



KAF BERNOULLI FILTER
Self-cleaning automatic filter
ANSI 2" - 40"

PROTECTING OF HEAT EXCHANGERS AND PLANTS



Tube bundle heat exchanger without filter after 4 months



Same heat exchanger with 300 µm KAF-Filter. Inspection opening after 9 months



Functional principle

- Enables effective and reliable continuous automatic filtration
- Contact-free flushing function
- Uses the increase in flow velocity for flushing
- Functions in any piping configuration



24" GRP



DN 600 GRP

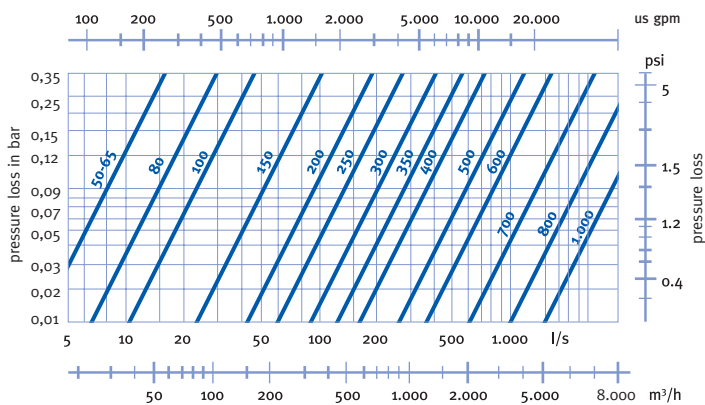


DN 200 GRP



15" carbon steel

Dimensioning chart



APPLICATIONS

Industrial processes

- Cooling water filtration
- Chemical industry
- Fertiliser industry
- Petrochemical
- Protection of cooling circuits against mussel larvae
- Plastics processing sector
- Automotive industry
- Food sector
- Cement manufacturing
- Steelworks
- Aluminium industry
- Mineral oil filtration
- Protection of reverse osmosis systems
- Demineralised water filtration
- Desalination plant protection

Power stations

- Biomass power stations
- Coal power stations
- Gas power stations
- Nuclear Power stations

Wastewater treatment plants

- Surface water filtration
- Industrial water filtration

Shipbuilding

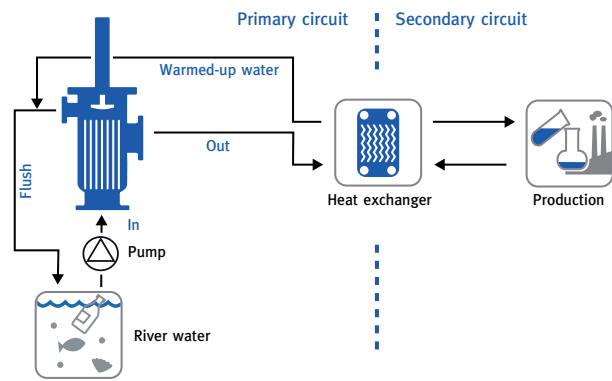
- Cooling circuits/water treatment
- Ballast water filtration
- LNG and LPG natural gas applications
- Marine
- Offshore
- FSRU
- REGAS

Benefits for the operator:

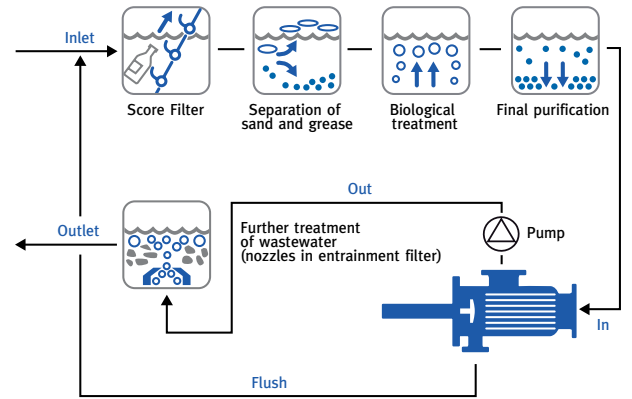
- Flow rates of up to 7,500 m³/h in a single unit
- Working pressure is possible from 0.3 bar to 25 bar
- Continuous operation
- Minimal differential pressure (Δp) during continuous operation (even below 0.1 bar)
- Short, adjustable flushing time and minimum pressure drop in the system during flushing
- Small variable flush rates
- Positive energy balance due to low differential pressure during filtration

