HYDAC INTERNATIONAL

HYDAC AutoFilt®
Automatic filters

Product Overview

EN 7.814.5/11.24

Your Partner for Expertise in Automatic Filtration

The HYDAC AutoFilt®Concept

Challenge

Particle contamination in process water and other operating fluids accelerates the wear in system components, pipework and valves. The contamination in these media also has a detrimental impact on the quality of the end products.

To protect the operational infrastructure and ensure short maintenance times, a filtration system to remove solid particles from operating fluids is essential.

Solution

In process technology, the filters in the HYDAC AutoFilt® series have been highly successful. They feature an impressive flow-optimised design. Their robust design, specially developed for retrofitting, makes installation in both existing and new systems fast and cost-effective.

Numerous operators of power stations, sewage treatment plants and industrial manufacturing companies have relied on these dependable filters for years.

Our range of services

- Automatic back-flushing filters for low to high viscosity fluids (water, coolants, heavy oil etc.)
- Development and improvement of filtration concepts
- Customised models
- System solutions
- Worldwide commissioning, service and maintenance

Note

The information in this brochure relates to the operating conditions and applications described. For applications and/or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

Global yet local: HYDAC Process Technology

HYDAC has been developing and manufacturing self-cleaning automatic filters since the 1980s. As a full-line supplier, we offer you a wide variety of automatic filtration solutions.

With over 10,000 employees worldwide, HYDAC is one of the leading suppliers of fluid technology, hydraulic and electronic equipment.
More than 50 overseas subsidiaries and over 500 sales and service partners guarantee expert on-site service – wherever you need our support.

The breadth of HYDAC's product range and our expertise in development, manufacturing, sales and service allow for comprehensive filtration concepts – from individual filter components to the complete system.

The benefits of a single-source supplier

- Solutions for almost all industries and applications (paper, power plant, automotive and steel industries, oil & gas and maritime applications, etc.)
- Application-based new and further development, state-of-the-art test rig technologies
- Fluid analyses and series of tests are carried out at HYDAC's own research and development centres

Certified quality

The perfect filtration solution for every requirement

Different requirements call for different filter concepts and filtration processes. HYDAC offers the perfect solution for every fluid being filtered and for every type and size of contamination.

Key features of our automatic filters:

- **Isokinetics**
  (AutoFilt® RF3 / RF4 / RF4W / RF5 / RF7 / RFP1) Filtration with integral pressure cleaning
- **JetFlush**
  (AutoFilt® RF12) Technology with a hydrodynamic suction effect
- **Hybrid**
  (AutoFilt® ATF TwistFlow Strainer) Centrifugal separation with a defined filtration rating
- **Hydropneumatics**
  (AutoFilt® RF9) Pressure cleaning with secure media separation
- **HySuction**
  (AutoFilt® RF14) Basket filter for fine filtration < 40 µm
  (AutoFilt® RF15) Basket filter for fine filtration < 34 µm

Inline filters for every industry and application

HYDAC inline filters provide effective filtration of all types of solid contamination. A variety of designs and filter materials ensure the best fit to the filtration task and the given process conditions.

- Temperatures up to 400 °C
- Pressures up to 1000 bar
- Filtration ratings from 1 µm (absolute) to 10,000 µm
- Flow rates up to 3600 m³/h

Intelligent Solutions Protect Our Environment

Conservation of resources with the use of automatic filters

Filtration is usually one of the most important steps in multi-stage treatment processes, as it has a crucial impact on the efficiency of main treatment and after-treatment processes further downstream.

With the use of automatic filters in the HYDAC AutoFilt® series, system operators and the environment benefit equally from:

- Cleanable filter materials
- Improved service lives for system components further downstream
- Lower energy consumption
- Increased process reliability
- Guaranteed quality

Certified environmental management

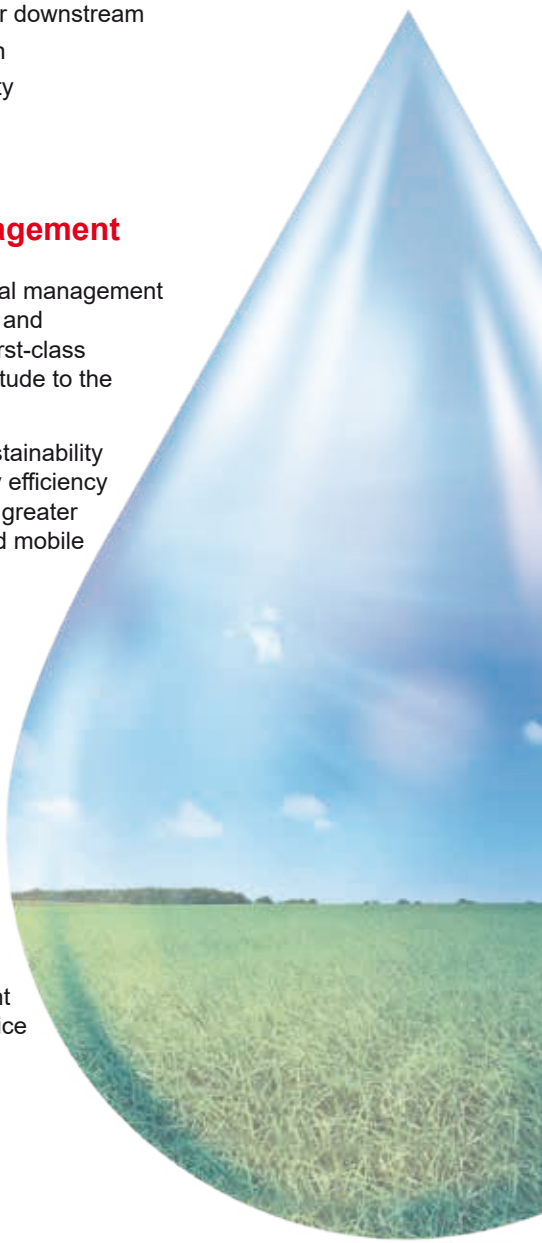
The quality and environmental management standards DIN EN ISO 9001 and DIN EN ISO 14001 denote first-class quality and a responsible attitude to the environment and resources.

As resources are limited, sustainability is a global challenge. Energy efficiency is an important step towards greater sustainability in industrial and mobile technology.

HYDAC has spent years developing intelligent and energy-efficient product solutions and system solutions to help you to make your operations sustainable.

This allows you to save natural and financial resources in the long term.

Using energy efficiently is only one way to increase sustainability. Other important methods are increasing service life and optimising new and existing plants.



Member of German Water Partnership

BLUEcoMPETENCE Alliance Member
Partner of the Engineering Industry Sustainability Initiative

HYDAC AutoFilt® Product Overview – A Guide to the Right Automatic Filter

Water		Emulsion	Oil & fuel
Operating pressure ≥ 2 bar	Operating pressure < 2 bar **		

Isokinetics – Filtration with integral pressure cleaning	AutoFilt® RF3	AutoFilt® RF4	AutoFilt® RF4W	AutoFilt® RF5	AutoFilt® RF7	AutoFilt® RFP1
Q_{max}	7500 m³/h	385 l/min	385 l/min	4200 m³/h	7500 m³/h	860 m³/h
Filtration ratings	25 – 3000 µm	25 – 1000 µm	25 – 1000 µm	200 – 3000 µm	25 – 3000 µm	25 – 3000 µm
P_{min} / P_{max}	2 bar / 100 bar	2 bar / 16 bar	up to 16 bar	2 bar / 10 bar	2 bar / 16 bar	2 bar / 16 bar
Filter element type	■ Chemicron® wedge wire ■ Chemicron® SuperMesh wire mesh, sintered* ■ Optional: SuperFlush non-stick coating					

JetFlush – Technology with a hydrodynamic suction effect	AutoFilt® RF12
Q_{max}	80 l/min
Filtration ratings	25 – 100 µm
P_{min} / P_{max}	0.7 bar / 10 bar
Filter element type	■ Chemicron® wedge wire ■ Chemicron® SuperMesh wire mesh, sintered* ■ Optional: SuperFlush non-stick coating

Hybrid – Centrifugal separation with a defined filtration rating	AutoFilt® ATF TwistFlow Strainer
Q_{max}	400 m³/h
Filtration ratings	Dependent on particle nature
P_{min} / P_{max}	1 bar / 16 bar
Filter element type	■ Chemicron® wedge wire ■ Chemicron® SuperMesh wire mesh, sintered* ■ Optional: SuperFlush non-stick coating

Hydropneumatics – Pressure cleaning with secure media separation	AutoFilt® RF9
Q_{max}	1000 m³/h
Filtration ratings	1 – 500 µm
P_{min} / P_{max}	1.5 bar / 16 bar
Filter element type	■ Chemicron® metal fibre fleece ■ Chemicron® wire mesh

HySuction – Special basket filter for fine filtration < 40 µm	AutoFilt® RF14	AutoFilt® RF15
Q_{max}	4460 m³/h	600 m³/h
Filtration ratings	20 – 80 µm	10 – 34 µm
P_{min} / P_{max}	6 bar is standard 10 bar / 16 bar is optional	1.5 bar / 10 bar
Filter element type	■ Chemicron® filter basket (plain / Δ-mesh)	

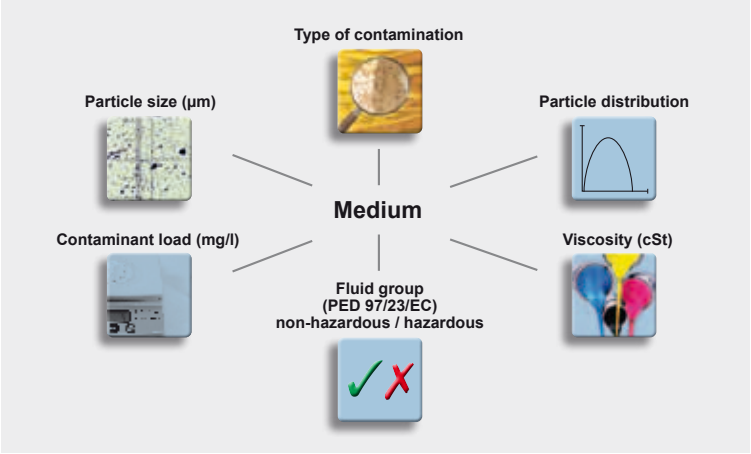
* With or without support structure

** Applications with an operating pressure < 2 bar can be implemented by using a back-flushing pump after consultation with the head office.

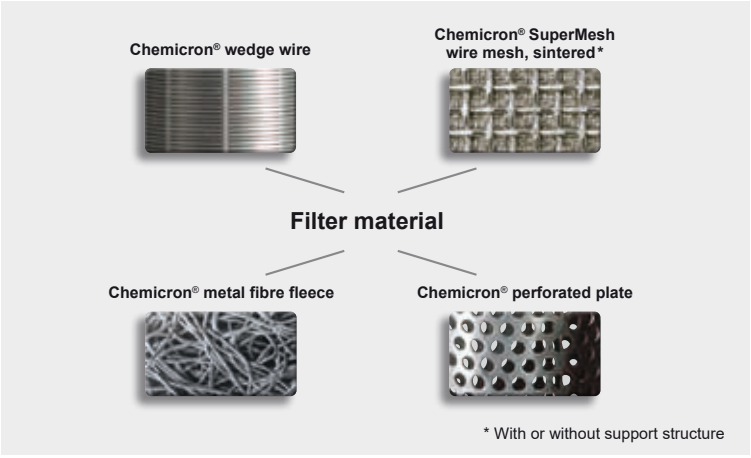
Subject to technical modifications.

Selecting the right filter

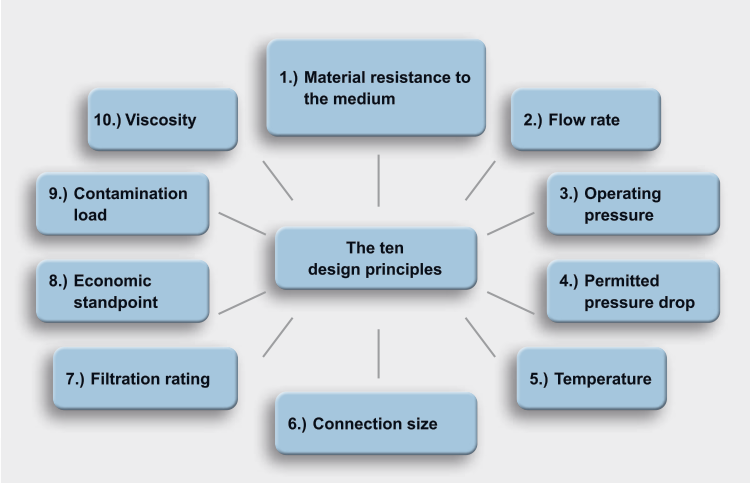
Nature of the medium being filtered



Filter material and filtration rating



Design criteria for filter selection



Filter Element Technology: Types and Materials

Quality

At the heart of every filter are its filter elements. To a large extent, they determine the filter performance.

That's why HYDAC filters are made from only the best filter materials which meet the highest demands in terms of stability, durability and cleanability.

Performance

The automatic back-flushing filters in the HYDAC AutoFilt® series generally use conical filter elements.

The conical shape and configuration of the filter elements allow consistent flow, resulting in a low pressure drop and complete cleaning of the filter elements.

Advantages:

- Fewer back-flush cycles
- Smaller back-flush volumes
- Lower differential pressure (Δp)

Cleanability

Our automatic back-flushing filters only use cleanable filter elements.

Downtimes due to filter element changes are eliminated, as the filters clean themselves automatically during operation.

This saves natural and financial resources in the long term.

