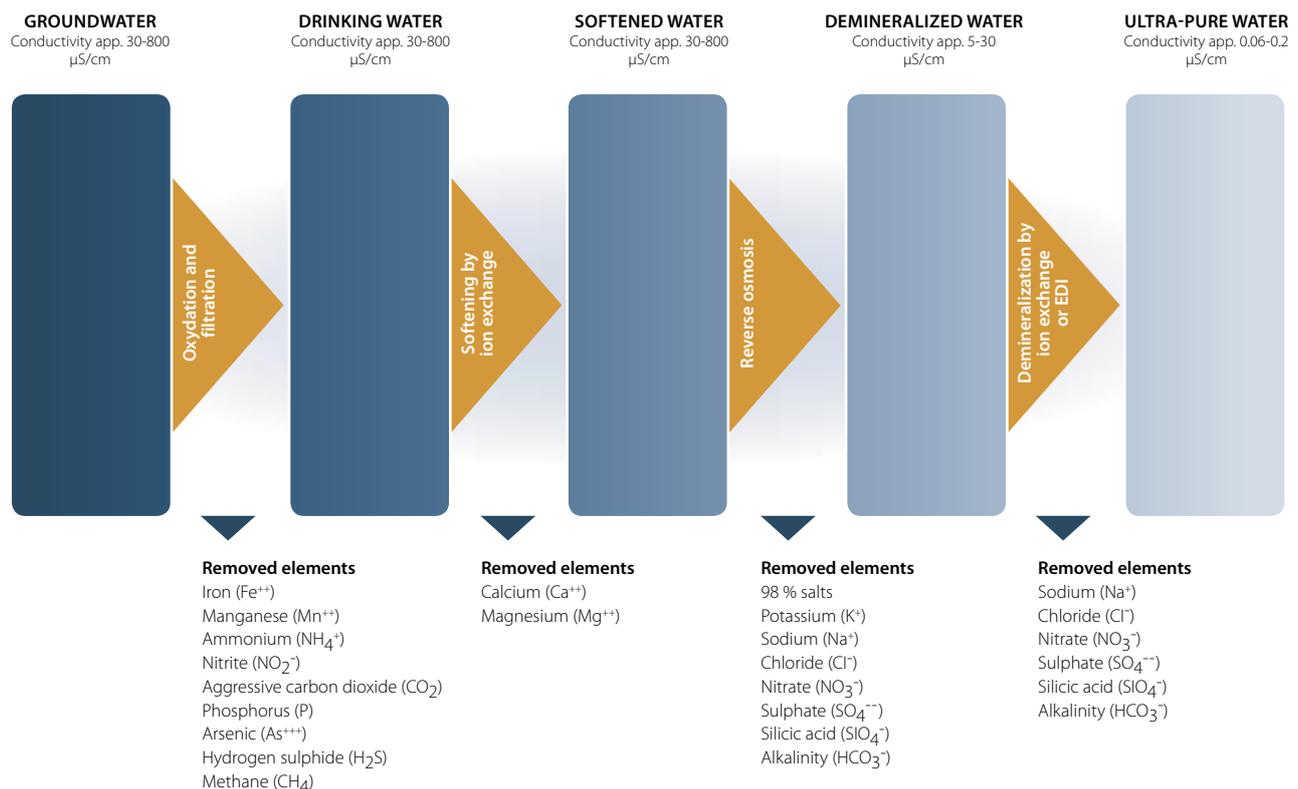
### Microorganisms

Bacteria, viruses, algae, and fungi

### Gases

Carbon dioxide, oxygen, methane, and hydrogen sulphide

## From groundwater to pure water



# What can be filtered and how?

The below table gives a survey of problems caused by selected impurities in the water, proven solutions, and the type of filter medium known to solve the problem in the best possible way. The table does not illustrate the complexity of the real world. If you encounter problems with the water, you are welcome to contact us for advice and guidance. EUROWATER has the necessary know-how of correct water treatment and guarantees quality and performance.