APPLICATION EXAMPLES

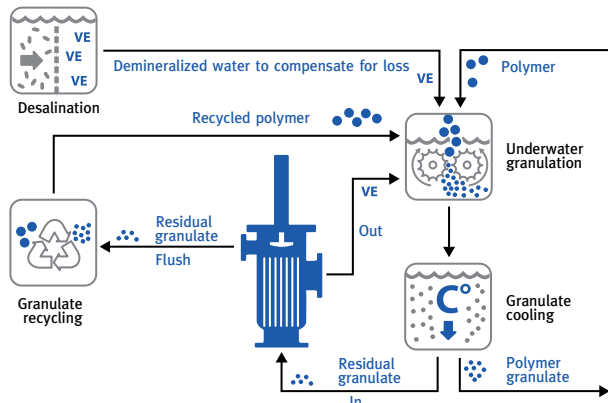
Chemical industry



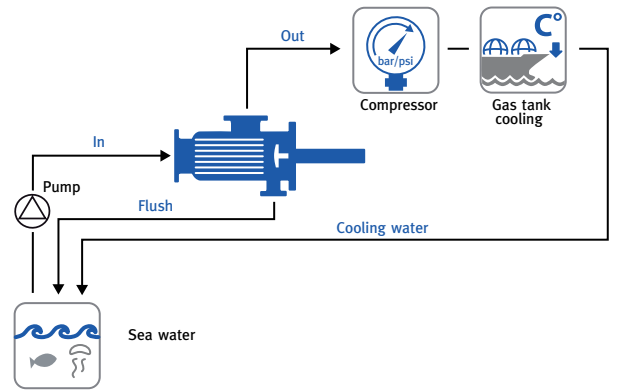
Wastewater treatment plants



Underwater pellet granulation



LNG tanker



DN 80 stainless steel



24" GRP



8" GRP



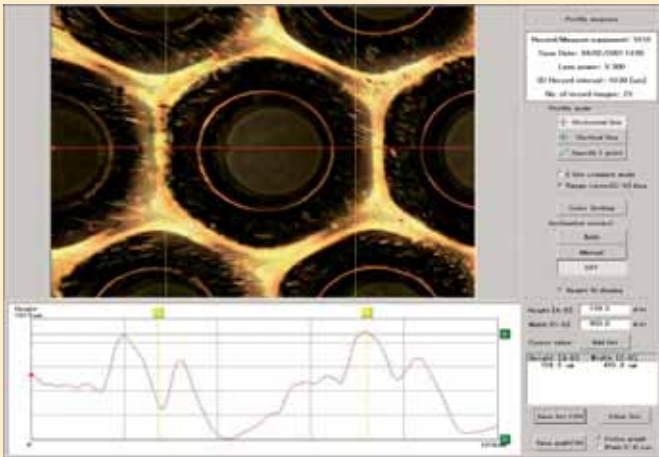
DN 350 carbon steel



DESIGN – RESEARCH – DEVELOPMENT

Research and development

Working with our customers we integrate our filter system in the customer's process and our engineers provide support in optimisation of the filter system in the customer's on-site process. State of the art CAD systems, finite element tools and flow simulations provide the basis for ongoing further development and optimisation.



Microscopic analyses of new filter screen media



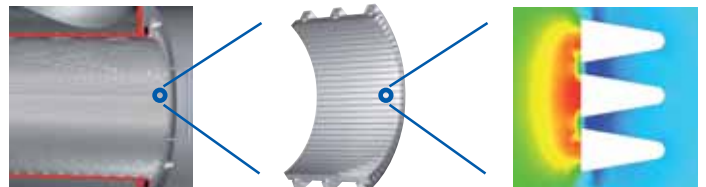
The build materials

The many different fields of application for the filter require a wide range of materials for the housings. The filter is manufactured in steel and rubber-lined steel, stainless steel 1.4571, bronze, GRP/FRP (glass-fibre reinforced plastic/polyester), PVDF or PE, as well as in other special materials. The use of high quality composite materials such as GRP enhances the advantages of the filter system in terms of its material strength, economy of weight, and good mechanical qualities. In particular, this material is outstandingly suited to salt water systems or cooling water systems with chemical additives.

Test filter concept and filtration side effects

We are always able to provide customers with a test filter equipment service for verification of the level of optimisation in the customer's own system; this is best carried out using empirical tests over a longer period.

