



ALF – Alfa Laval Filter

A filter for cooling systems using low-quality water



The use of inexpensive secondary cooling water has become a widely accepted and successful solution to cooling problems within industry, on ships, in power plants and in district heating and cooling systems. However, as the supply of good quality cooling water has diminished, the need for cost-efficient solutions to eliminate clogging, fouling and corrosion has become more apparent. In a cooling system incorporating a plate heat exchanger and an Alfa Laval Filter, polluted or corrosive water can now cool even the most sensitive process equipment.

The Alfa Laval Filter operates as an integral part of a cooling system to remove debris which can foul and clog a plate heat exchanger or a tubular condenser. The Alfa Laval Filter is also well suited for use with many process liquids for which filtration is required. In spite of effective screening at the water intake, mussels and other forms of marine life can get into the heat exchanger and settle on the heat transfer surface. Such conditions are ideal for the growth of these forms of life and they multiply rapidly, causing reduced heat transfer and even breakdown of the heat exchangers.

Measures such as backflushing and chlorination are not always sufficient if the blockage is severe, and in some cases, chlorination is prohibited by environmental legislation. The Alfa Laval Filter protects the heat exchanger from clogging and fouling and also prevents blockages in the cooling water system. This filter, which is generally installed close to the heat exchanger inlet, removes debris and marine life and is automatically backflushed at regular intervals.

Operation and design

ALF is a pressure filter with an automatic flushing arrangement. It has a filter casing made of stainless steel (ALF-S), fibreglass reinforced polyester (ALF-P) or rubber lined carbon steel (ALF-R). The internal cylindrical filter basket is made of stainless steel. Optional filter basket material qualities and mesh sizes can be selected.

The filter is available for connections ranging from 100 mm / 4" to 600 mm / 24" and is designed for placement directly in the pipe system. This enables installation of the filter in almost any position.

ALF has the inlet directly in line and the outlet at a 90° angle; it is therefore suitable for installation on any 90° angle bend in proximity to the equipment to be protected. This permits access to the filter basket without removing the connections.

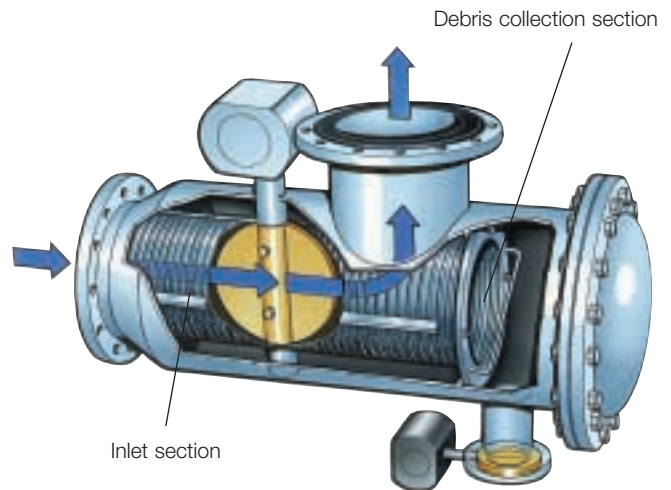
Automatic flushing is carried out at regular intervals without interrupting the filtering process. The completely automatic flushing arrangement contains a flushing valve and a flow diverter which are regulated by a PLC in the control panel which can be mounted adjacent to the filter.

The liquid enters the filter basket which is divided into two sections by the flow diverter: the inlet section and the debris collection section. A flushing valve for draining the debris is located at the outlet of the debris collection section.

Normal operation

During normal operation the liquid enters the filter basket in which the flow diverter is open and the flushing valve closed. The liquid passes through the inlet section where it is forced through the filter basket before passing through the outlet. The liquid velocity is sufficient to dislodge and remove any matter embedded in the inlet section of the basket.

NORMAL OPERATION



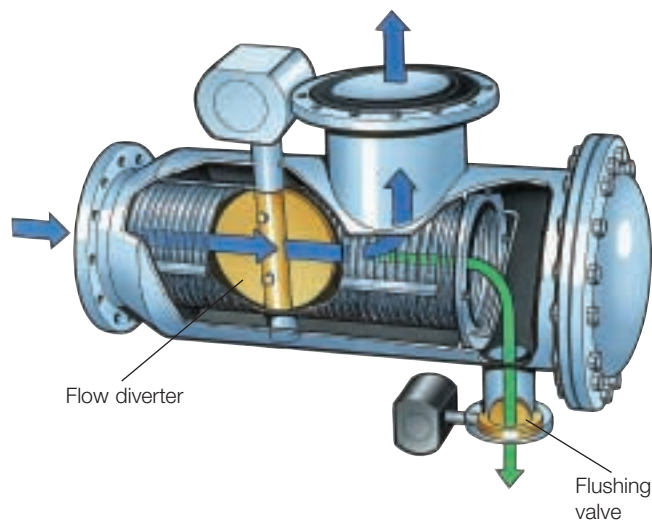
Regeneration

ALF can be cleaned either automatically at predetermined intervals, or manually by pushing a button on the control panel.