Impurities	Problems	Solutions	Filter media
<b>Aggressive CO<sub>2</sub></b>	Aggressive carbon dioxide corrodes concrete, piping, and hot-water tanks of black steel. The corrosion products make the water turbid and the water becomes red with rust and ochre. The carbon dioxide is often present in raw water in earth strata deficient in calcium.	Aggressive carbon dioxide can be neutralized in a pressure filter employing a calcium-containing filter medium. In special cases, aggressive carbon dioxide can be removed by degassing.	<b>Magno-Dol</b> 
<b>Iron and manganese</b>	Often, the worst problems of waterworks are iron and manganese because of discolouration of washing and sanitary appliances in buildings. Typical signs of elevated contents of iron and manganese in water are that the water becomes ochre-coloured or black with a metallic taste.	After oxidation, iron and manganese can be filtered off in a pressure filter. The filter medium can be quartz sand, Nevtraco®, or Hydrolit-MN.	<b>Gravel</b> 
<b>Ammonium and nitrite</b>	The presence of ammonium indicates microbiological activity in the water, possibly resulting from fertilization, contamination, or from geology. Nitrite in raw water is often present as a residual product of an incomplete ammonium conversion. Nitrite also indicates contamination and microbiological activity.	Ammonium is converted into nitrite and afterwards nitrate through biological nitrification. Nitrification requires much oxygen and sufficient filter medium.	<b>Nevtraco®</b> 
<b>Pesticides and chlorine</b>	Contamination from pesticides is primarily a result of the use of the herbicides Caseron G and Prefix G for weed control. The decomposition product 2,6-dichlorobenzamide – BAM – comes from dichlorobenzil and chlorthiamid, which are the active substances of Caseron and Prefix.	BAM can be reduced in a pressure filter with a filter medium of activated carbon. Activated carbon is a natural product made from pit coal, wood, or coconut shells. Among other things, an activated carbon filter can remove free chlorine, pesticides, and organic solvents.	<b>Activated carbon</b> 
<b>Arsenic</b>	Arsenic is a natural element and related to certain geochemical environments. Arsenic is found in two forms, As(III) and As(V) of which As(III) is more poisonous and harder to remove from the water. According to WHO, arsenic poses serious health hazards when ingested and has been associated with skin cancer and various organ diseases.	Arsenic combines with iron and can be removed through co-precipitation with iron. If insufficient iron is available in the raw water for this process, the iron content in the water can be increased by addition of iron chloride. Another approach is to remove arsenic by adsorption in a pressure filter with a special filter medium containing iron hydroxide.	<b>Iron granulate</b> 
<b>Adjustment of hardness</b>	Calcium and magnesium mainly determine the total hardness in the water. A large content results in hard water, a small content in soft water. The hardness of the water is measured in German degrees of Hardness (°GH).	A recarbonation filter with various calcium-containing filter media is employed for hardening of the water hardness, for example minerals have to be added to demineralized water before use.	<b>Hydrolit CA</b> 
<b>Suspended solids</b>	If the water contains much suspended matter (high turbidity) such as surface water, there will be an increased need for frequent filter washing when traditional sand filters are employed.	A depth filter is also known as a multimedia filter because the solution combines surface and depth filtration in one pressure filter. The advantage is that a large volume of suspended matter and particles can be removed in one filter. The filter media quartz sand and hydro-anthracite are used for this purpose.	<b>Hydro-anthracite</b> 

# One plant – many applications

EUROWATER has great expertise in developing reliable pressure filters with a long life and minimum need of maintenance – and the applications are many.

## Drinking water

Waterworks and companies/households with own water boring needing drinking water quality use filtration in pressure filters to reduce contents of aggressive carbon dioxide, iron, manganese, ammonium, pesticides, and arsenic.

Test samples are taken at the waterworks and at the consumers to check the water quality. The water must be clear and without colour, smell, or taste. If the water does not comply with the drinking water standards, filtration will often be the solution.

## Process water

Industries are large consumers of clean water. Pressure filtration is often used as pretreatment before other water treatment, such as softening and demineralization. Reuse of process water is another example of application within industrial water treatment.

## Other applications

Our filters are also applied to solve other problems such as:

- dechlorination
- filtration of seawater
- particle filtration
- recarbonation of demineralized water
- percolate filtration
- final filtration of wastewater



*Arsenic removal by means of adsorption in waterworks. The solution comprises an automatic pressure filter type NSB 170 installed after open filters. Flow rate: 12 m<sup>3</sup>/h.*



*Removal of iron, manganese, and ammonium in waterworks. Flow rate: 2 x 35 m<sup>3</sup>/h.*

### Solution:

- Pressure filters 4 x TFB 35 (primary and secondary filter)
- Oxidation equipment comprising compressor and aeration and control air system
- Blower and rinse pump for backwash
- Frequency-controlled discharge
- Complete plants with choice of external connection of maintenance personnel and watchmen via the internet
- Likewise alarming via SMS and generation of daily, weekly, monthly, quarterly, and yearly reports

# The optimum solution

Selection of pressure filters depends on application, water quality, and water consumption. We are at your disposal for information and know-how about the right solution.

Our dimensioning of an individual plant is based on a water analysis combined with several other parameters that all influence the right solution: water quality, operational requirements, flow rate, filtration rate, and rinse frequency. Add to this: choice of materials, surface coating, and individually composed filter media.