High turbulence levels in the filter profile gaps lead to high shear and stress rates, which in turn result in a high so-called dissipation rate (mortality) of larvae and other life forms. This gives very good results in protecting cooling circuits from mussels, for example.



QUALITY ASSURANCE, MATERIALS, CERTIFICATIONS AND DOCUMENTATION



Certification

GL, LR, DNV, ABS
ASME VIII DIV 1, ASME BPVC X
or PED 97/23/EC, GOST, RTN



Germanischer Lloyd



Materials

Composite materials

- GRP / FRP (vinylester based fibre reinforced plastic)

Steel

- 1.4571 / SS 316 Ti
- Carbon steel (rubber-lined)

Medium wetted parts

- 1.4571 (316 Ti)
- 1.4404
- 1.4410 (super duplex)
- Titanium
- Hastelloy
- Monel



THE BERNOULLI-PRINCIPLE IN FILTRATION

Putting a 250 year-old physical principle into practice

A disc moved by a piston generates high local increase in flow velocity between the flushing disc as it moves into the screen and the filter insert. The resulting drop in pressure gives contract-free cleaning of the screen and the particles escape via the flushing valve, which, when opened, creates a pressure difference with the working pressure, thus discharging the particles.

With its outstanding flow mechanics based design, the filter only generates a very low pressure drop in the system. The result is a considerable saving in energy in comparison to conventional so-called backflush filters. The quantities of flushing water are so small that systems can generally be operated without any additional investment in plant modifications. The filter comes supplied with an electronic multi-function unit, with monitoring of all functions and the facility for parameter adjustment and optimisation.

Equally, there is no problem in integrating and controlling the system using the customer's own control devices (DCS) and monitoring systems.

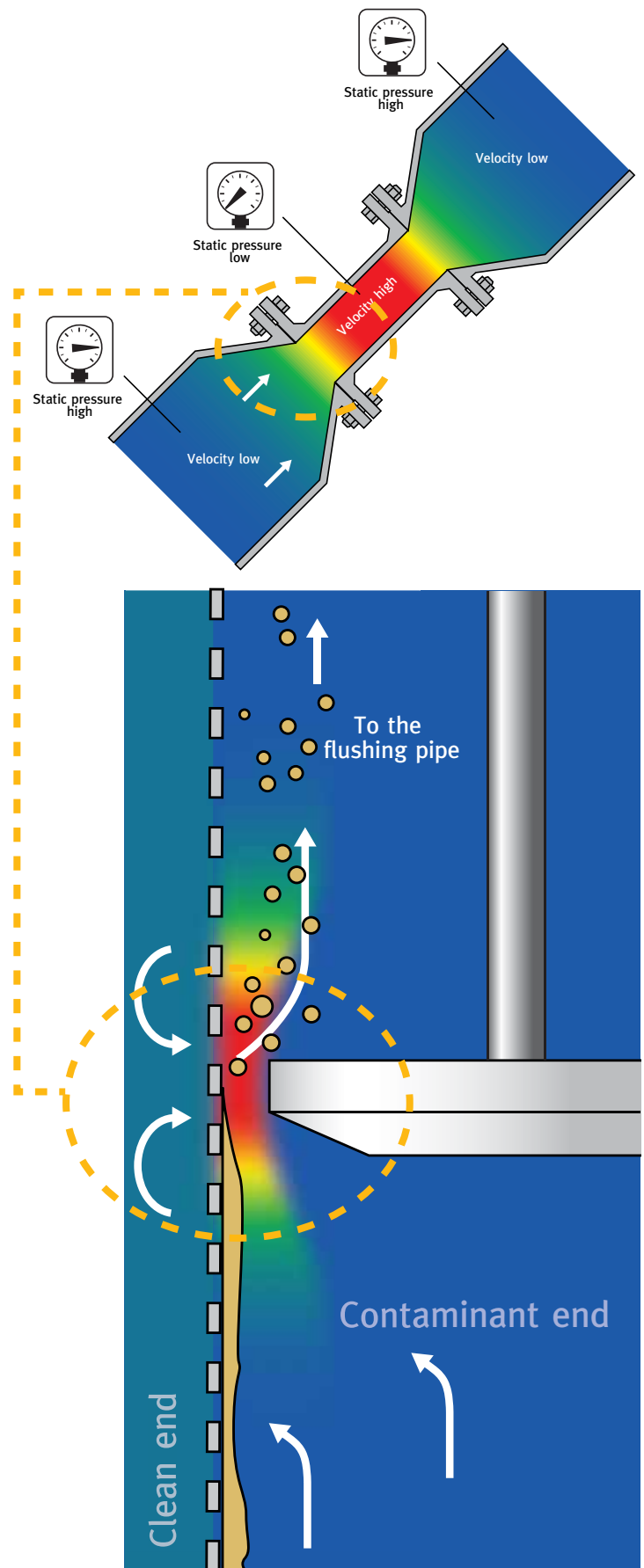
$$\frac{1}{2} \rho v^2 + p + \rho gh = \text{const.}$$

