



ALF - Alfa Laval Filter

Filtration for cooling systems using low-quality water



The use of inexpensive secondary cooling water from locations such as the sea, lakes or rivers has become a successful cooling solution that is now widely accepted in industry. Secondary cooling is in widespread use on ships, in power plants and in district heating and cooling systems.

However, such installations require large quantities of clean cooling water. With the supply of high-quality cooling water diminishing, the need for cost-effective solutions to eliminate clogging, fouling and corrosion has become increasingly more apparent. In a cooling system incorporating a heat exchanger and an Alfa Laval Filter, even polluted or corrosive water can be used to cool the most sensitive process equipment.

The Alfa Laval Filter (ALF) operates as an integral part of a cooling system, to remove debris that can foul and clog plate heat exchangers, tubular condensers, cooling tower spray nozzles or any similar equipment. In spite of effective screening at the water intake, mussels, seaweed and other forms of marine life can settle on the heat transfer surfaces. Conditions are ideal for the growth of these forms of life and, as a result, they multiply rapidly. This then causes less effective heat transfer and even the complete breakdown of heat exchangers or other equipment.

If these kinds of blockages are severe, measures such as pesticides or chlorination are often no longer sufficient. In some cases, these simply cannot be used because they are prohibited by environmental legislation.

This is where Alfa Laval Filter technology comes in. It protects a wide range of sensitive equipment from clogging and fouling, and also prevents blockages in the cooling water system. An Alfa Laval Filter removes debris and marine life, and is automatically backflushed at regular intervals to keep it clean.

Standard control panel with PLC for one filter. Alternative configurations are available for controlling multiple filters. Options for remote control or high protection classes, such as ATEX, are also available.



Operation and design

The Alfa Laval Filter is a pressure filter with an automatic flushing arrangement. The design features a pressure vessel casing made of stainless steel (ALF-S), fibreglass reinforced polyester (ALF-P) or rubber-lined carbon steel (ALF-R). The internal cylindrical filter basket, along with other wetted parts, is usually made of stainless steel, super stainless steel (SMO) or titanium.

The filter system is available with connections ranging from 100 mm/4" to 800 mm/32" and is designed for placing directly in the pipe system. Because the automatic regeneration process is run by the inlet pressure, and the nozzles can be mounted in almost any way required, the Alfa Laval Filter can be mounted in almost any position.

The inlet is placed at one end and the main outlet at a 90° angle, making it suitable for installation on any 90° pipe bend close to the equipment to be protected. The inspection/service opening is placed on the opposite side of the inlet, thus providing easy service access with no need to remove the pipe connection.

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

The filter itself is divided into two sections by the flow diverter valve, the inlet section and the outlet section. A flushing valve for discharging the debris is located at the end of the outlet section.

Regeneration

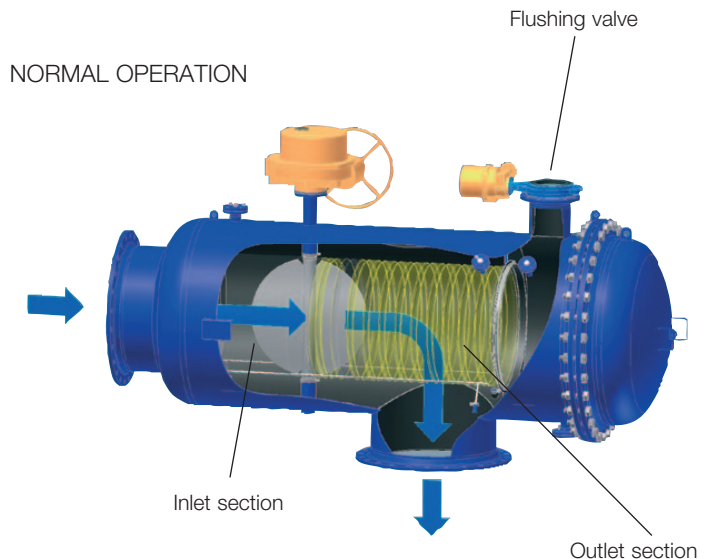
ALF units can be cleaned either automatically, using a timer, at predetermined intervals, or manually by pushing a button on the control panel. An optional differential pressure control system is available as a back-up and for monitoring the filter status.

1. Primary flushing

The flushing valve opens, thereby reducing the pressure drop and increasing velocity and total flow through the filter. Any debris sticking to the filter basket is dislodged and flushed out through the flushing valve. The liquid velocity is sufficient to remove any debris embedded in the inlet section of the basket.