## Flow rates up to 100 m<sup>3</sup>/h

In our standard programme, the flow rates of pressure filters range between 1-100 m<sup>3</sup>/h per filter. These plants can solve filtration problems even in water with extreme pH-values and temperatures. The product programme covers a wide range of plant sizes making it possible to adapt the solution and thus your investment to the individual requirements for filtered water. If the pressure filter is used as a two-media filter or as a sand filter, the flow rate can be increased to 200 m<sup>3</sup>/h.

## Own production

We manufacture our own filters and that gives us the unique advantage of being

able to control the entire production process – from selection of supplier and welding of vessels and pipe system to assembly, pressure testing, and dispatch of the plant from our factory in Denmark. In this way, the plant complies with the high performance criteria of the industry.

## Pressure filter configuration

The composition of the filter is individual based on the problem to be solved. The three most frequent configurations are: single filter, parallel filter, and primary and secondary filters. In single and parallel filters, the raw water is oxidized and filtered once. The advantages of parallel filters are enlarged capacity and the possibility of backwashing one filter while the other is in operation.

In primary and secondary filters, the water is oxidized twice and also filtered twice. This method is used when single filtration is insufficient to reach the required water quality.



*A great many consumers are situated so that connection to a large, municipal waterworks is not practical or desirable. The technical solution will of course be based on the same principles as the large water supplies. A pressure filter type NSB is ideal for small and medium drinking water supplies.*



**Manual pressure filter type NS**  
Flow rates from 1 to 12 m<sup>3</sup>/h

**Automatic pressure filter type NSB**  
Flow rates from 1 to 12 m<sup>3</sup>/h

**Manual/automatic pressure filter type TF/TFB**  
Flow rates from 1 to 100 m<sup>3</sup>/h

# Efficient and reliable plants

Pressure filters are long-term investments and the requirements of EUROWATER for the best possible materials are a matter of course. Our time horizon will often be 25 years. Our filters have some significant advantages: easy to use, completely safe operation, and low wash water consumption.

## Oxidation and aeration

In our standard programme, the raw water is oxidized with atmospheric air to aid the precipitation processes and to oxidize the water to the regulations in force. The water is oxidized inside the pressure filter so that precipitations are not formed in the inlet piping. An integrated aeration and spraying system ensures optimum oxidation at the right place in the filtration process. External aeration can be supplied on request.

## Nozzle plate - optimum operation

In the lower part of our pressure filters, there is a nozzle plate which brings some significant advantages. First of all, it ensures even distribution of load for optimum utilization of the filter medium. Furthermore, stagnant water is avoided - both during operation and during backwash, which is important in order to limit bacterial growth.

## Efficient backwash with air and water

The special design with the nozzle plate also results in an efficient and even backwashing. The filter media is cleaned through backwashing at even intervals dependent on the quality of the raw water and the water consumption. To clean the filter, a strong air flow is blown upward through the filter to loosen embedded particles that afterwards are removed through backwashing with water. In special cases, it is necessary to use a combination washing with air and water. After backwash, the filter is again ready for use.