Daniel Bernoulli



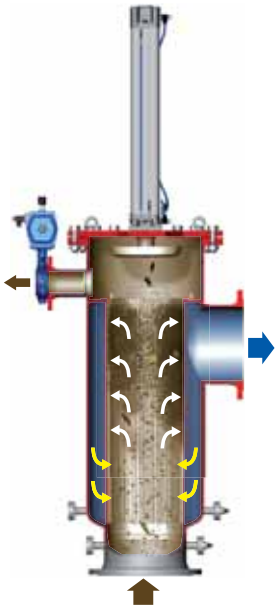
(1700 - 1782)

It was in the 18th century that the Swiss scientist discovered the fundamental principles of hydrodynamics. He studied the flow of fluids and formulated, among other things, the principle that the pressure exerted by a fluid is inversely proportional to the velocity of its flow, and that the sum of velocity and pressure is constant in fluids under flow.



KAF BERNOULLI FILTRATION AND FLUSHING PHASES

DN 40 - DN 1000

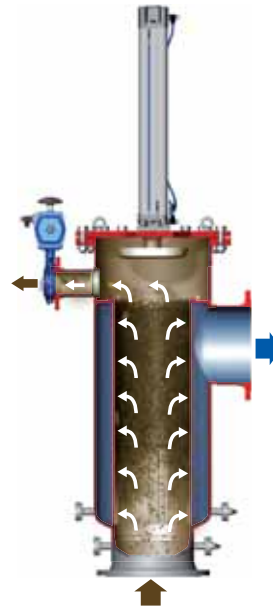


Filtration

The filter is in the normal filtration phase. Given the laws of flow mechanics, the particles are progressively deposited in the screen in a top to bottom direction.

As a result of the design and resulting flow mechanics environment, in this phase no particles are deposited in the filter inlet area.

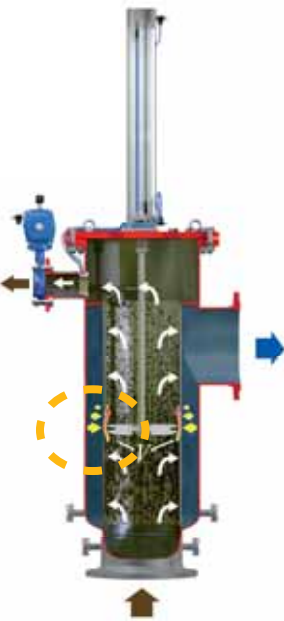
- Very low differential pressure during filtration
- Screen with high capability for particles retention



Filtration and continuous flushing initiation

During the flushing phase, the flushing valve opens, generating a difference in pressure with regard to the system pressure prevailing in the pipe system. As a result of this difference in pressure, coarser and easily flushed particles are discharged from the filter insert. Filtration is continued without a break during this process, and the flow rate is defined and limited by a orifice located in the flushing outlet. Flushing is triggered by differential pressure monitoring and/or time interval control.

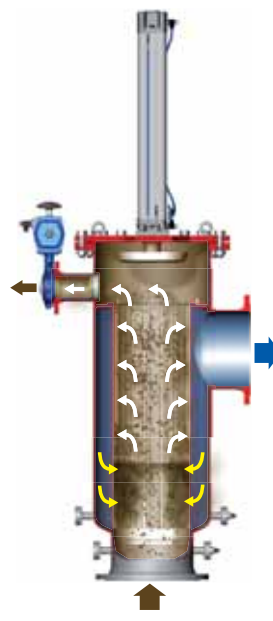
- Fully automatic cleaning begins



Filtration and flushing

The flushing valve is opened. The pneumatically actuated piston with its flushing disc moves into the screen (this might take, for example, 5 seconds). The high local increase in velocity in the gap between the flushing disc and filter insert generates a static pressure drop (Bernoulli effect) at the clean/filtrate end of the screen. It is only to a limited extent around the flushing disc that the external pressure at the clean end of the filter exceeds the pressure in the area between the flushing disc and the screen. Together with the considerable increase in flow velocity, this results in the filter element being "vacuumed". The contaminant is discharged from the filter through the opened flushing valve tap and the pressure difference this generates.