Normal operation

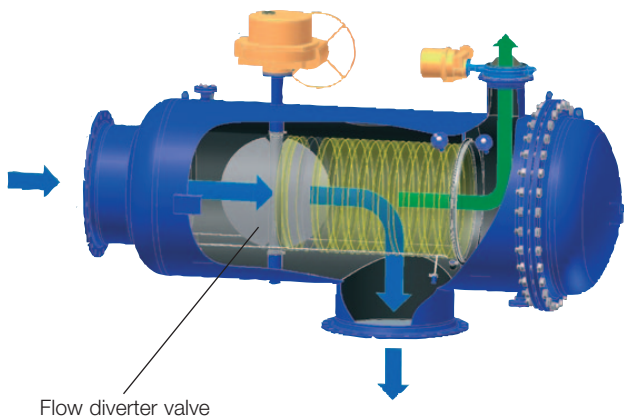
During normal operation, liquid passes through the inlet into the filter basket, in which the flow diverter valve is open and the flushing valve closed. The liquid passes through the filter basket prior to being discharged at the main outlet.



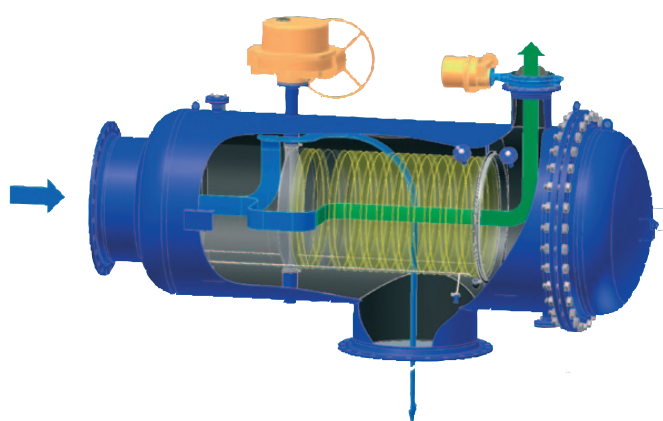
2. Secondary flushing (backflushing)

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

REGENERATION – primary flushing



REGENERATION – secondary flushing (backflushing)



Installation

ALF units can be installed upstream of heat exchangers with shut-off valves placed upstream of the filter and downstream of the heat exchanger. This enables flexible servicing if many units are installed in parallel— for instance in a duty/standby installation or when installed on a bypass pipe, allowing the filter to be taken out of service separately.

Depending on pipe dimensions, flow rate and the permissible pressure drop, one ALF filter can be installed to protect several heat exchangers. The filter(s) should preferably be

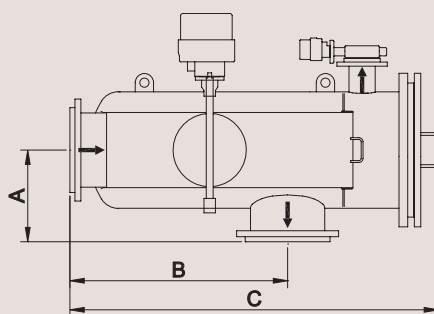
mounted close to the heat exchanger(s) in order to minimize the risk of biological growth in the pipe system connecting the components.

Due to the flexible nozzle orientation, ALF filters can be installed in almost any position, horizontally as well as vertically. Alfa Laval recommends connecting the flushing outlet to the heat exchanger outlet when possible, and returning the debris to the natural water source. It is important that the filter is installed downstream of the feed pump(s), operating as a pressure filter.

Dimensions



ALF-R with filter casing made of rubber lined carbon steel

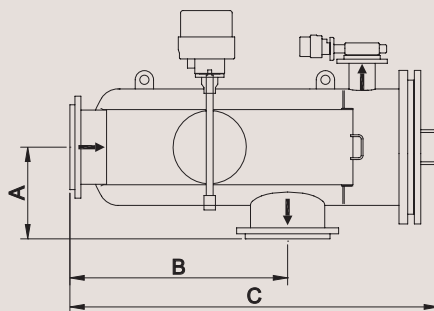


ALF-R

	A	B	C
ALF 20R	325	720	1230
ALF 30R	425	950	1610
ALF 40R	496	1150	1961
ALF 50R	600	1400	2380
ALF 60R	700	1650	2605
ALF 80R	905	2080	3720