Filter type	AutoFilt® RF3 / RF4 / RF4W / RF5 / RF7	AutoFilt® RF9	AutoFilt® RF12	AutoFilt® ATF	AutoFilt® RF14 / RF15
Filter element					
Type	Chemicron® wedge wire	Chemicron® metal fibre fleece	Chemicron® wedge wire	Chemicron® wedge wire	Chemicron® filter basket
Filtration rating in µm	50 – 3000	1 – 25	30 – 100	200 – 3000 Depending on the specific weight, even particles < 100 µm are separated effectively.	20 – 80
Type	Chemicron® SuperMesh wire mesh, sintered*	Chemicron® wire mesh	Chemicron® SuperMesh wire mesh, sintered*	Chemicron® SuperMesh wire mesh, sintered*	
Filtration rating in µm	25 – 500	10 – 500	25 – 100	500 – 1000 Depending on the specific weight, even particles < 100 µm are separated effectively.	

* With or without support structure

Subject to technical modifications.

Innovative Structure and Coating

Chemicron® SuperMesh

**Wire mesh, sintered –
with or without support structure**

- Outstanding stability due to sintered filter element technology
- Highly effective cleaning
- Particles don't build up or lodge between the filter element layers
- Reliable filtration ratings are guaranteed thanks to sintered filter layers and the resulting uniform pore structure
- With its self-supporting structure, the available filtration area for the HYDAC filter element is up to 40 % larger in comparison to conventional wire mesh filter elements with a support layer

with and without SuperFlush non-stick coating

SuperFlush

**Non-stick coating
for filter elements**

- Available as an option for almost all filter element types in the AutoFilt® series
- Unique coating technology
- Available for conical filter elements
- Recommended for filtration ratings ≤200 µm
- Minimises the adhesion of sticky particles on the filter element surface
- Reduces biofouling
- Increases the interval between two back-flush cycles
- Increases efficiency

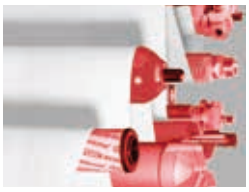
Industries and Applications

Power plant industry

- Industrial water treatment for generator cooling
- Sealing water filtration to extend the service life of turbine shaft mechanical seals in hydropower plants

Steel industry

- Process water filtration for nozzle and pump protection in high-pressure descaling
- Water treatment for cooling blast furnaces and rolling mills
- Emulsion filtration in cold and hot rolling mills
- Filtration of rolling oil



Paper industry

- Protection for all types of nozzles on paper machines
- Treatment of fresh water (e.g. river water) to be used for cooling

Automotive industry

- Coolant filtration
- Washing fluid filtration
- Machine tool protection

Maritime

- Pre-filtration for ballast water treatment systems
- Filtration for exhaust gas purification systems (scrubber water)
- Filtration of fuels and lubricating oils in large engines

Chemical industry

- Cooling water filtration
- Industrial water filtration
- Filtration of chemicals

Oil and gas industry

- Injection water filtration
- Cooling water filtration
- Service water filtration
- Flushing water filtration (pipeline flushing)
- Filtration solution for the subsea sector

Water / waste water treatment

- Protective filters upstream of membrane systems
- Increased service lives
- Industrial water treatment in sewage treatment plants

Aquaculture

- Protective filtration
- Fine filtration
- Industrial water treatment

Automatic Filter AutoFilt® RF3

Tried-and-tested operating principle – variable filter design

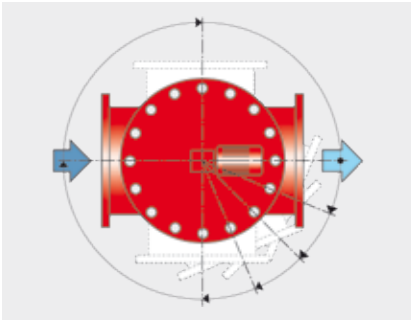
In process technology, the automatic back-flushing filters of the AutoFilt® RF3 series have been highly successful. They are used to separate solid particles from low viscosity fluids and feature a flow-optimised design.

Features

- Separation of solid particles from low viscosity fluids
- Conical filter elements provide greater efficiency
- Variable housing design

Advantages

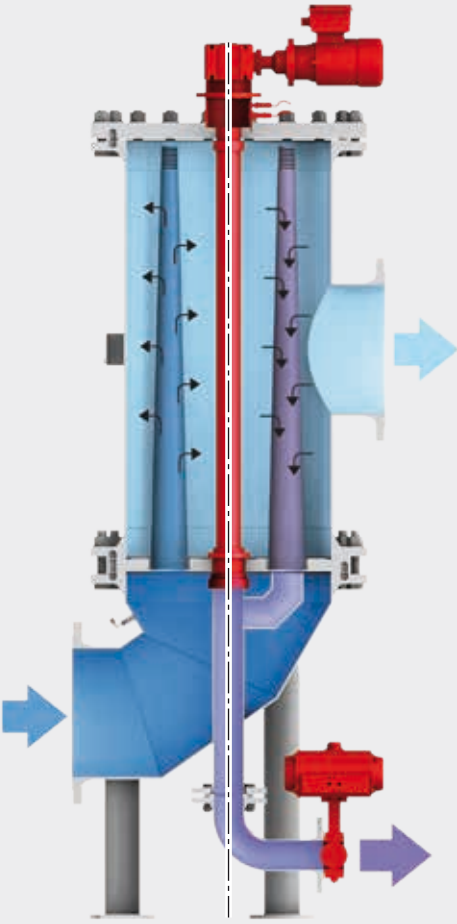
- Fully automatic function
- Ready-to-operate unit
- Maximum utilisation of the filter area
- Remote monitoring possible with smartphone or tablet
- Self-diagnosis, system diagnosis, process monitoring
- Bidirectional communication of component activity
- Open connectivity to all commonly used customer interfaces (1x Ethernet, 1x serial RS-232 C / RS 485)



Variable flange positions

Technical specifications	AutoFilt® RF3
Connection sizes	■ DN 50 to DN 900
Flow rates	■ up to 7500 m^3/h
P_{min} / P_{max}	■ 2 bar / 100 bar
Max. operating temperature	■ 90 °C
Filtration ratings	■ 25 µm to 3000 µm
Filter elements	■ Chemicron® wedge wire ■ Chemicron® SuperMesh wire mesh, sintered ■ Optional: SuperFlush non-stick coating
Filter housing materials	■ Carbon steel ■ Stainless steel
Corrosion protection	■ 2K epoxy coating ■ 2K highly cross-linked polyurethane coating ■ Rubber lining
Materials of internal parts and filter elements	■ Stainless steel
Control types	■ Electro-pneumatic cyclic control ■ Electro-pneumatic circulation control ■ Electrical circulation control ■ Pneumatic cyclic control ■ Pneumatic cyclic control with timer function ■ Manual ■ Without control (Control via customer PLC)

Isokinetic filtration and back-flushing

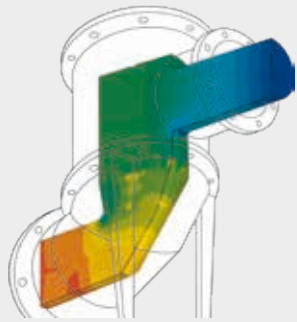


The special conical shape and configuration of the filter elements allow consistent flow resulting in a low pressure drop and complete cleaning of the filter elements.

- Fewer back-flush cycles
- Lower back-flushing losses
- Lower differential pressure (Δp)

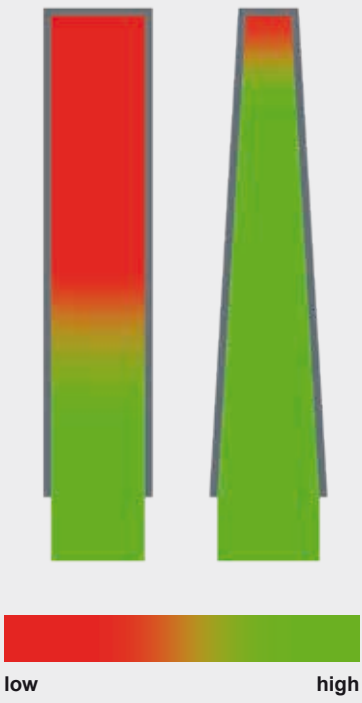
Flow-optimised filter design

The filter was developed using the latest flow simulation methods. The filter's flow-optimised design enables compact dimensions with high filtration performance and low pressure drops.



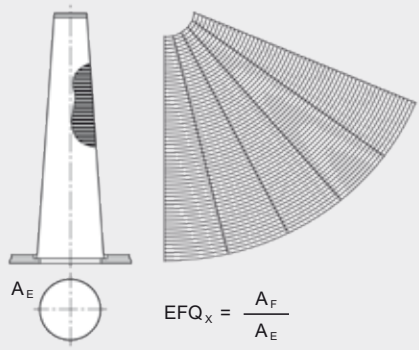
Back-flushing efficiency

Cylindrical vs. conical filter elements



Opening quotient EFQ_x

The filter element opening quotient (EFQ_x) is crucial for consistent flow without back-pressure through the filter element during filtration and back-flushing. The EFQ_x value is the ratio of the open filter area of a filter element to the opening cross section at the filter element inlet.



X = filtration rating in µm

Example:
EFQ_{100} < 3 for filter elements with a filtration rating of 100 µm

Control types

Electro-pneumatic cyclic control

The electrically operated gear motor rotates the flushing arm under the filter elements to be cleaned and stops. The back-flushing valve is opened by a pneumatically operated rotary drive and the filter element or elements are cleaned. The pressure drop between the filtrate side and back-flush line flushes a small amount of the filtrate back through the contaminated filter elements. The contamination particles collected on the inside of the filter elements are loosened and flushed into the back-flush line via the flushing arm.
After the “back-flushing time per filter element” has elapsed, the back-flush valve is closed. The gear motor then rotates the flushing arm further to the next filter element(s) to be cleaned.
The back-flush valve is opened again and the filter element or elements are back-flushed.
A full back-flush cycle is complete once all filter elements have been cleaned.

Pneumatic cyclic control

Like electro-pneumatic cyclic control, but with purely pneumatic components.

Pneumatic cyclic control with timer function

Like pneumatic cyclic control but with the option of setting a maximum filtration time between two back-flush cycles, independently of the differential pressure. The back-flushing filter's control automatically triggers back-flushing when the maximum filtration time without back-flushing has been exceeded – timer function.

Electrical circulation control

The electrically operated back-flush valve opens. The gear motor continuously rotates the flushing arm underneath the filter elements to be cleaned. The pressure drop between the filtrate side and the back-flush line flushes a small amount of the filtrate back through the contaminated filter elements. The contamination particles collected on the inside of the filter elements are loosened and flushed into the back-flush line via the flushing arm. When the flushing arm reaches its starting position, the gear motor stops and the electrical back-flush valve closes automatically. The number of cycles can be preset via the control.

Electro-pneumatic circulation control

Like electrical recirculation control, but with the back-flush unit operated pneumatically.

Pulse-aided back-flushing

With the control types electro-pneumatic cyclic control and pneumatic cyclic control, rapid opening of the pneumatic back-flush valve generates a pressure surge (cyclic pulse) in the filter element openings, and supplements the cleaning effect of the back-flushing process.

Small back-flush volumes thanks to cyclic control

With the control types electro-pneumatic cyclic control and pneumatic cyclic control, the back-flush valve opens and closes for each filter element.

Filter control AutoFilt® Control Unit ACU

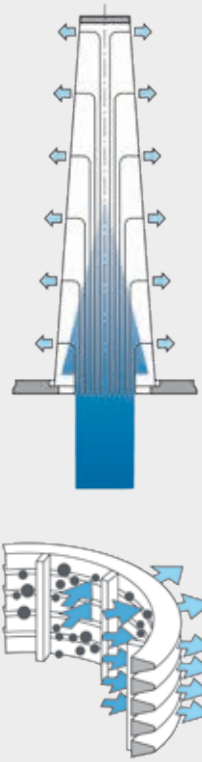
Thanks to the touchscreen's clear design, the user can keep an eye on the filter's current operating status at all times.
The symbols used in the display are self-explanatory and are based on current international standards and colour codes.
The control is designed to ensure open connectivity to all customer interfaces.

Advantages of the AutoFilt® Control Unit:

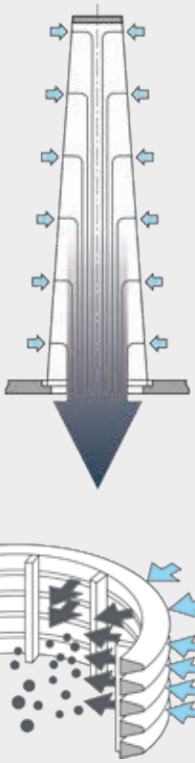
- Intuitive menu navigation via touchscreen
- Several menu languages to choose from
- Remote monitoring possible with smartphone or tablet
- Self-diagnosis, system diagnosis, process monitoring
- Bidirectional communication of component activity
- Open connectivity to all commonly used customer interfaces (1x Ethernet, 1x serial RS-232 C / RS 485)
- High-precision pressure measurement using HYDAC pressure transmitter HDA
- Additional differential pressure gauge available as an option

How it works

Filtration



Back-flushing



Filtration

- The medium being filtered flows through the filter elements from the inside to the outside
- Contamination particles then collect on the smooth inside of the filter elements
- As the level of contamination increases, the differential pressure between the contaminated and clean sides of the filter increases
- When the differential pressure reaches the pre-set trigger point, back-flushing starts automatically

Automatic back-flushing is triggered:

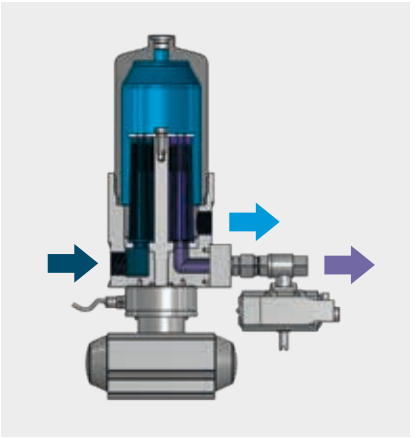
- When the differential pressure trigger point is exceeded
- Via an adjustable time relay
- By pressing the "Test" button

As soon as back-flushing has been triggered, the back-flushing filter starts to clean the filter elements.

