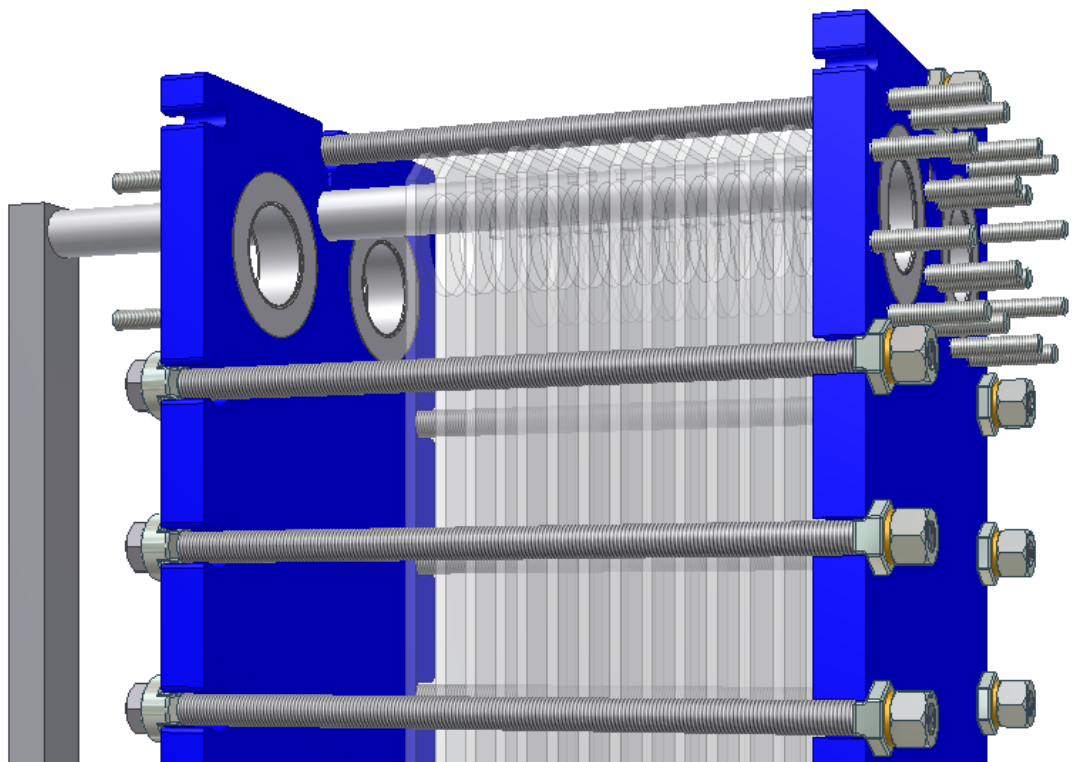


Port filter

Instruction for Port Filters for Gasketed plate heat exchanger



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Instruction Manual

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1 Introduction

This manual provides information needed to install, operate and carry out maintenance of the port filter used for gasketed plate heat exchanger with port size 200 mm or larger.

1.1 Intended use

The intended use of this equipment is to prevent foreign objects from entering and causing clogging in gasketed plate heat exchangers.

All other use is prohibited. Alfa Laval will not be held responsible for injury or damage if the equipment is used for any other purpose than the intended use described above.

1.2 Environmental compliance

Alfa Laval endeavours to perform its own operations as cleanly and efficiently as possible, and to take environmental aspects into consideration when developing, designing, manufacturing, servicing and marketing its products.

Waste management

Separate, recycle, or dispose of all material and components in a safe, and environmentally responsible way, or according to national legislation or local regulations. If there is any uncertainty regarding what material a component is made of, contact the local Alfa Laval sales company. Use a certified (ISO 14001 or similar) scrapping or waste handling company.

Unpacking

Packing material consists of wood, plastics, cardboard boxes and, in some cases, metal straps.

- Wood and cardboard boxes can be reused, recycled or used for energy recovery.
- Plastics should be recycled or burnt at a licensed waste incineration plant.
- Metal straps should be sent for material recycling.

Maintenance

- All metal parts should be sent for material recycling.
- Oil, all non-metal wear parts, cleaning compound, cloths and other cleaning material must be taken care of in accordance with local regulations.

Scrapping

At end of use, the equipment shall be recycled according to relevant, local regulations. Besides the equipment itself, any hazardous residues from the process liquid must be considered and dealt with in a proper manner. When in doubt, or in the absence of local regulations, please contact the local Alfa Laval sales company.