1. Primary flushing

The flushing valve opens the flushing outlet thereby increasing the total flow through the filter. This loosens debris sticking to the pipe walls and to the filter basket. The debris is flushed out to the drain through the flushing valve.

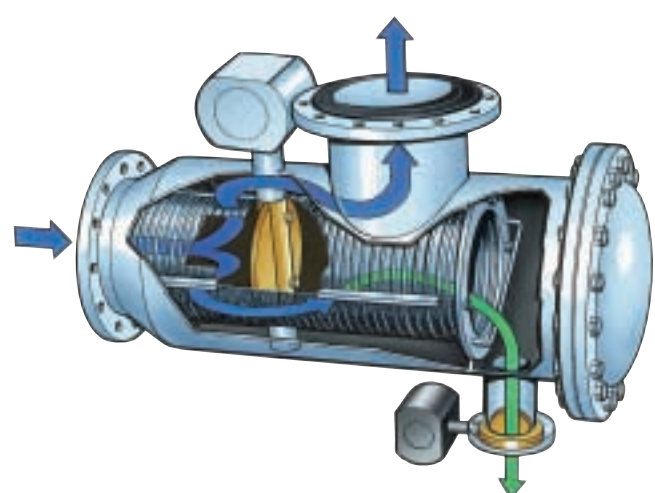
REGENERATION – primary flushing



2. Secondary flushing (backflushing)

The flow diverter closes while the flushing valve remains open. The flow is then diverted and forced to pass through the filter basket in the inlet section. The majority of the liquid leaves the filter through the main outlet but the pressure in the filter draws part of the flow from the exterior to the interior of the debris collection section. This provides a backflushing effect on this section of the filter. Dislodged remnants are discharged through the flushing valve.

REGENERATION – secondary flushing (backflushing)



Installation

All of the ALF models are suitable for protecting heat exchangers from clogging. In this case, no valve is required between the filter and the heat exchanger and the flushing outlet can be connected to the heat exchanger outlet.

The ALF can also be used with one filter serving a battery of heat exchangers. This manner of operation requires the filter to be placed in close proximity to the heat exchangers with no dead ends or low velocity sections. This installation arrangement is generally combined with a bypass around the filter.

Advantages

ALF solves most fouling problems in natural water sources. The pressure filter combines high capacity with low pressure drop. In addition, ALF:

- does not disturb operation and offers full flowrate while preventing surface fouling caused by diminished flow velocity.
- is mounted directly in the pipe system
- has few moving parts



Fig. 1 IP65 / NEMA4 standard control panel with PLC for one filter. Optional higher protection classes (IP66/NEMA 4x) or explosion proof versions available.

Technical Data

Sizes (inlet/outlet)	DN 100, 150, 200, 300, 400, 500, 600	(4", 6", 8", 12", 16", 20", 24")
Connections	DIN2501/PN10	Standard
	ANSI B16.5/Class150	Standard
	JIS B2238/K10	Standard
Operation	Pneumatic or electric	Actuator controlled valves
Mesh size	Ø of holes	1.0-1.5-2.0-2.5 mm
	Wedge wire design (slot size)	0.1-0.3-0.5-1.0 mm
Materials	Filter body (ALF-P)	GRP/FRP, (Fibre) Glass Reinforced Polyester
	Filter body (ALF-R)	Rubber-lined carbon steel (P 265 GH/ASTM A516 Gr60)
	Filter body (ALF-S)	Stainless steel EN 1.4436 / ASTM 316
	Internal parts	Stainless steel, EN 1.4436 / ASTM 316
	Internal parts	Super stainless steel, EN 1.4547 / ASTM S31254 (SMO)
	Internal parts	Titanium, EN 3.7025 / ASTM B265 Gr1
Design pressure	10 bar (g) / 150 psi	Standard
Design Temp.	65° C/149° F (ALF-R/ALF-S), 50° C/122° F (ALF-P)	Standard
Control panel	PLC (Siemens)	Power supply: 1~ 230/110 V, 50-60 Hz



Fig 2. Five Alfa Laval Filters in parallel serve as main inlet cooling water filters for an ammonia plant on the Mediterranean Sea.