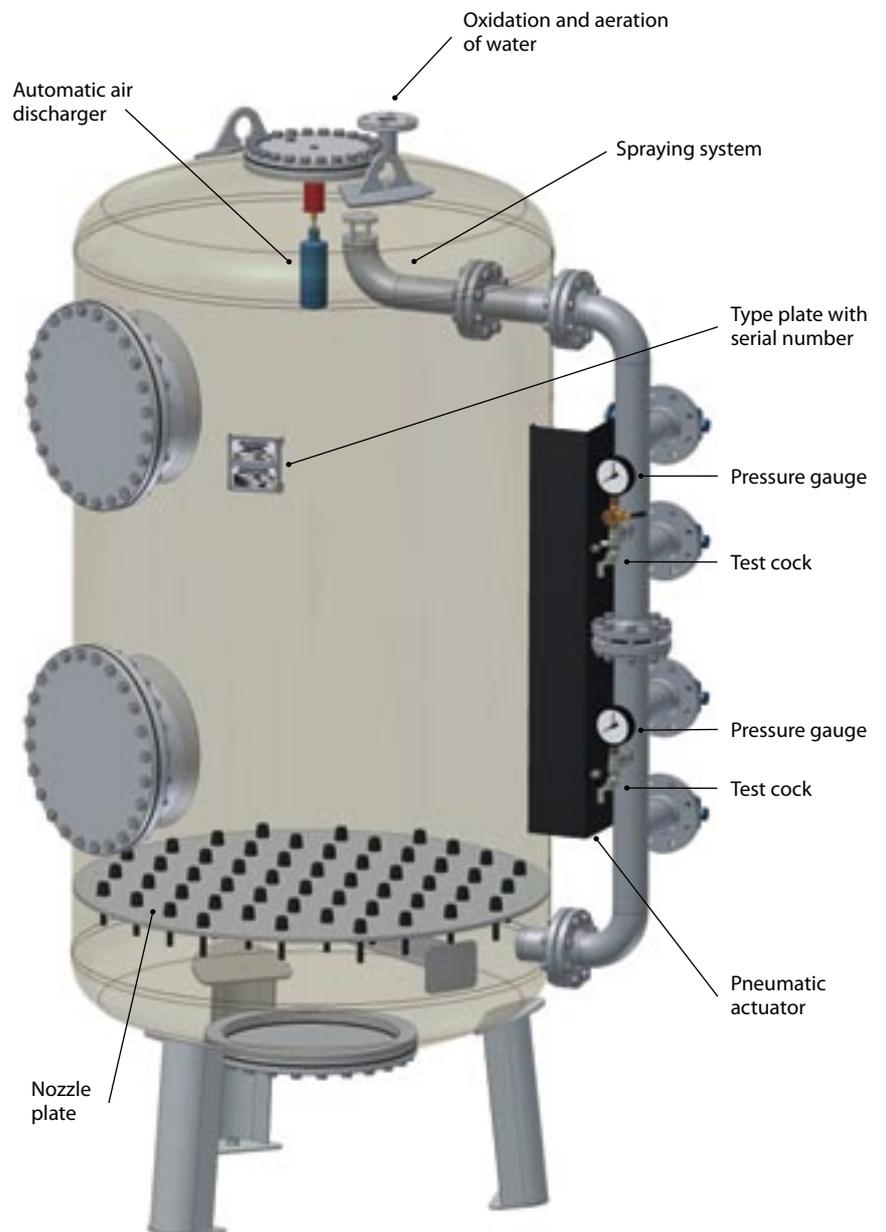
## Reuse of rinse water

To save water, the rinse water can often be reused as raw water after filtration and UV disinfection.

## Compact pipe system

The pipe system for manual and automatic pressure filters is either surface coated, hot-dip galvanized, of black steel, or alternatively of stainless steel or PE (polyethylene). The result from the water analysis is decisive for the selection of corrosion-resistant materials.

Our automatic pipe systems are constructed with one actuator for four valves, thereby minimizing the risk of incorrect valve positioning. Pressure filters with monitoring of operation and backwash have a pipe system equipped with monitoring of the valve positioning.





Complete water treatment solution comprising a pressure filter and technical equipment for oxidation and backwashing.



Degassing of dissolved gases such as aggressive carbon dioxide, methane, and hydrogen sulphide is a precondition of optimum filtration. Photo: degassing and pressure filtration in brewery.

### Surface coating

The filter vessels are of steel and therefore extremely robust and less sensitive to changes in pressure. The composition of the water and the temperature determine the selection of surface coating. We offer a wide range of options with which we have great experience. Surface coating is classified as inside and outside surface coating.

Normally, outside surface coating will be sand blasting and efficient priming followed by synthetic enamel in an optional RAL colour. Inside, the filter vessels can either be without coating or with coa-

tings suitable for different applications. Specific requirements for hygiene and drinking water approval can often be met. In most countries, such an approval is indispensable in order that the pressure filter can be used within water supply and food production.

Several of the filter vessels are surface treated with polyethylene (PPA) both inside and outside. Thus, the filter vessels acquire the strength of steel combined with the strong corrosion resistance of a synthetic material. Hot-dip galvanizing or stainless steel are other options.

### The Pressure Equipment Directive (PED)

All our pressure filter plants comply with the pressure equipment directive of the EU. This directive sets out common standards for the design and manufacture of pressure equipment.

### User-friendly control

All control solutions are custom-fitted to the requirements of the individual waterworks or industry. We offer a wide range of controls – from simple programmers to PLC controls, solutions combining control, regulation and monitoring, web-based systems, and systems based on GSM communication.



SE10 and SE20 controls.



Control box.



*Reduction of iron, manganese, aggressive carbon dioxide, and ammonium in waterworks. The solution comprises 5 x TFB 75 connected in parallel, blower, and rinse pump. Flow rate: 265 m<sup>3</sup>/h. The colour of the tanks is custom-made.*

## After sales service

EUROWATER has an international sales and service organization. Our service cars are equipped with a broad range of spare parts, often enabling us to solve problems at site and in this way ensuring reliable operation of your water treatment plant. We offer service contracts and around-the-clock service.

### **Pure water treatment since 1936**

EUROWATER is an international group with subsidiary companies in 14 countries servicing our customers through 21 local offices. Moreover, we are represented in most of the other European countries through dealers that all are water treatment specialists.

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