The back-flushing function depends on the selected control type.

Application examples	Applications
Power plant industry	■ Industrial water treatment for generator cooling ■ Sealing water filtration to extend the service life of the turbine mechanical seals
Steel industry	■ Process water filtration for nozzle and pump protection in high-pressure descaling ■ Water treatment for cooling blast furnaces and rolling mills ■ Emulsion filtration in cold and hot rolling mills ■ Filtration of rolling oil
Paper industry	■ Protection of all types of nozzles on paper machines ■ Treatment of fresh water (e.g. river water) to be used for cooling
Automotive industry	■ Coolant filtration ■ Washing fluid filtration ■ Machine tool protection
Martime	■ Pre-filtration of ballast water
Chemical industry	■ Cooling water filtration ■ Industrial water filtration ■ Filtration of chemicals
Oil and gas industry	■ Injection water filtration ■ Cooling water filtration ■ Service water filtration ■ Flushing water filtration
Water and waste water treatment	■ Protective filters upstream of membrane systems ■ Industrial water treatment in sewage treatment plants
Mining	■ Filtration of water for shield spraying ■ Filtration of water for cutting machines ■ Cooling water treatment for mine ventilation

Automatic Filter AutoFilt® RF4



Sectional drawing of the AutoFilt® RF4

Self-cleaning automatic back-flushing filter for low flow rates

The AutoFilt® RF4 is a continuously operating, fully automatic and self-cleaning filter for removing particles from low-viscosity fluids.

Features

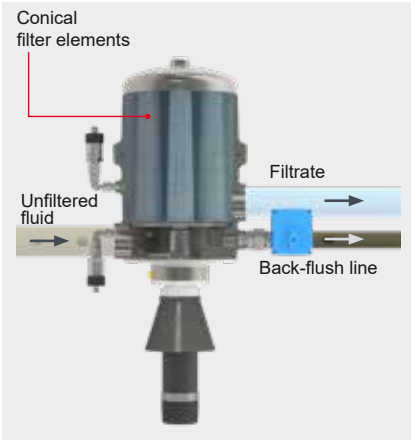
- Separation of solid particles from low viscosity fluids (coolants, water)
- Filtration ratings from 25 to 1000 µm
- Flow rates up to 385 l/min
- Conical filter elements provide greater efficiency

Advantages

- Compact design
- Fully automatic operation
- Ready-to-operate unit
- Maximum utilisation of the filter area
- Remote monitoring possible with smartphone or tablet
- Self-diagnosis, system diagnosis, process monitoring
- Bidirectional communication of component activity
- Open connectivity to all commonly used customer interfaces (1x Ethernet, 1x serial RS-232 C / RS 485)

Technical specifications	AutoFilt® RF4
Connection sizes	■ G 1" ■ G 1 ½" ■ G 2"
Flow rates	■ 385 l/min
P_{min} / P_{max}	■ 2 bar / 16 bar
Operating temperature	■ 80 °C
Filtration ratings	■ 25 µm to 1000 µm
Filter elements	■ Chemicron® wedge wire ■ Chemicron® SuperMesh wire mesh, sintered ■ Optional: SuperFlush non-stick coating
Filter housing materials	■ Anodised aluminium ■ Stainless steel ■ Carbon steel, nickel-plated
Corrosion protection	See filter housing materials
Materials of internal parts and filter elements	■ Internal parts: stainless steel 1.4301 ■ Filter elements: stainless steel 1.4435
Control types	■ Manual ■ Electro-pneumatic cyclic control ■ Electrical cyclic control ■ Electrical circulation control

Automatic Filter AutoFilt® RF4W



Sectional drawing of the AutoFilt® RF4W

Self-cleaning automatic stainless steel back-flushing filter for water applications

The AutoFilt® RF4W is a continuously operating, fully automatic and self-cleaning filter for removing particles from low viscosity fluids.

Features

- Separation of solid particles from low viscosity fluids
- Flow rates up to 385 l/min
- Conical filter element technology
  - Chemicron® wedge wire (50 µm - 1000 µm)
  - Chemicron® SuperMesh wire mesh, 3 layer, sintered (25 µm, 40 µm, 60 µm)
  - Optional SuperFlush non-stick technology

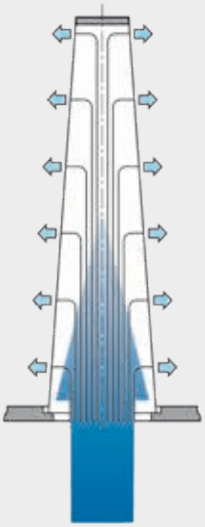
Advantages

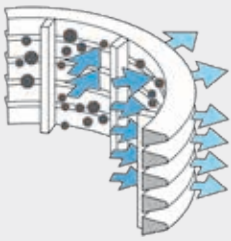
- Ready-to-operate unit
- Compact design with innovative sealing concept and quick opening
- Fully automatic operation
- No interruption to filtration during back-flushing
- Full filtration performance following back-flushing
- Maximum utilisation of the filter area
- Low operating costs
- Low maintenance costs

Technical specifications	AutoFilt® RF4W
Connection sizes	■ Inlet / outlet: G 2" ■ Back-flush line: G ¾"
Flow rates	■ 385 l/min
P_{min} / P_{max}	■ Up to 16 bar
Operating temperature	■ 80 °C
Filtration ratings	■ 25 µm to 1000 µm
Filter elements	■ Chemicron® wedge wire ■ Chemicron® SuperMesh wire mesh sintered ■ Optional: SuperFlush non-stick coating
Filter housing materials	■ Cast stainless steel: 1.4581 or similar (Group 316)
Corrosion protection	See filter housing materials
Materials of internal parts and filter elements	■ Internal parts: stainless steel group 304 (optional: group 316) ■ Filter elements: Chemicron® wedge wire, wire mesh – Chemicron® SuperMesh, stainless steel group 316
Control types	■ Electro-pneumatic cyclic control ■ Electrical circulation control – standard

How the RF4 and RF4W work

Filtration





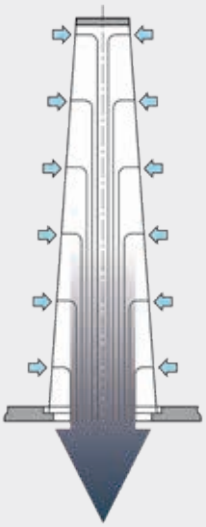
Filtration

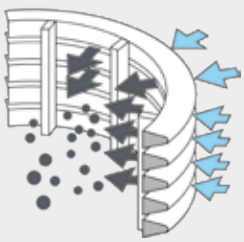
- The medium being filtered flows through the filter elements from the inside to the outside
- Contamination particles then collect on the smooth inside of the filter elements
- As the level of contamination increases, the differential pressure between the contaminated and clean sides of the filter increases
- When the differential pressure reaches the pre-set trigger point, back-flushing starts automatically

Triggering back-flushing

- Automatically:
  Automatic back-flushing is triggered when the differential pressure trigger point is exceeded
- Manually:
  When the visual clogging indicator responds

Back-flushing





Back-flushing the filter elements – Back-flush cycle

- The pneumatic drive rotates the filter element mounting plate, including the filter elements, into the correct position, so that a contaminated filter element sits over the flushing opening
- The back-flush valve is opened
- The pressure drop between the filtrate side and back-flush line flushes a small amount of the filtrate back through the contaminated filter elements
- The contamination particles collected on the inside of the filter elements are loosened and flushed into the back-flush line via the flushing opening
- After the "back-flushing time per filter element" has elapsed, the back-flush valve is closed
- In this way, all the filter elements are back-flushed, one after the other
- A full back-flush cycle is complete once all filter elements have been cleaned
- With the AutoFilt® RF4 with manual back-flushing, the filter element mounting plate, including the filter elements, is rotated and the back-flush valve is opened by hand

Isokinetic filtration and back-flushing

The special conical shape and configuration of the filter elements allow consistent flow, resulting in a low pressure drop and complete cleaning of the filter elements.

- Fewer back-flush cycles
- Low back-flushing losses

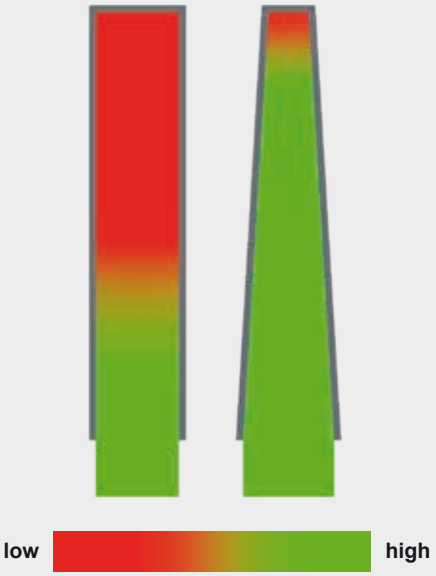
Small back-flush volumes due to cyclic control

The back-flush valve opens and closes during the back-flushing for each filter element.

Pulse-aided back-flushing

The flushing arm remains under the filter element for only a few seconds. Rapid opening of the pneumatic back-flush valve generates a pressure surge in the filter element openings, and supplements the cleaning effect of the back-flushing process.

Back-flushing efficiency in conical filter elements compared to conventional cylindrical filter elements



Application examples	Applications
Automotive industry, machine tools	■ Filtration of coolants and washing emulsions ■ Cooling channels, pipework, rotary joints and valves are protected from wear and clogging
Power plant industry	■ Industrial water treatment for generator cooling ■ Sealing water filtration to extend the service life of the turbine mechanical seals
Paper industry	■ Protection of all types of nozzles on paper machines ■ Treatment of fresh water (e.g. river water) to be used for cooling
Water and waste water treatment	■ Protective filters upstream of membrane systems ■ Industrial water treatment in sewage treatment plants

Automatic Filter AutoFilt® RF5

Self-cleaning automatic back-flushing filter with proven technology and vertical filter inlet

The robust construction and automatic back-flushing with the AutoFilt® RF5 make a significant contribution to operational reliability and reduce operating and maintenance costs.

Features

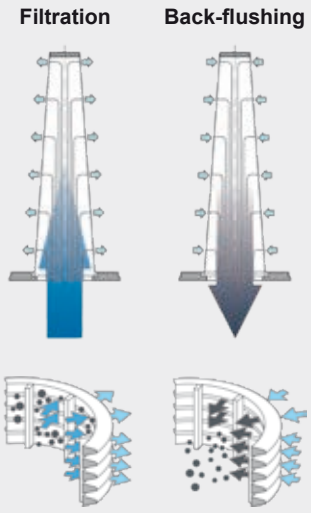
- Separation of solid particles from low viscosity fluids (coolants, water)
- Filtration ratings from 200 to 3000 µm
- Flow rates up to 4200 m^3/h
- Conical filter elements provide greater efficiency
- Vertical filter inlet

Advantages

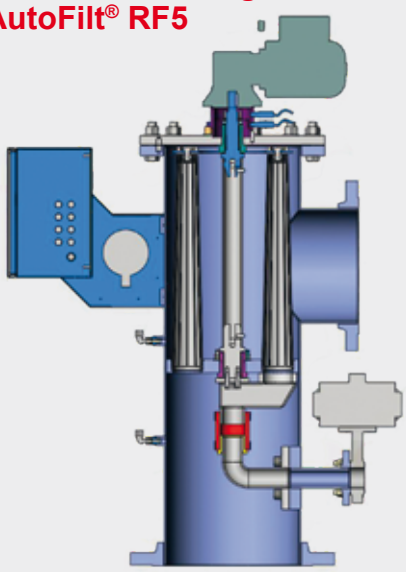
- Fully automatic operation
- Ready-to-operate unit
- Maximum utilisation of the filter area
- Isokinetic filtration and back-flushing

Technical specifications	AutoFilt® RF5
Connection sizes	■ DN 250 to DN 900
Flow rates	■ 4200 m^3/h
P_{min} / P_{max}	■ 2 bar / 10 bar
Max. operating temperature	■ 90 °C
Filtration ratings	■ 200 µm to 3000 µm
Filter elements	■ Chemicron® wedge wire ■ Chemicron® SuperMesh wire mesh, sintered ■ Optional: SuperFlush non-stick coating
Filter housing materials	■ Carbon steel ■ Stainless steel
Corrosion protection	■ 2K epoxy coating ■ 2K highly cross-linked polyurethane coating ■ Rubber lining
Materials of internal parts and filter elements	■ Stainless steel
Control types	■ Electro-pneumatic time control ■ Electrical time control ■ Electro-pneumatic cyclic control ■ Pneumatic cyclic control ■ Pneumatic cyclic control with timer function ■ Without control (Control via customer PLC)

How it works



Sectional drawing of AutoFilt® RF5



Control types

Electro-pneumatic time control

- The back-flush valve opens
- The gear motor continuously rotates the flushing arm underneath the filter elements to be cleaned
- The pressure drop between the filtrate side and back-flush line flushes a small amount of the filtrate back through the contaminated filter elements
- The contamination particles collected on the inside of the filter elements are loosened and flushed into the backflush line via the flushing arm
- After the set back-flushing time has elapsed, the gear motor stops and the back-flush valve is closed

Pneumatic cyclic control

- An identical functional sequence to electro-pneumatic cycle control but with purely pneumatic components

Electrical time control

- An identical functional sequence to electro-pneumatic time control but with an electrical back-flush valve

Electro-pneumatic cyclic control

- The gear motor rotates the flushing arm under the filter elements to be cleaned and stops
- The back-flush valve is opened and cleaned due to the pressure drop between the filtrate side and back-flush line
- After the back-flushing time per filter element has elapsed, the back-flush valve is closed
- The gear motor rotates the flushing arm further to the next filter element
- A full back-flush cycle is complete once all filter elements have been cleaned

Pneumatic cyclic control with timer function

- Like pneumatic cyclic control but with the option of setting a maximum filtration time between two back-flush cycles, independently of the differential pressure

Application examples	Applications
Power plant industry	■ Industrial water treatment for generator cooling ■ Sealing water filtration to extend the service life of the turbine mechanical seals
Paper industry	■ Protection of all types of nozzles on paper machines ■ Treatment of fresh water (e.g. river water) to be used for cooling
Water and waste water treatment	■ Protective filters upstream of membrane systems ■ Industrial water treatment in wastewater treatment plants
Irrigation	■ Nozzle protection

Automatic Filter AutoFilt® RF7

Self-cleaning automatic back-flushing filter for low installation heights

The AutoFilt® RF7 is suitable for removing solid particles from low viscosity fluids. It supplements the HYDAC back-flushing filter product range with an additional user-friendly and compact series, which is particularly suitable for use in systems with limited space.