ALF-S with filter casing made of stainless steel

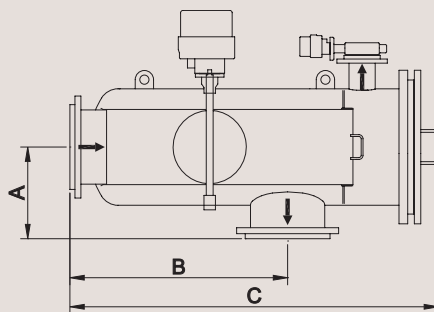


ALF-S

	A	B	C
ALF 10S	175	450	740
ALF 15S	250	595	975
ALF 20S	300	720	1180
ALF 30S	400	950	1610



ALF-P with filter casing made of fibreglass reinforced polyester



ALF-P

	A	B	C
ALF 10P	250	530	890
ALF 15P	300	685	1150
ALF 20P	350	840	1400
ALF 30P	520	1130	1820
ALF 40P	570	1150	2110

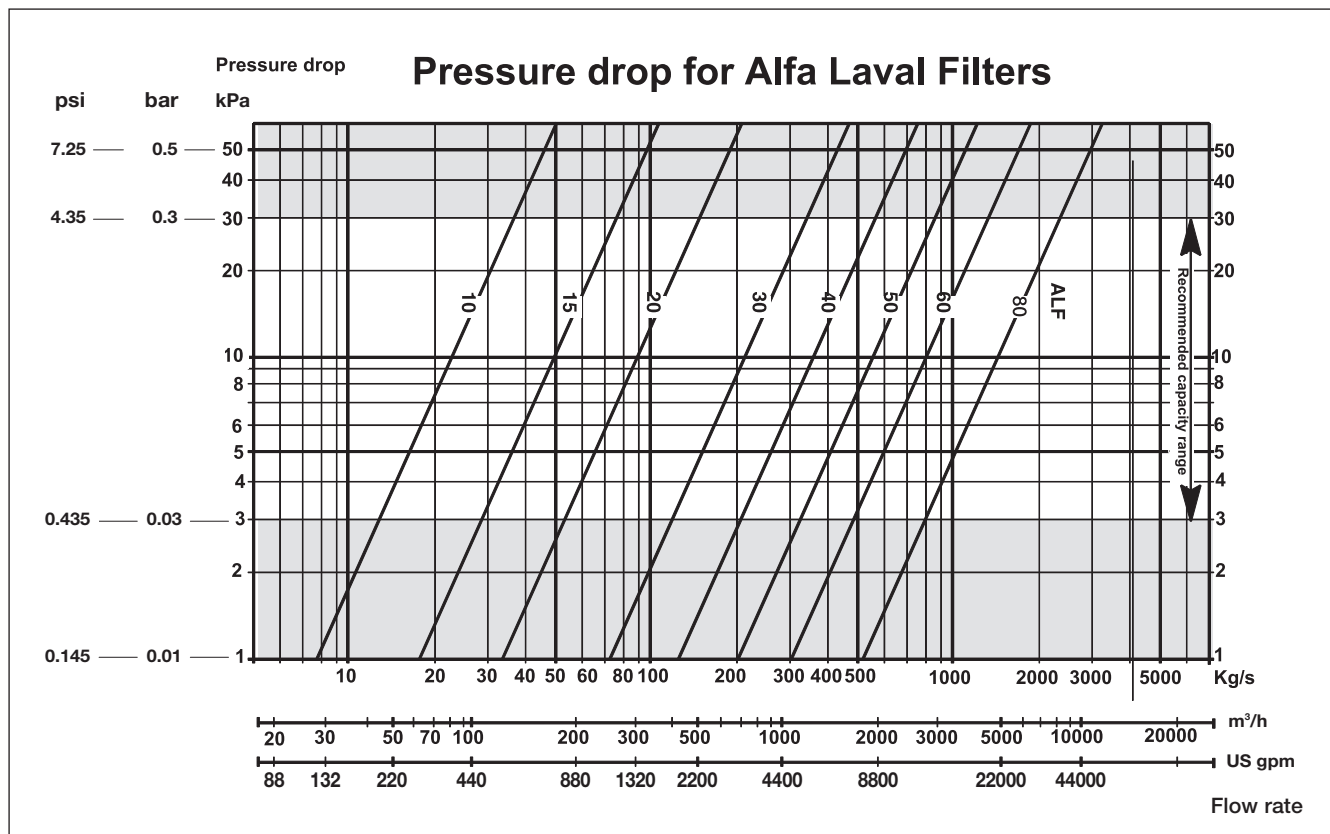


Fig. 3 Recommended pressure drop and capacity range

Technical data

Connections	EN 1092.1/PN10	DN100-DN800
	ANSI B16.5/B16.47, B series, # 150	4"-32"
	JIS B2238/K10	DN100-DN800
Operation	Pneumatic, electric or hydraulic	Actuator controlled valves
Mesh size	Perforated plate design (Ø hole)	1.0-1.5-2.0-2.5 mm
	Wedge wire design (slot size)	0.3-0.5-1.0 mm
Materials	Filter body (ALF-R)	Rubber-lined carbon steel (EN P265 GH/ASTM A516 Gr60)
	Filter body (ALF-S)	Stainless steel EN 1.4404 ASTM 316
	Filter body (ALF-P)	Fibreglass reinforced polyester (GRP/FRP)
	Internal parts (wetted)	Stainless steel EN 1.4404 ASTM 316
	Internal parts (wetted)	Super stainless steel, EN 1.4547 / ASTM S31254 (SMO)
	Internal parts (wetted)	Titanium, EN 3.7025 / ASTM B265 Grade 3
Design code	EN13445 / ASME VIII, div.1/div.2	ALF-R / ALF-S
Design code	EN13121 / ASME X	ALF-P
Design pressure	10 bar (g) / 150 psi	Alternatives on request
Design temperature	65°C / 149°F	Alternatives on request
Control panel	PLC-based	Power supply: 1~ 100-250 V, 50-60 Hz

How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com