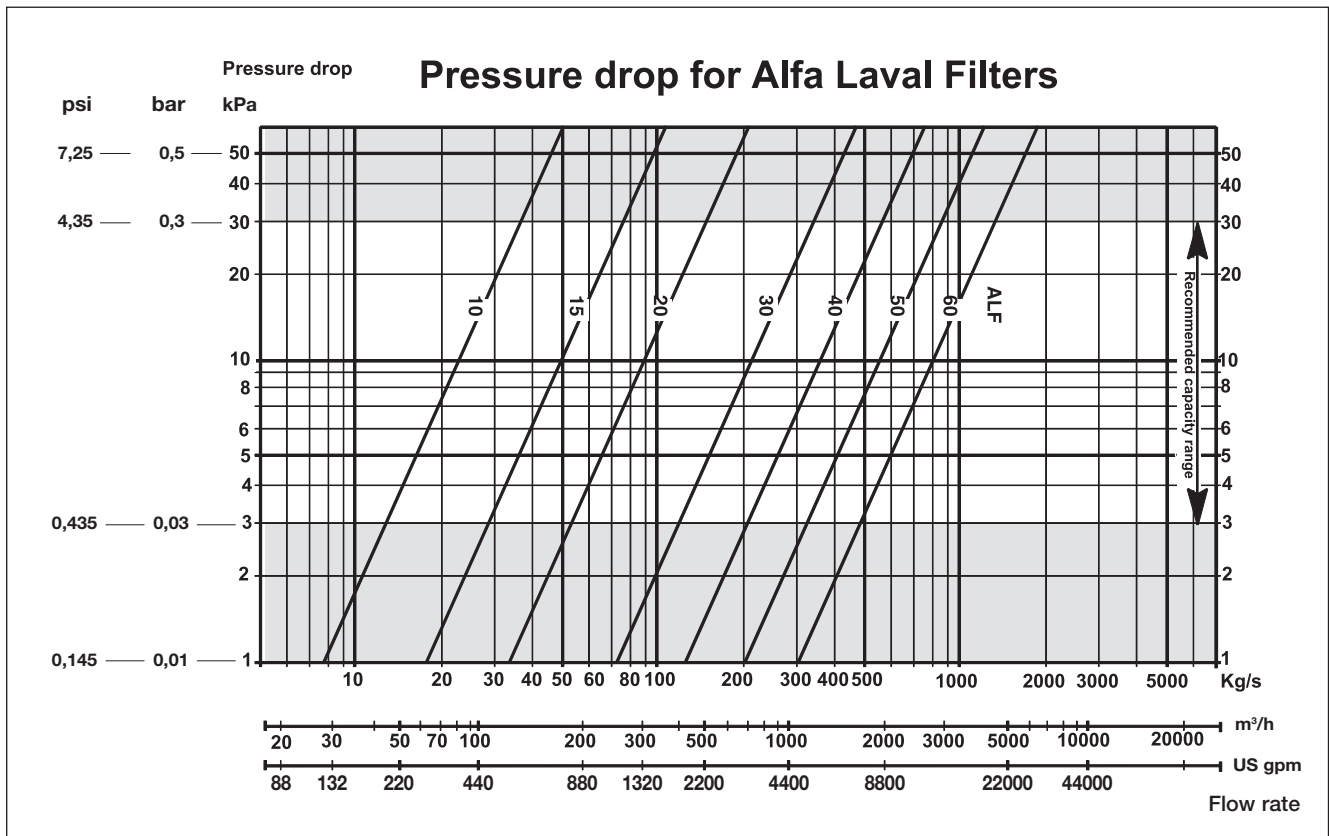


Fig. 3 Recommended pressure drop and capacity range



Fig. 4 ALF20-S with electrical actuators and optional pressure transducers for differential pressure based control of flushing sequence

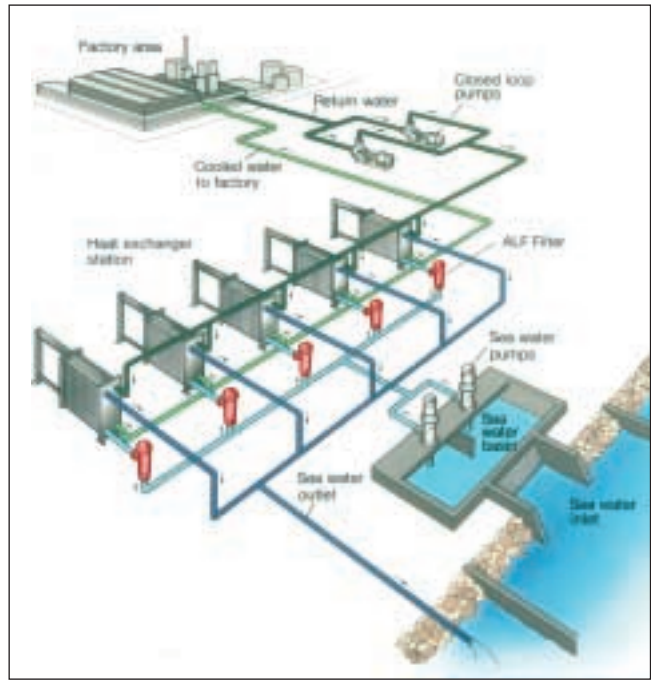


Fig. 5 Alfa Laval Filters in closed loop cooling system protecting plate heat exchangers

How to contact Alfa Laval
 Contact details for all countries are continually updated on our website. Please visit www.alfalaval.com to access the information direct.