Features

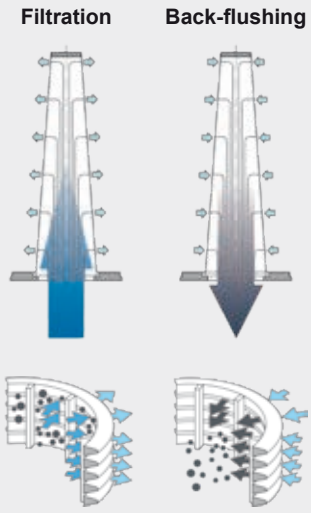
- Space-saving horizontal design
- Pivoting lid device supplied as standard, for easy access to the inside of the filter
- Separation of solid particles from low viscosity fluids
- Filtration ratings from 25 to 3000 µm
- Flow rates up to 7500 m^3/h
- Conical filter elements provide greater efficiency

Advantages

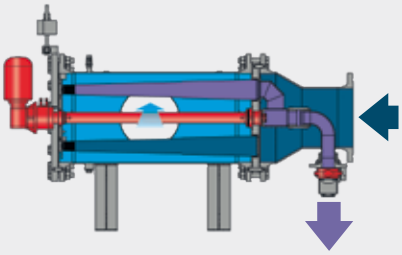
- Ideally suited to systems with limited space
- Fully automatic operation
- Ready-to-operate unit
- Maximum utilisation of the filter area
- Isokinetic filtration and back-flushing

Technical specifications	AutoFilt® RF7
Connection sizes	■ DN 50 to DN 900
Flow rates	■ 7500 m^3/h
P_{min} / P_{max}	■ 2 bar / 16 bar
Max. operating temperature	■ 90 °C
Filtration ratings	■ 25 µm to 3000 µm
Filter elements	■ Chemicron® wedge wire ■ Chemicron® SuperMesh wire mesh, sintered ■ Optional: SuperFlush non-stick coating
Filter housing materials	■ Carbon steel ■ Stainless steel
Types of corrosion protection	■ 2K epoxy coating ■ 2K highly cross-linked polyurethane coating ■ Rubber lining
Materials of internal parts and filter elements	■ Stainless steel
Control types	■ Electro-pneumatic cyclic control ■ Electrical circulation control ■ Pneumatic cyclic control ■ Electro-pneumatic circulation control ■ Pneumatic cyclic control with timer function ■ Manual ■ Without control (control via customer PLC)

How it works



Sectional drawing of AutoFilt® RF7



Control types

Electro-pneumatic cyclic control

- The gear motor rotates the flushing arm under the filter elements to be cleaned and stops
- The back-flush valve is opened and cleaned due to the pressure drop between filtrate side and back-flush line
- After the back-flushing time per filter element has elapsed, the back-flush valve is closed
- The gear motor rotates the flushing arm further to the next filter element
- A full back-flush cycle is complete once all filter elements have been cleaned

Pneumatic cyclic control

An identical functional sequence to electro-pneumatic cyclic control but with purely pneumatic components.

Pneumatic cyclic control with a timer function

Like pneumatic cyclic control but with the option of setting a maximum filtration time between two back-flush cycles, independently of the differential pressure.

Electrical circulation control

- The electrical back-flush valve opens
- The gear motor continuously rotates the flushing arm underneath the filter elements to be cleaned
- The pressure drop between the filtrate side and back-flush line flushes a small amount of the filtrate back through the contaminated filter elements
- The contamination particles collected on the inside of the filter elements are loosened and flushed into the back-flush line via the flushing arm
- When the flushing arm reaches its starting position, the gear motor stops and the electrical back-flush valve closes automatically

Electro-pneumatic circulation control

An identical function sequence, but with the back-flush unit operated pneumatically.

Application examples	Applications
Power plant industry	■ Industrial water treatment for generator cooling ■ Sealing water filtration to extend the service life of the turbine mechanical seals
Steel industry	■ Process water filtration for nozzle and pump protection in high-pressure descaling ■ Water treatment for cooling blast furnaces and rolling mills ■ Emulsion filtration in cold and hot rolling mills ■ Filtration of rolling oil

Automatic Filter AutoFilt® RFP1

AutoFilt® RFP1
Resistance meets Efficiency

JetFlush technology – Hydrodynamic suction effect

The AutoFilt® RFP1 has been developed to complement our product range and is based on our proven AutoFilt® RF3 technology. This filter features the use of media resistant plastics.
This means that the filter can be used in the following applications:

- Seawater applications
- Applications requiring chemical resistance
- Applications with corrosive media
- Applications in which using a sacrificial anode would not be acceptable

Features

- Seawater applications
- Applications requiring chemical resistance
- Applications with corrosive media
- Applications in which using a sacrificial anode would not be acceptable

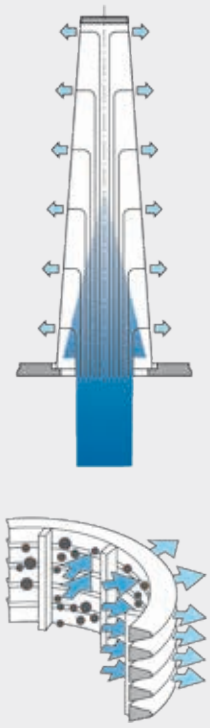
Advantages

- Inexpensive alternative to versions with duplex and super-duplex internal parts
- Reduction in the number of internal components due to the advantageous sliding properties of plastic
- High cleaning efficiency thanks to tried-and-tested conical Chemicron® wedge wire elements

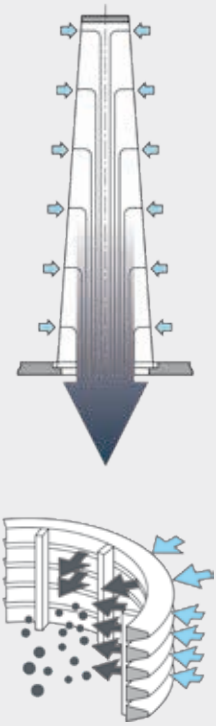
Technical specifications	RFP1
Connection sizes	■ DN 80 to DN 300
Flow rates	■ 860 m^3/h
P_{min} / P_{max}	■ 2 bar / 6 bar* (*depending on the operating temperature)
Max. operating temperature	■ 55 °C
Filtration ratings	■ 25 µm to 3000 µm
Filter elements	■ Chemicron® wedge wire ■ Chemicron® SuperMesh wire mesh, sintered ■ Optional: SuperFlush non-stick coating
Filter housing materials	■ HDPE
Materials of internal parts and filter elements	■ Internal parts: POM ■ Filter elements: stainless steel
Control types	■ Electro-pneumatic cyclic control ■ Pneumatic cyclic control

Isokinetic filtration and back-flushing

Filtration

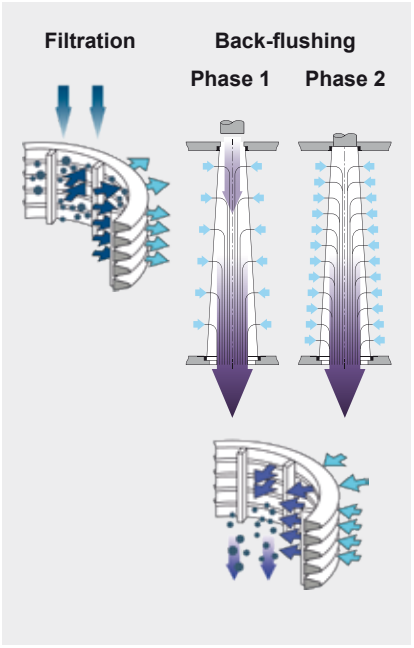


Back-flushing



Application examples	Applications
Aquaculture	■ Protective filtration / industrial water treatment
Water and waste water treatment	■ Seawater desalination plants
Other applications	■ Applications with corrosive media

Automatic Filter AutoFilt® RF12



Compact automatic filter with energy-optimised filtration and back-flushing principle – the efficient alternative to cyclone separators

The performance of conventional automatic filters is largely determined by the differential pressure between the filter outlet and the back-flush line. In contrast to this, the AutoFilt® RF12 is notable for being completely unaffected by this pressure drop.

The AutoFilt® RF12 impresses with its highly efficient back-flushing based on the conical JetFlush technology and is only dependent on the inlet pressure.

Features

- Highly efficient back-flushing based on conical JetFlush technology
- Only dependent on the inlet pressure, required inlet pressure min. 0.7 bar

Advantages

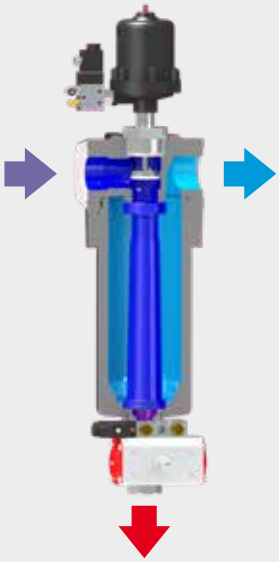
- Energy-optimised filtration and back-flushing principle
- Not dependent on the pressure of the filtrate
- Compact design
- Simple structure
- Simple integration and flexible adaptation to the machine
- An easy to maintain design

Technical specifications	AutoFilt® RF12
Connection sizes	■ G 1 ½"
Flow rates	■ 80 l/min
P_{min} / P_{max}	■ 0.7 bar / 10 bar
Max. operating temperature	■ 90 °C
Filtration ratings	■ 25 µm to 100 µm
Filter elements	■ Chemicron® wedge wire ■ Chemicron® SuperMesh wire mesh sintered
Filter housing materials	■ Aluminium
Materials of internal parts and filter elements	■ Internal parts: stainless steel 1.4301 ■ Filter elements: stainless steel 1.4435
Control types	■ Electro-pneumatic

How it works

Filtration

- The medium being filtered enters the filter housing via the filter inlet and flows through the filter element from the inside to the outside
- The filtrate leaves the filter via the filter outlet
- As fluid is filtered, particles collect on the inside of the filter element and the differential pressure between the contaminated and clean sides increases



Triggering back-flushing

- After the time pre-set on the timer has elapsed, or with the use of an optional differential pressure gauge, back-flushing starts automatically

Phase 1 of back-flushing: stripping away the contamination

- The back-flush valve opens
- A pressure drop occurs between the filter inlet and the back-flush line
- Unfiltered fluid from the filter inlet above flows into the filter element
- The conical filter element geometry produces a core flow, supplied mainly by the filter inlet
- This core flow is supported by the open JetFlush effect which also draws clean fluid from the filtrate side into the inside of the filter element

Phase 2 of back-flushing: discharging the contamination

- The JetFlush valve above the filter element is closed
- The moving column of fluid draws clean fluid from the filtrate side as soon as the supply of unfiltered fluid stops as a result of the JetFlush reservoir closing
- The filtrate flow is interrupted during this phase
- After the JetFlush valve is opened, the contamination is discharged by means of a flow of unfiltered fluid via the back-flush line
- After the back-flush valve is closed, the filter begins filtering again

Application examples	Applications
Machine tools	■ Filtration of coolants in low pressure applications

Hybrid Filter
AutoFilt® TwistFlow Strainer ATF

AutoFilt® ATF skid for handling high flow rates

Centrifugal separation with a defined filtration rating – Outstanding performance due to hybrid technology

With the unique combination which provides the filtration performance of a hydrocyclone and filtration rating of an inline filter, the ATF offers greater process reliability and increased efficiency in one system.

Features

- Suitable for wide variations in untreated water quality
- Easily copes with high contamination loads
- No transfer of contamination to the clean side
- 2-stage operating principle:

  1st stage: High contamination loads are tackled by the cyclone-like flow and it is this that achieves the filtration performance and efficiency of a centrifugal separator.

  2nd stage: The conical filter element guarantees the filtration rating and prevents transfer of contamination to the clean side – irrespective of fluctuations in the operating conditions and the contamination density.