- Low variable flow rate



Filtration and final flushing phase

While the flushing disc is moving to its initial position, the flushing valve remains open. This allows the remaining particles to leave the filter unit. Equally, due to the self-cleaning effect, during the upward movement of the flushing disc, the lower area of the filter insert is automatically flushed clean by the continual reoccurrence of the Bernoulli flow conditions.

For continuation of the process, see:
Filtration

ABOUT OURSELVES

KRONE Filter GmbH – Experts in filter technology.

For two decades KRONE Filtertechnik has been a byword in the manufacture and distribution of process filters and filter systems – from manual filters to fully automatic backflush filter systems.

Our highly trained sales and service teams can provide a consultancy service, optimisation, supply, fitting and maintenance to expert levels.



Krone has agents in

- Australia
- Chile
- Germany
- Great Britain
- Iran
- Korea
- Netherlands
- Norway
- Austria
- Russia
- Switzerland
- Slovenia
- Spain
- Taiwan
- Turkey
- The United Arab Emirates

Quality Assurance

We maintain a quality assurance system to DIN ISO 9001 : 2000



Our product range

- Basket filters from ductile cast iron
- Welded special-purpose designs
- Automatic filters
- Bag filters
- Duplex filters
- Backflush filters
- MANN+HUMMEL industrial filters
- Soot filters/catalysers

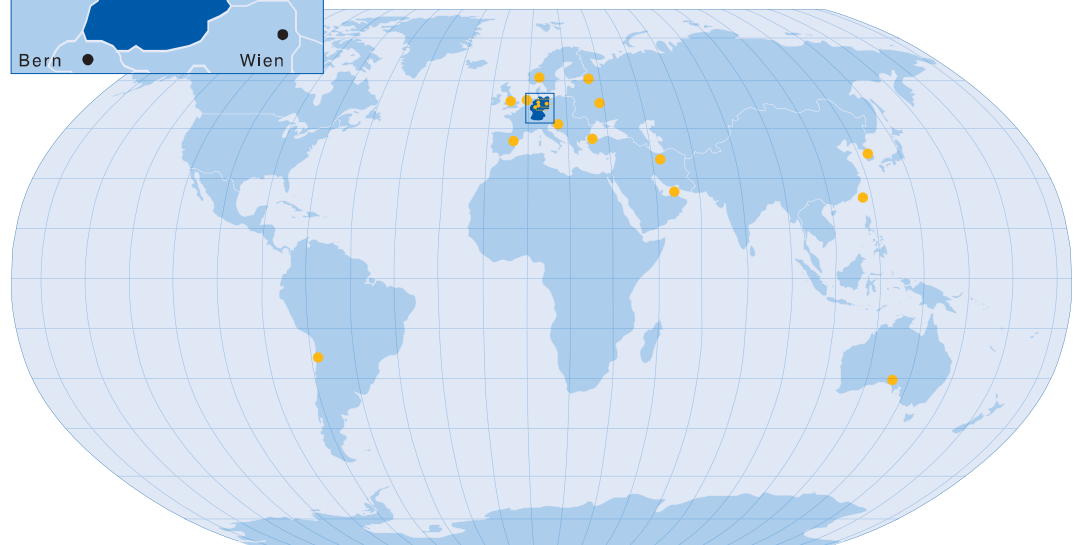


Our customers

Companies from almost every sector.

Place your trust in one of the leading companies in the field of filter technology – you are welcome to put our various qualities to the test.

If commitment to service, quality, short lead times and on-site attendance are important for you, then in us you have found the perfect partner.



Krone Filter
SOLUTIONS IN FILTRATION

KRONE FILTER GMBH
Herbert-Ludwig-Str. 12-14
28832 Achim
Germany

Tel +49 (0)4202 97 69 23
Fax +49 (0)4202 97 69 27
info@krone-filter.com
www.krone-filter.com