Advantages

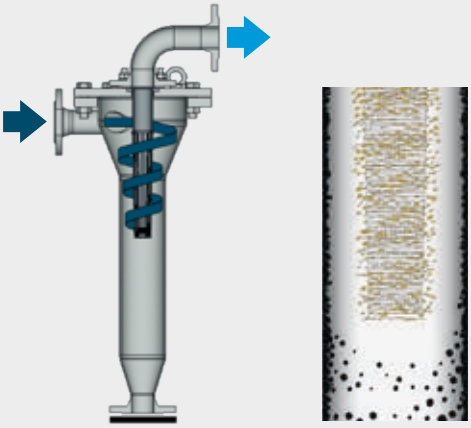
- Consistent filtrate quality
- Continuous filtration mode – constant self-cleaning
- No rotating parts – easy to service and low maintenance
- Also available as a system solution for higher flow rates

Technical specifications	AutoFilt® ATF
Connection sizes	■ G 1" – DN 200
Flow rates	■ 400 m^3/h
P_{min} / P_{max}	■ 1 bar / 16 bar
Max. operating temperature	■ 90 °C
Filtration ratings	■ Dependent on particle nature and operating conditions
Filter elements	■ Chemicron® wedge wire ■ Chemicron® SuperMesh wire mesh, sintered ■ Optional: SuperFlush non-stick coating
Filter housing materials	■ Carbon steel ■ Stainless steel
Corrosion protection	■ 2K highly cross-linked polyurethane coating
Materials of internal parts and filter elements	■ Stainless steel
Control types	■ Without control ■ Manual ■ Electro-pneumatic drain valve with or without timer function ■ Electrical drain valve with or without timer function

How it works

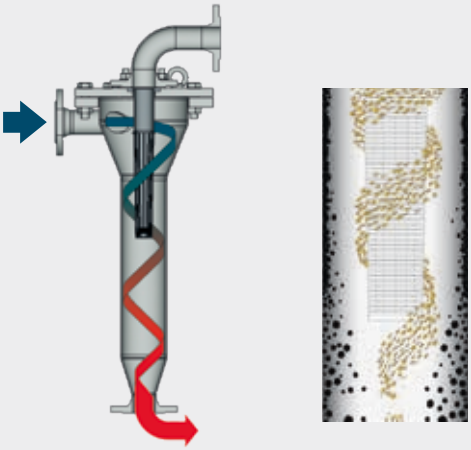
Filtration

- Fluid enters the housing tangentially
- As a result of the tangential inflow and the conical housing cross-section, the fluid flows down in a spiral shape
- Particles with a high density are pressed against the housing wall by the centrifugal forces, and are deposited in the lower section of the housing
- Particles with a lower density that are not deposited in the lower section are separated by the conical Chemicron® wedge wire filter element with a defined filtration rating



Cleaning

- Deposited particles and those separated by the conical Chemicron® wedge wire filter element collect in the lower section and are removed periodically
- Cleaning is performed by flushing with unfiltered fluid
- Filtration is continuous as only part of the flow is used for flushing



The AutoFilt® TwistFlow Strainer ATF can achieve ratings finer than 200 µm

Depending on the specific weight, even particles < 100 µm are separated effectively.
Whereas with conventional hydrocyclones there is the risk of contamination reaching the clean side if operating conditions change, the conical Chemicron® wedge wire in the ATF performs a protective function (safety filter) with defined filtration ratings, preventing contamination reaching the clean side.

Efficiency / particle size	Specific weight 7.5 g/cm³	Specific weight 2.6 g/cm³	Specific weight 1.7 g/cm³
> 100 µm	99 %	98 %	77 %
100 –75 µm	92 %	84 %	35 %
75 – 50 µm	87 %	78 %	21 %

Application examples	Applications
Automotive industry	■ Cooling and process water filtration
Hydropower plants	■ Treatment of industrial water for generator cooling ■ Sealing water filtration to extend the service life of the turbine shaft mechanical seal
Alpine technology	■ Filtration of water to protect snow cannons ■ Ensuring snow quality
Paper industry	■ Protection of spray nozzles for the screens ■ Fewer failures caused by clogging and wear
Steel industry	■ Nozzle and pump protection in high-pressure descaling ■ Water treatment for cooling blast furnaces and rolling mills
Sewage treatment plants	■ Saving valuable drinking or well water through filtration of part of the clear water flow ■ Filtration of industrial water
Environmental technology	■ Pre-filters upstream of wastewater treatment plants

Hydropneumatic Filter AutoFilt® RF9

Pneumatic control unit:
Variable adjustment of the back-flushing pressure optimises the back-flushing process

Hydro-pneumatic back-flushing with secure media separation

In this filter, HYDAC combines its expertise and innovative strength in an interdisciplinary combination of solid filter technology and tried-and-tested piston accumulator technology.
What sets the AutoFilt® RF9 apart is its patented hydropneumatic back-flushing technology which is unique worldwide and features secure media separation.

Features

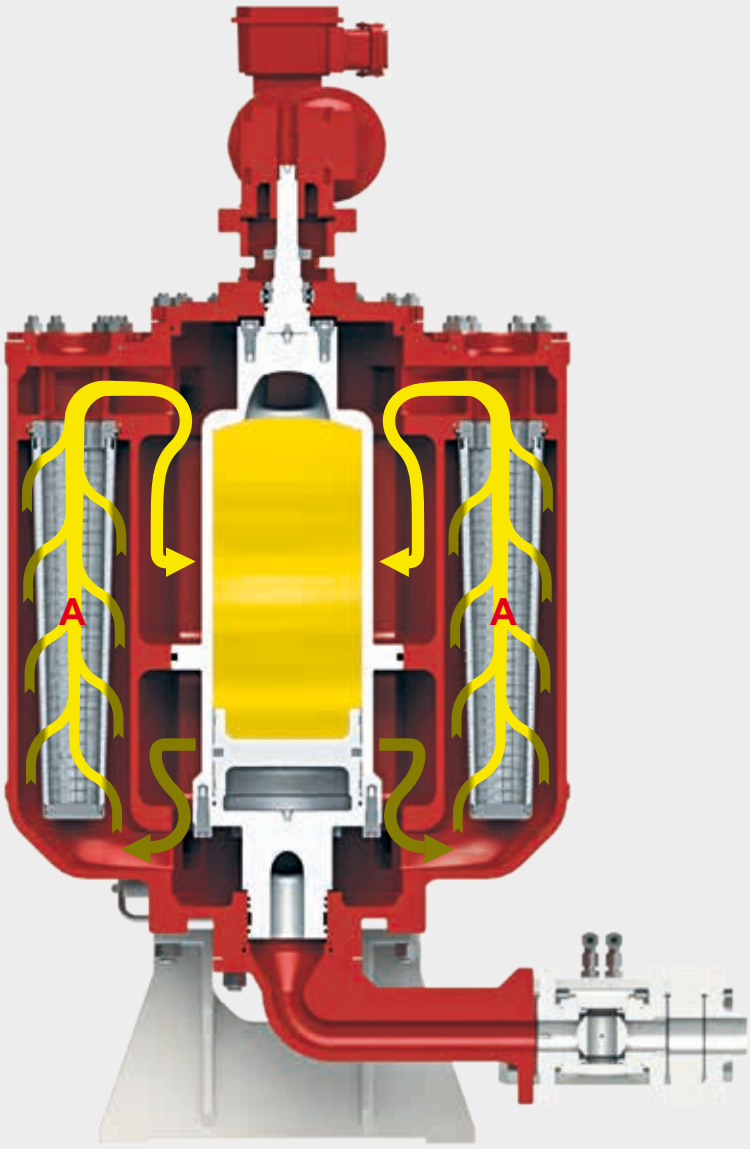
- Back-flushing driven by external medium
- Large filter surface for its compact size
- Low maintenance and easy-to-service design
- Suitable for fuels, coolants, lubricants
- External heater possible
- Optional: bypass filter
- Optional: Sludge Treatment Unit STU for back-flush volume treatment

Advantages

- No mixing with the compressed air
- Adjustable back-flushing intensity
- Efficient hydraulic cleaning
- High cleaning efficiency
- No reduction in pressure during back-flushing
- Low compressed air consumption
- Low flow drops
- Intelligent control system

Technical specifications	AutoFilt® RF9
Connection sizes	■ DN 32 to DN 350
Flow rates	■ 1000 m^3/h
P_{min} / P_{max}	■ 1.5 bar / 16 bar
Max. operating temperature	■ 180 °C
Filtration ratings	■ 1 µm to 500 µm
Filter elements	■ Chemicron® metal fibre fleece ■ Chemicron® wire mesh
Filter housing materials	■ EN-GJS-400-15 / DIN EN 1563 / AD-2000 W3/2
Materials	■ Internal parts: steel and cast iron ■ Filter elements: stainless steel
Control types	■ Electronic control unit

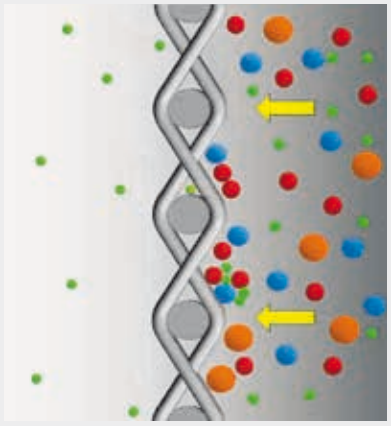
How filtration works



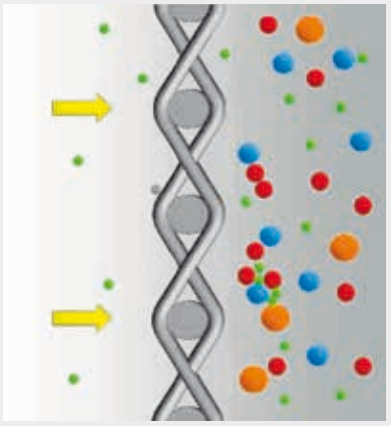
Filtration –
consistent filter performance

- The medium enters the filter housing via the inlet and is evenly distributed to the different filter chambers.
  One cleaned filter chamber is always on stand-by.
- The flow direction through the filter elements **A** in the chambers is from the outside to the inside.
  The contamination is separated from the fluid on the outer surface of the filter element and is retained there.
- The cleaned medium leaves the various filter chambers, collects in the upper part of the filter housing and exits the filter through the outlet.
- As the level of contamination in the filter elements increases, the differential pressure in the filter increases.

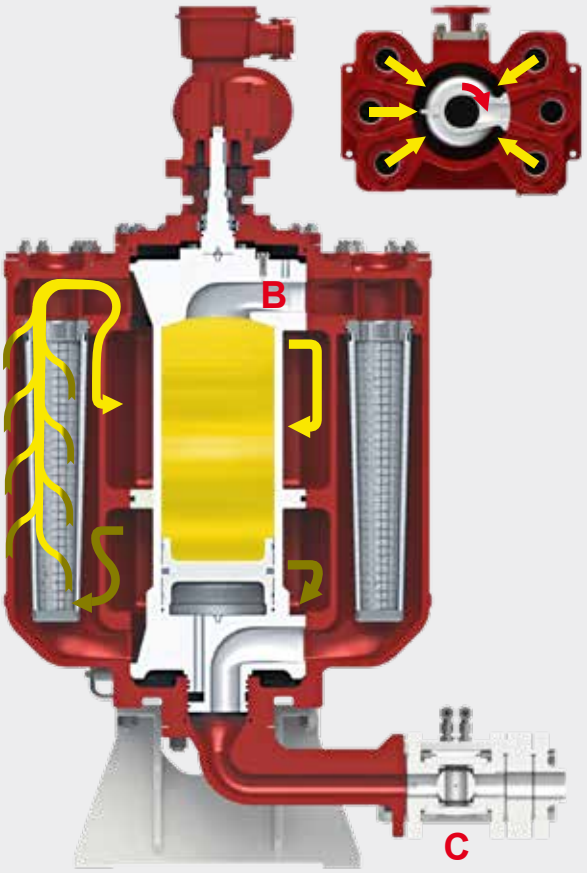
Filtration



Back-flushing

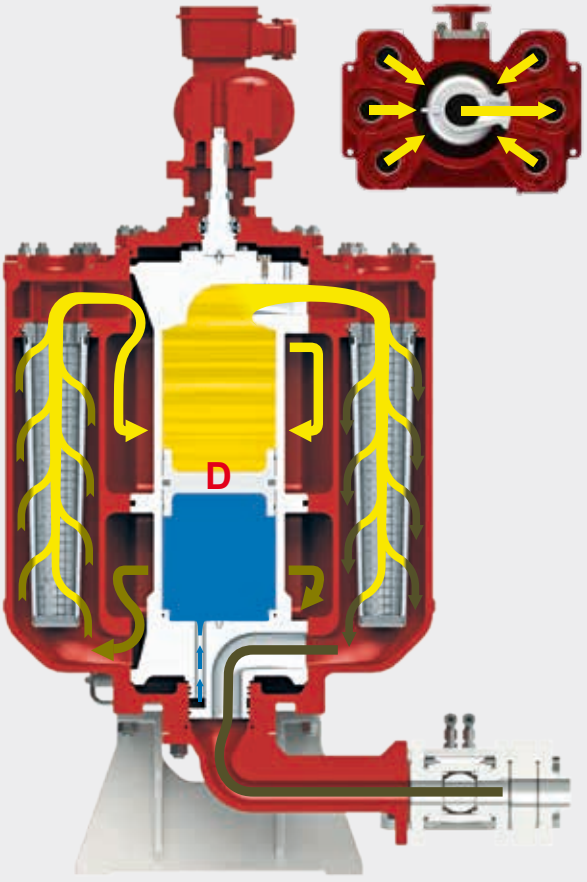


How back-flushing works



Preparing to back-flush without interrupting filtration

- When the differential pressure in the filter reaches the pre-set value, back-flushing is initiated. Back-flushing can also be carried out manually or at set intervals.
- When back-flushing has been initiated, the gear motor turns the back-flushing unit **B** to the next filter chamber.
  As the unit turns to the next filter chamber, the cleaned filter element is released from stand-by and the differential pressure is reset.
  A sensor stops the gear motor from turning as soon as the new filter chamber is reached.
- The back-flush valve **C** and the piston accumulator diaphragm valve open simultaneously.

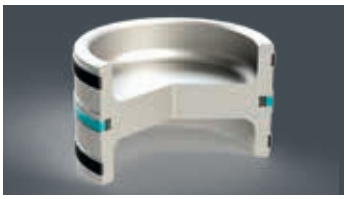


Back-flushing – with excellent efficiency

- The energy stored in the compressed air moves the back-flushing piston **D**, forcing the filtrate to flow in the reverse direction through the filter elements.
  The contaminated particles are detached from the filter material and discharged through the open back-flushing port.
- When the back-flushing piston **D** has reached its end position, both the back-flushing port and the piston accumulator diaphragm valve close.
- It takes less than a second to clean the filter element.
- The back-flushing piston is returned to its starting position via a filling bore; in other words the accumulator is charged with the filter's own cleaned medium, ready to clean another filter element.

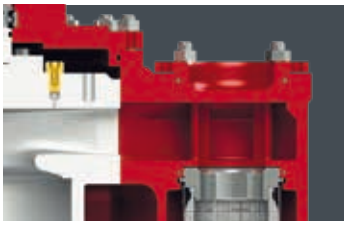
Filter elements are held securely

- Special design to hold filter elements securely prevents the elements from unintentionally working loose or falling out
- User-friendly handling, no tools or torque required
- Changing the element is quick and easy simply remove the filter cover plate



Back-flushing piston

- Guaranteed separation of filtrate and compressed air
- Special H design enables any installation position

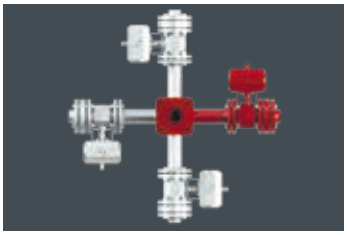


Flushing device

- Maximum flow cross-section, no flow losses
- Flexible design
- Optimum adaptation to every application due to a specially designed filling bore

Back-flushing port

- Can be configured to suit the installation situation, space-saving positioning



Trace heating (optional)

- Start not dependent on temperature,

  highly viscous media can be pre-heated
- Choice of heating media

Bypass filter (optional)

- Integrated filter solution
- Manual bypass filter

Sludge Treatment Unit STU (optional)

- Back-flush treatment

Application examples	Applications
Maritime & power	■ Heavy fuel oil ■ Diesel (marine diesel oil) ■ Biodiesel ■ Lubricating oil
Coolant	■ Fine filtration of coolants

Automatic Filter AutoFilt® RF14

HySuction technology - Self-cleaning basket filter, specially for filtration < 40 µm

As an addition to the automatic filter product family, the AutoFilt® RF14 is the first HYDAC filter to use basket-based back-flushing filter technology.

Features

- Extremely fast back-flushing
- High cleaning efficiency
- Variable filter isometry

Advantages

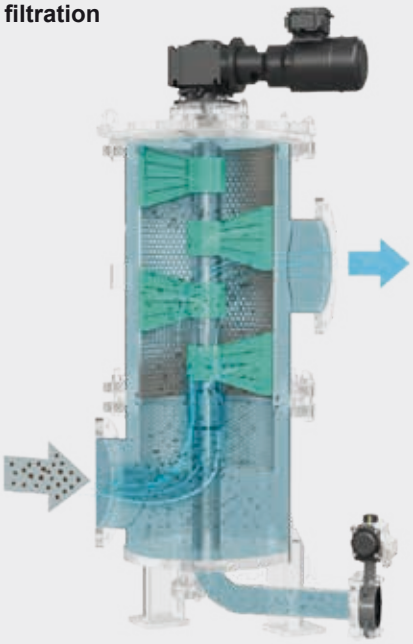
- Low flushing water loss
- Perfect for filtering large contamination volumes
- Compact design

Filter basket made of Chemicron® DeltaMesh

Technical specifications	AutoFilt® RF14
Connection sizes	■ DN25 – DN700
Max. flow rate	■ 4460 m³/h
P_{min} / P_{max}	■ Minimum pressure 2 bar / design pressure 6 bar (others on request)
Max. operating temperature	■ 55 °C
Filtration ratings	■ Filter basket ■ 20 – 80 µm
Filter housing materials	■ Carbon steel ■ Stainless steel
Corrosion protection	■ Highly cross-linked polyurethane coating
Materials of internal parts and filter basket	■ Stainless steel ■ Optional: duplex or similar.
Control types	■ Electro-pneumatic

How it works

Illustration of the filtration



Filtration

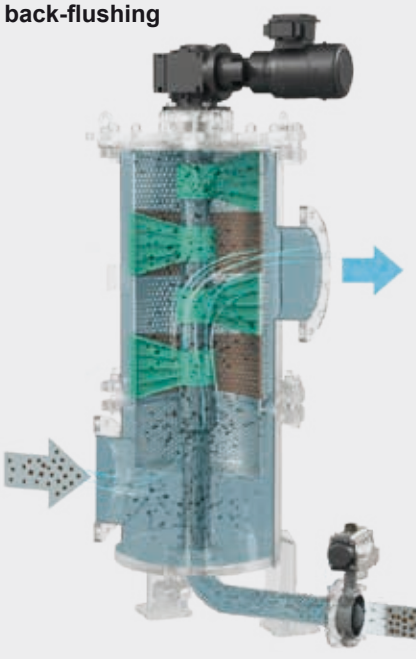
- The fluid to be filtered flows through the filter basket of the back-flushing filter, passing from the inside to the outside
- Particles then collect on the inside of the filter basket
- As the level of filter contamination increases, the differential pressure between the contaminated and the clean side increases
- When the differential pressure reaches the pre-set trigger point, back-flushing of the filter basket starts automatically
- The axially arranged cleaning device is rotated by the gear motor. The cleaning nozzles slide over the entire inside of the filter basket in the radial direction, back-flushing the filter mesh.
- No interruption of the filtrate flow during back-flushing

Automatic back-flushing initiation

You can choose how the back-flushing is initiated:

- When the pre-set triggering differential pressure is exceeded
- By using a timer function
- By pressing the "TEST" button

Illustration of back-flushing

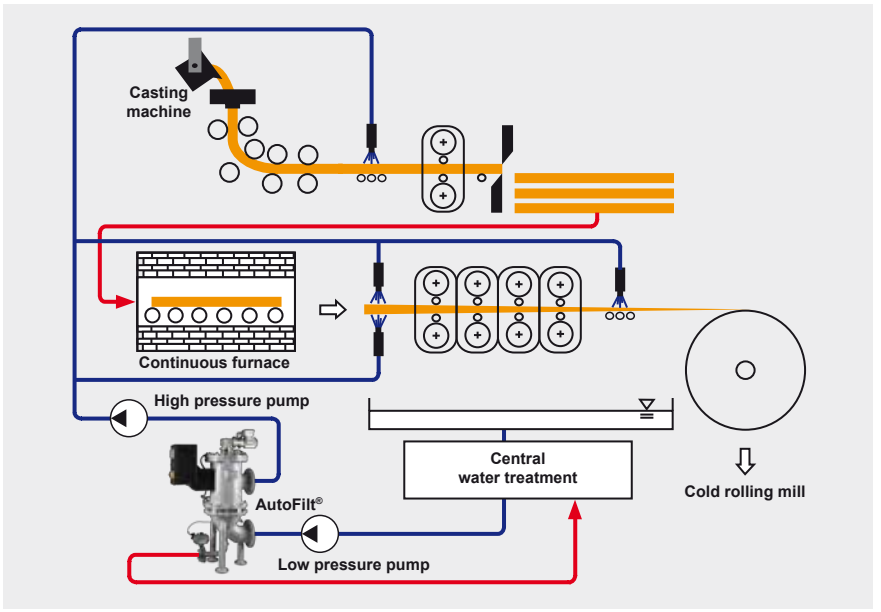


Automatic back-flushing sequence – back-flush cycle

- When the back-flushing is initiated, the gear motor starts and rotates the axially arranged cleaning device with individual cleaning nozzles
- The back-flush valve in the back-flush line is opened
- Due to the differential pressure arising between the filtrate and back-flush line, a partial reversal of flow occurs in the area surrounding the cleaning nozzles
- Part of the filtrate flows from outside to inside through the filter basket into the openings of the cleaning nozzles, while the contamination adhering to the inside of the filter basket is carried along by the flow that develops
- While the gear motor continues to rotate, the cleaning nozzles slide along the entire inside of the filter basket radially
- This results in the whole filter basket being cleaned
- Once the back-flush cycle is complete, the back-flush valve in the back-flush line closes and the rotation of the motor stops

Application examples	Applications
Maritime	■ Ballast water pre-filtration ■ Scrubber water treatment
Oil and gas industry	■ Produced water ■ Injection water
Industry	■ Cooling water treatment
Fish farming	■ Water treatment
And many more …	

Applications / Industries

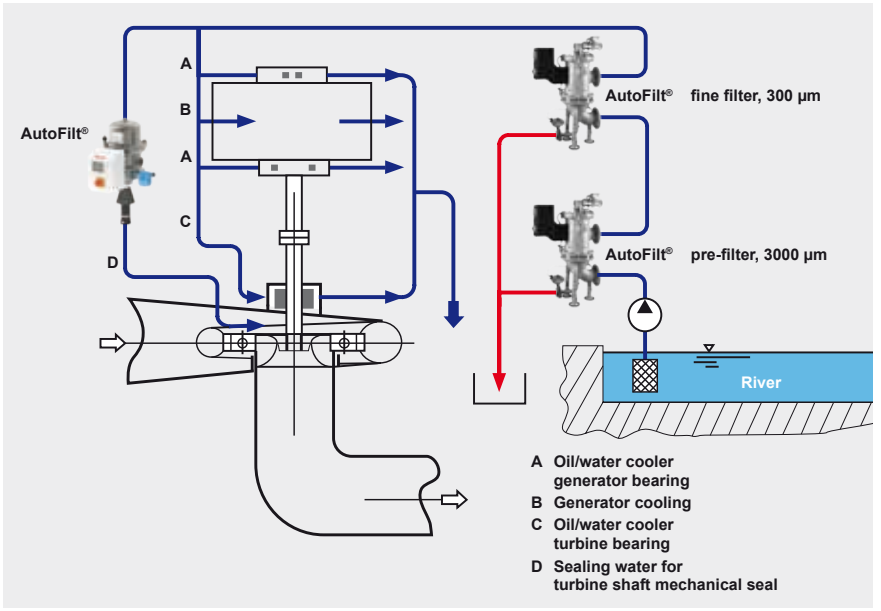


Steel industry / descaling

- High-pressure descaling in rolling mills
- Protection of high-pressure pumps and spray nozzles
- Water treatment for cooling blast furnaces and rolling mills

HYDAC solutions:

- AutoFilt® RF3 / RF4 / RF4W / RF5 / RF7
- AutoFilt® TwistFlow Strainer ATF
- Inline and screen basket filters
- Skid and system solutions

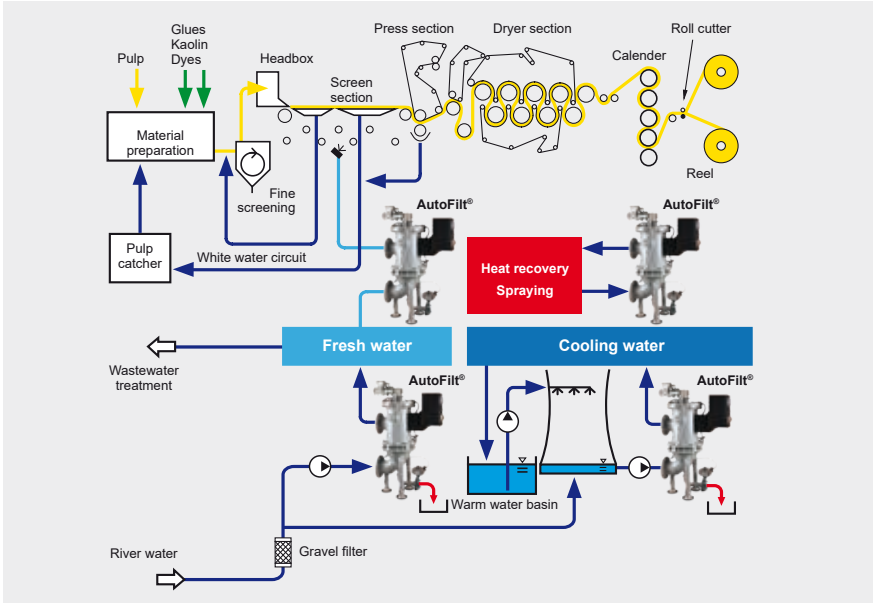


Hydropower plants

- Treatment of industrial water for generator cooling
- Sealing water filtration to extend the service life of the mechanical seals on the turbine shafts
- Water treatment for ball valve hydraulics

HYDAC solutions:

- AutoFilt® RF3 / RF4W / RF5 / RF7 / RFH
- AutoFilt® TwistFlow Strainer ATF
- Inline and screen basket filters
- Skid and system solutions

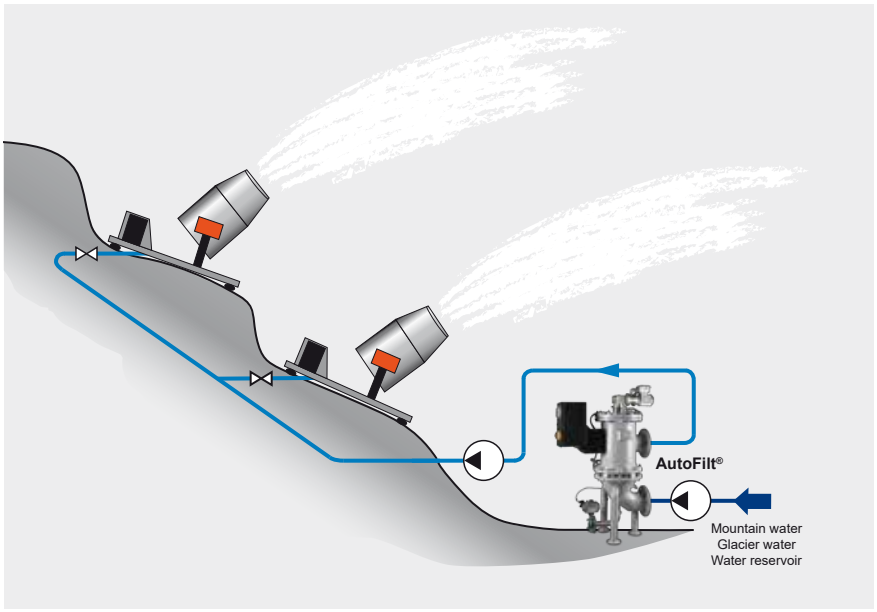


Paper manufacturing

- Fresh water treatment
- Cooling water treatment
- Sealing water treatment
- Hot water filtration
- Protective filter before felt spraying
- Waste water treatment
- Steam generation

HYDAC solutions:

- AutoFilt® RF3 / RF4 / RF4W / RF5 / RF7
- AutoFilt® TwistFlow Strainer ATF
- Inline and screen basket filters
- Skid and system solutions



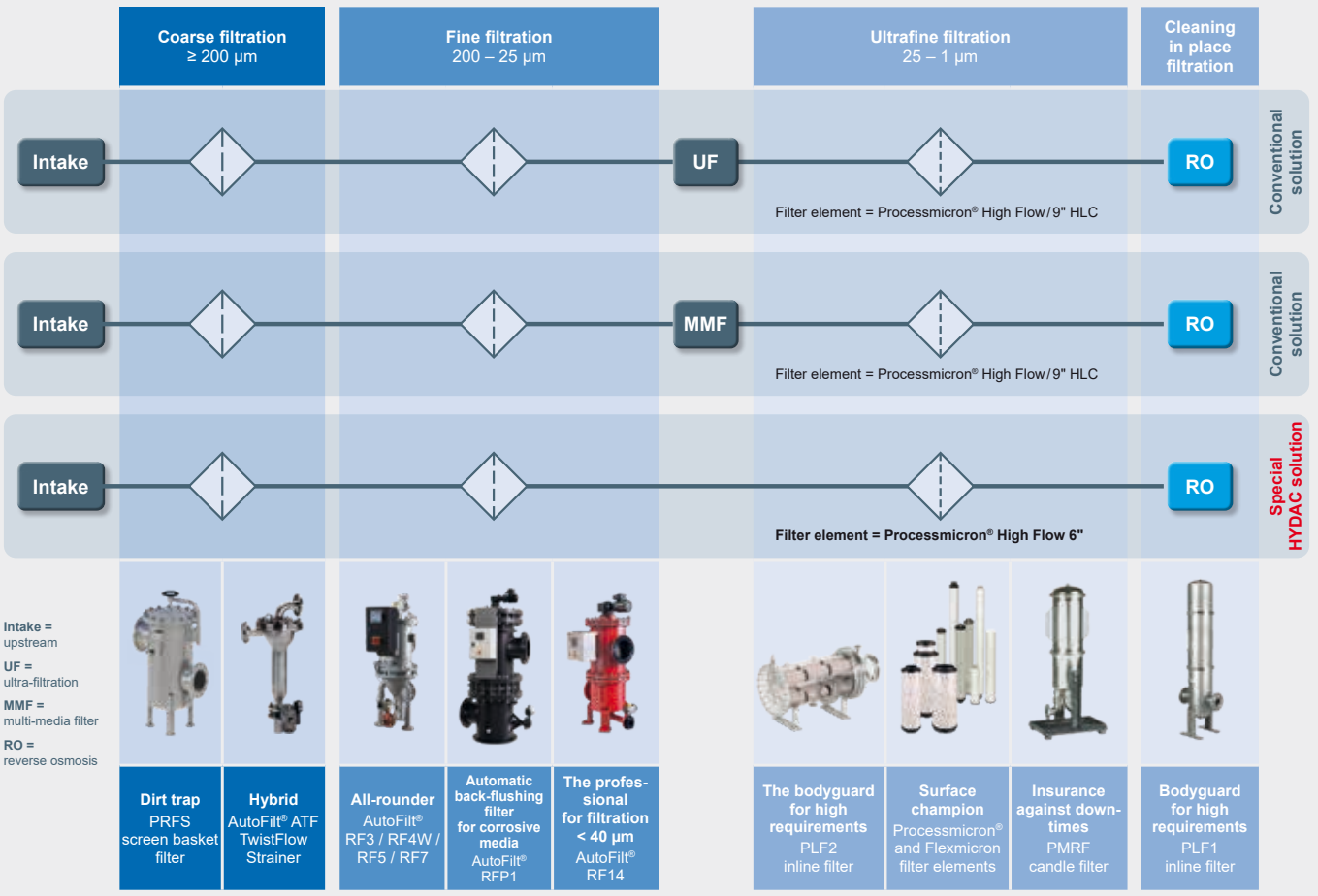
Artificial snow

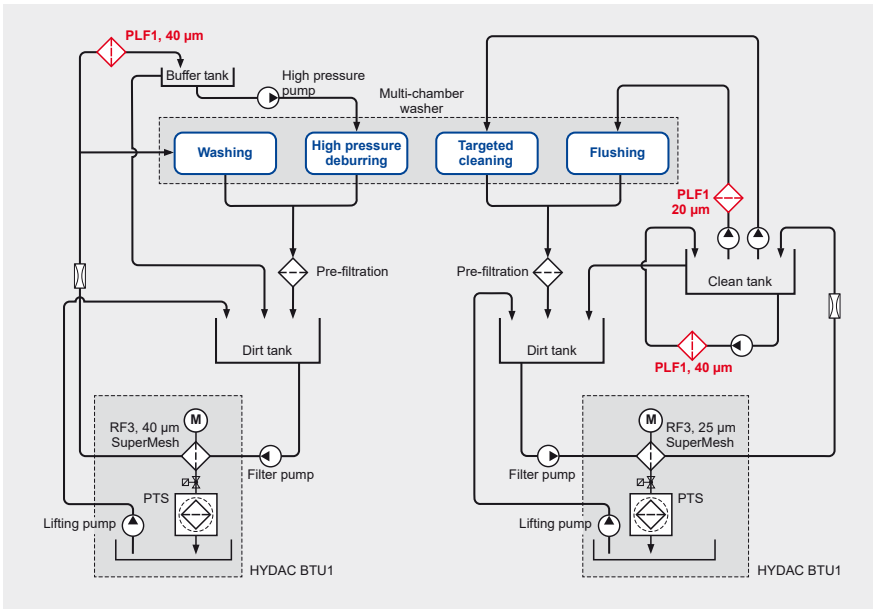
- Contamination in the water (sand, glacial sediment, etc.) causes damage to the snow cannon nozzles and reduces snow quality

HYDAC solutions:

- AutoFilt® RF3 / RF4 / RF4W / RF5 / RF7
- AutoFilt® TwistFlow Strainer ATF
- Inline and screen basket filters
- Skid and system solutions

Water filtration – applications and filtration ratings



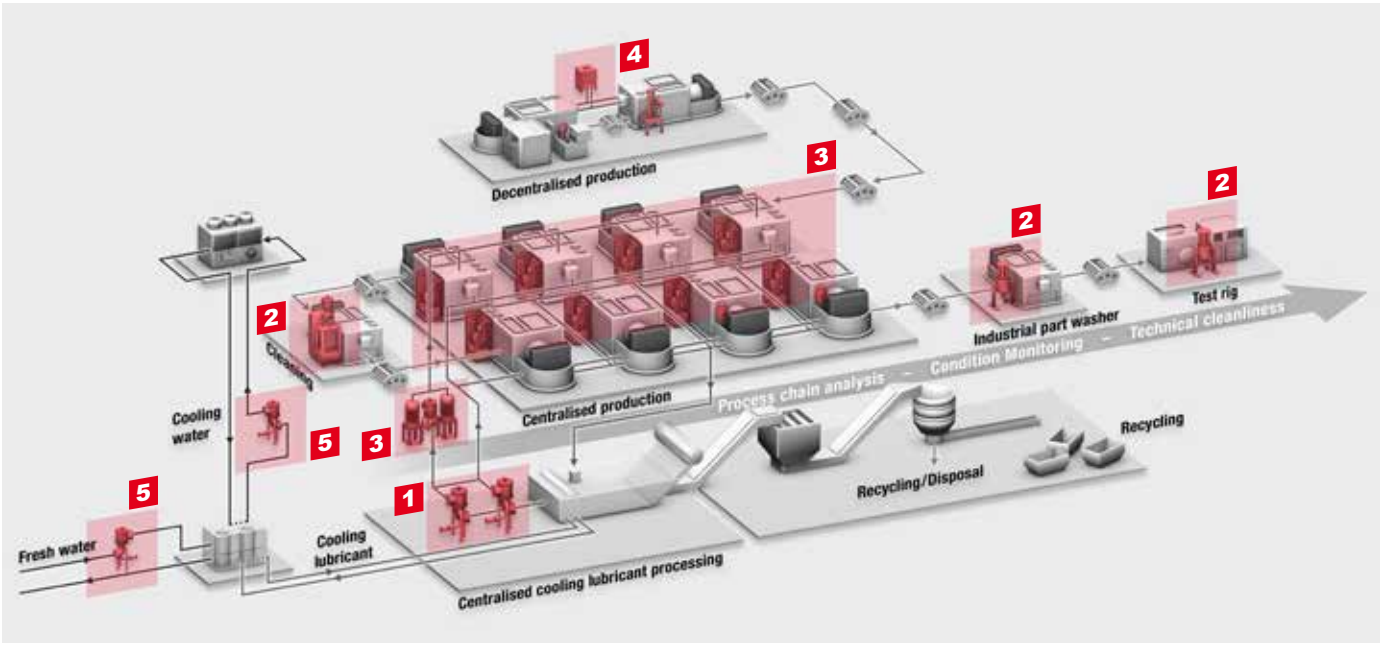


Industrial part washers

- Fresh water treatment
- Washing media treatment

HYDAC solutions:

- AutoFilt® RF3 / RF4 / RF4W / RF5 / RF7
- AutoFilt® TwistFlow Strainer ATF
- Process inline filter PLF1
- BTU Back-Flush Treatment Unit



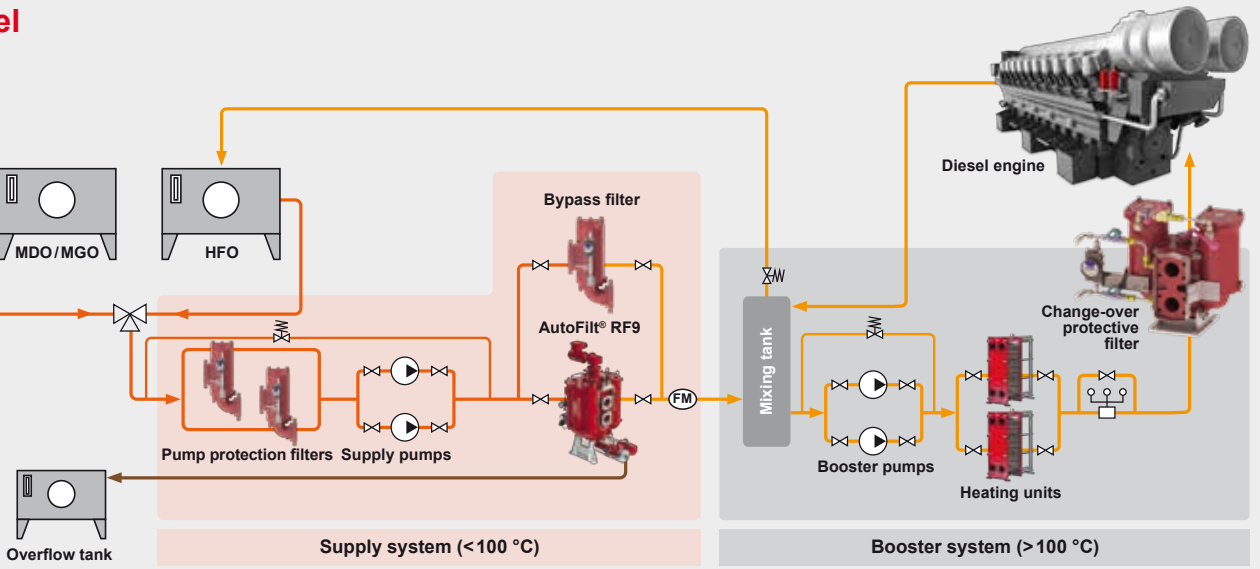
Automotive industry

1. Secondary filtration in centralised coolant systems
2. Filtration in industrial part washers and test rigs
3. Protective filtration in high pressure coolant circuits
4. Secondary filtration in decentralised coolant systems
5. Filtration of process and cooling water

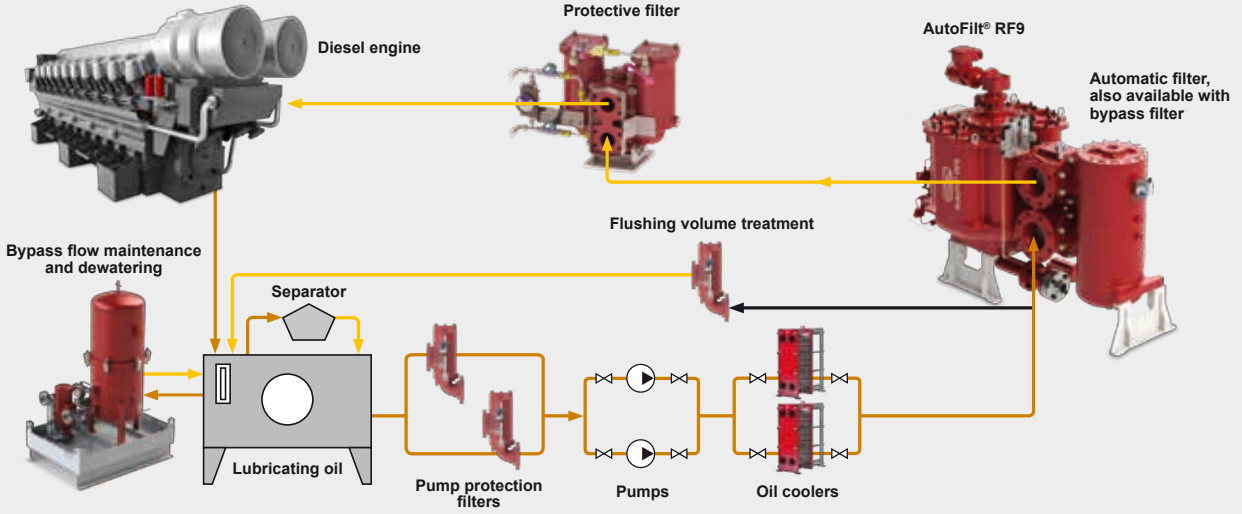
HYDAC solutions:

- AutoFilt® RF3 / RF4 / RF4W / RF7 / RF9 / RF12
- Process Booster Block PBB
- BTU Back-Flush Treatment Unit
- Process inline filter PLF1

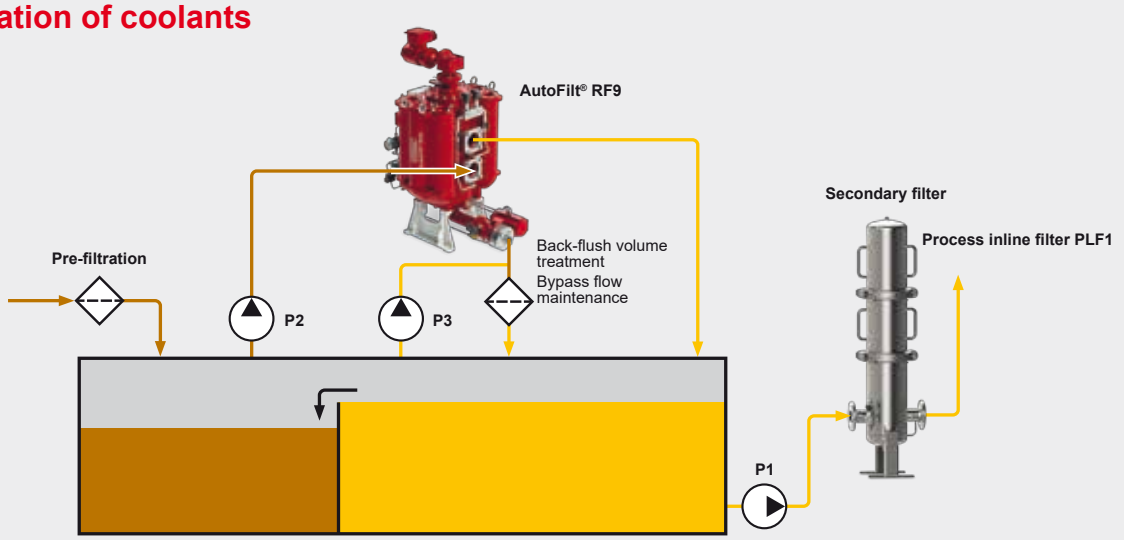
Fuel

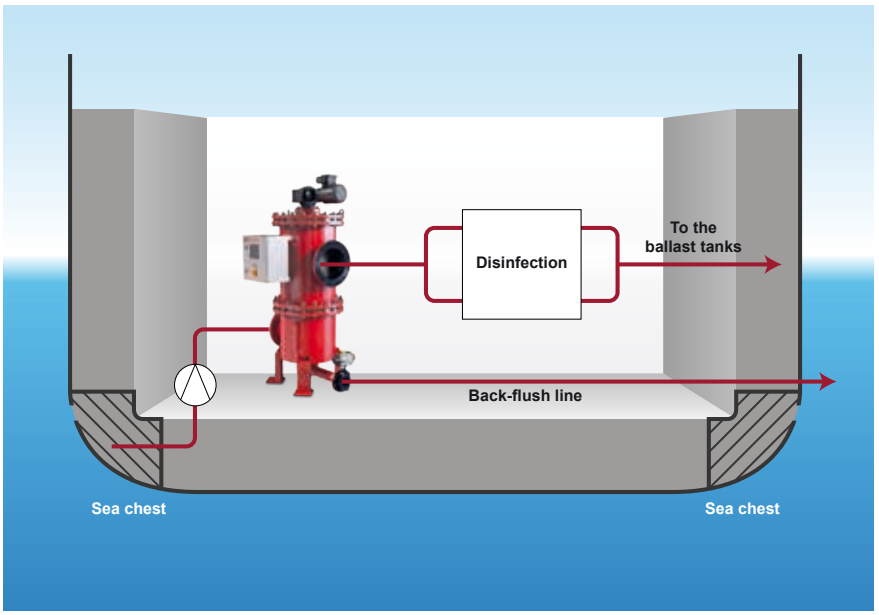


Lubricating oil



Fine filtration of coolants



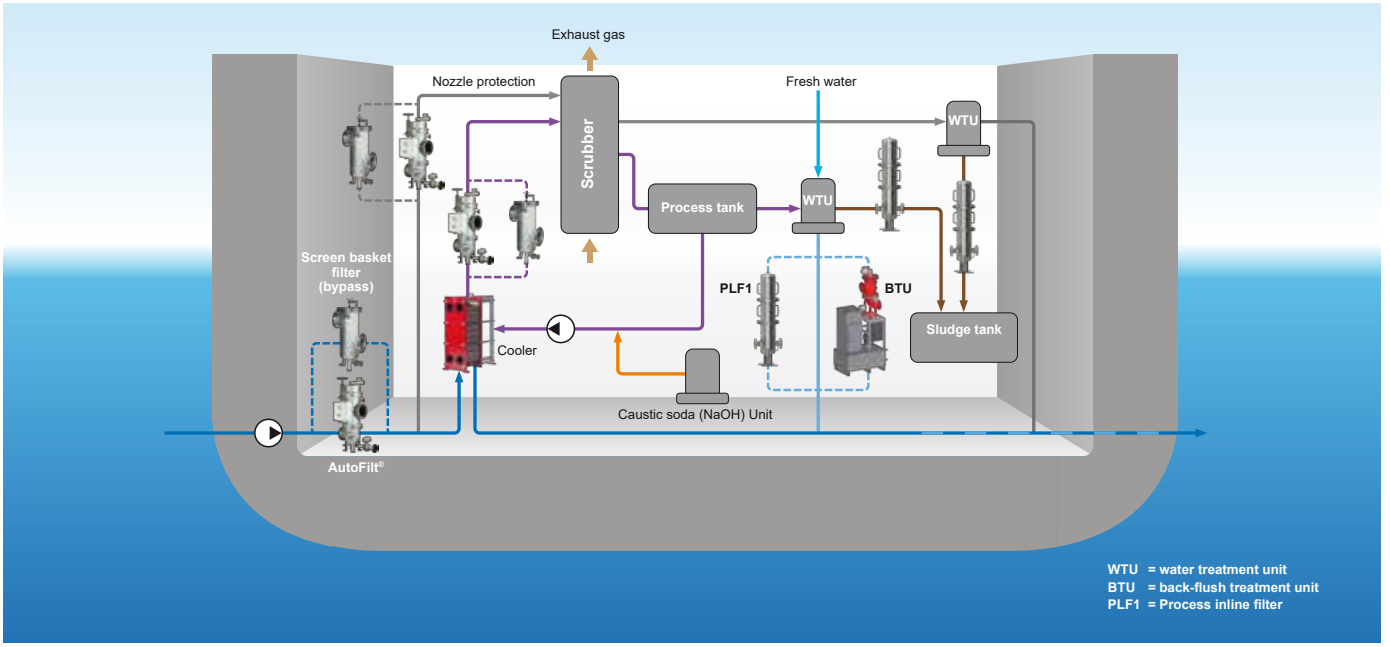


Ballast water

- Ballast water treatment
- Prefiltration

HYDAC solutions:

- AutoFilt® RF3 / RF7 / RF14



Exhaust Gas Treatment System ("EGTS" or "Scrubber")

- Nozzle protection
- Protection of the plate heat exchanger
- Washing water treatment for the closed circuit

HYDAC solutions:

- AutoFilt® RF3 / RF5 / RF7 / RF14
- Process inline filter PLF1
- PRFS
- BTU Back-Flush Treatment Unit
- Cooler

Process Filter Test-Cube

Filters, pre-tests, product training and service

Process Filter Test-Cube

- Insulated 40" high cube
- Process chamber with integrated frequency-controlled pump
- Separate electric operating area

Filter test stations

- 2x DN 250
- 1x DN 80

The site

The test site is located on the premises of Kraeft GmbH Systemtechnik in Bremerhaven, part of the HYDAC company group and an industry and service expert in maritime equipment, hydraulic steel structures, system engineering and much more.

With its favourable location at the Weser estuary, the site provides ideal test conditions with low tide influence.

Range of services

- Filter test benches
- Filter pre-tests for customers
- Customer-specific system optimisation
- Service training

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Local Expertise.
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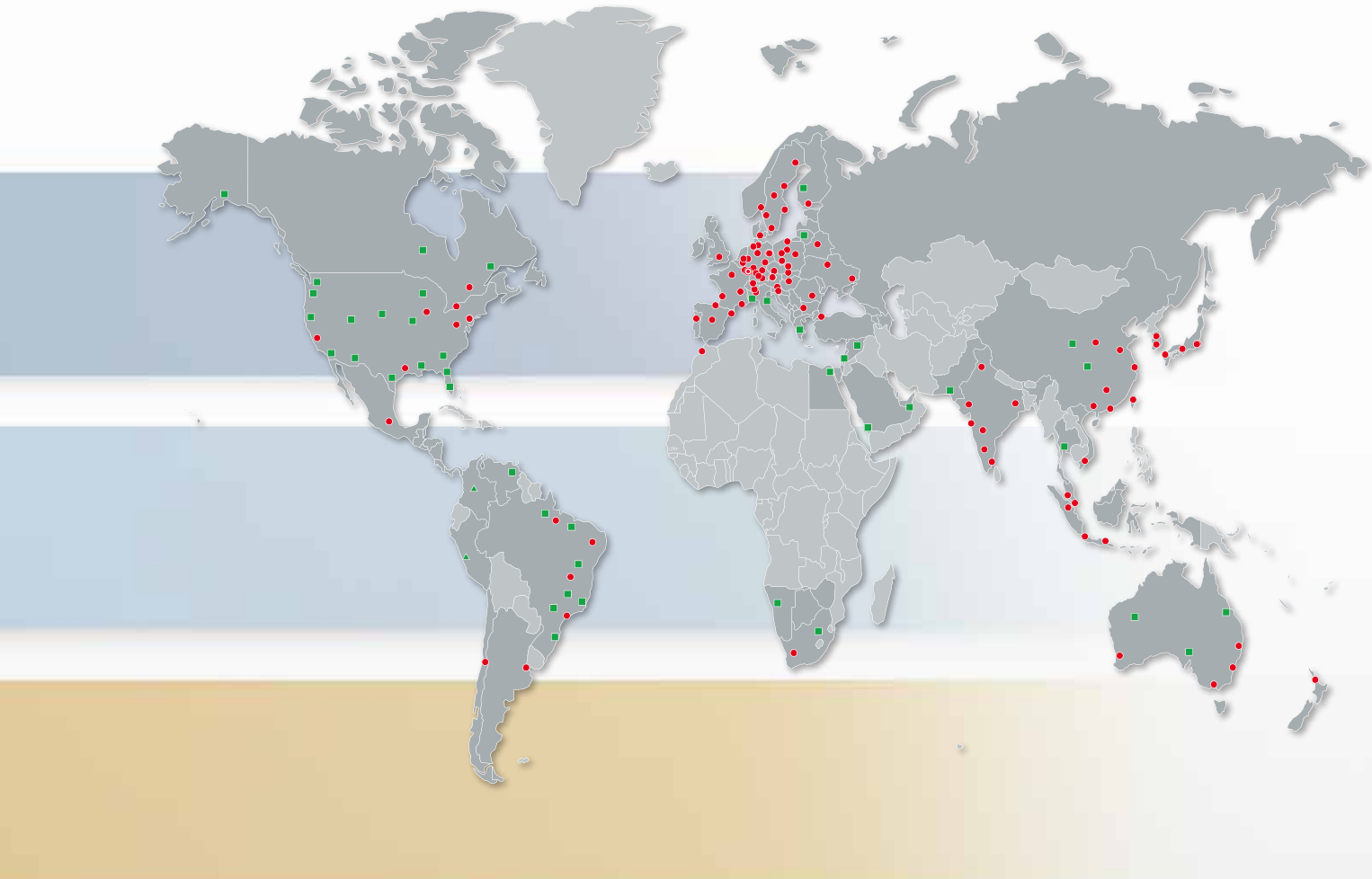

- HYDAC headquarters
- HYDAC companies
- HYDAC sales and service partners
- Free sales partners

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Note

The information in this brochure relates to the operating conditions and applications described.
For applications and/or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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