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2 Safety

2.1 Safety considerations

The port filters shall be used and maintained in accordance with Alfa Laval's instructions in this manual. Incorrect handling of the port filters may result in serious consequences with injuries to persons and/or property damage. Alfa Laval will not accept responsibility for any damage or injury resulting from not following the instructions in this manual.

The port filters shall be used in accordance with the specified configuration of material, media types, temperatures and pressure for the specific plate heat exchanger where the port filter are used.

2.2 Definitions of expressions



WARNING Type of hazard

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION Type of hazard

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



NOTE

NOTE indicates a potentially hazardous situation which, if not avoided, may result in property damage.

2.3 Personal protective equipment

Protective shoes

A shoe with a reinforced toe cap to minimize foot injuries caused by dropped articles.



Protective helmet

Any helmet designed to protect the head from accidental injury.



Protective goggles

A pair of tight-fitting eyeglasses worn to protect the eyes from hazards.



Safety



Protective gloves

Gloves that protects the hand from hazards.



2.4 Working at height

If the installation requires working at a height of two meters or higher, safety arrangements must be taken in consideration.

 **WARNING** Risk of falling.

For any kind of work at height, always ensure that safe means of access is available and used. Follow local work at height regulations and guidelines. Use scaffolds or a mobile work platform and a safety harness. Create a safety perimeter around the working area and secure tools or other objects from falling.



Safety

3 Description

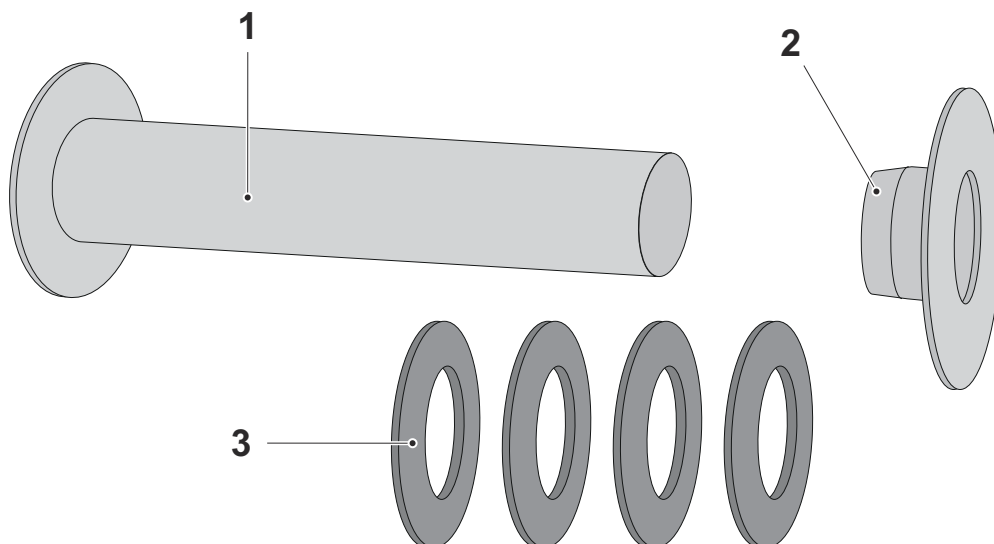
3.1 Components

The port filter consists of a cylindrical meshed tube with a flange in one end. The length of the filter tube is adapted for the total length of the plate pack including the thickness of the frame and pressure plate. The conical guide ring is inserted at the opposite port and keep the filter tube centered after installation. The welded rings in both ports provide a flat surface for flange gasket sealing against pipework and inspection cover.

NOTE

The port filter length is precisely adapted to the specific plate heat exchanger. Modifications to the plate heat exchanger may make the port filter not fit the dimensions of the plate heat exchanger anymore.

Following parts are required to install port filter.



1. Port filter
2. Conical guide ring
3. Flange gasket (4 pieces per port filter)

3.2 Function

The port filter is used to ensure high thermal efficiency of the plate heat exchanger by preventing foreign objects from entering and causing clogging of the plate pack. The port filter is designed to operate in conditions involving sea water, process water, cooling tower water or any kind of liquid containing particles with potential risk of disrupting the performance of the system.

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4 Installation

4.1 Unpacking

Follow the instruction below to unpack the components of the port filter



WARNING Risk of personal injury.

There can be sharp edges, splinters, and nails on the crate and the equipment.

Wear personal protective equipment when handling the equipment during unpacking and installation. Handle the equipment with precaution. See Section [Personal protective equipment](#) in Chapter [Safety](#)

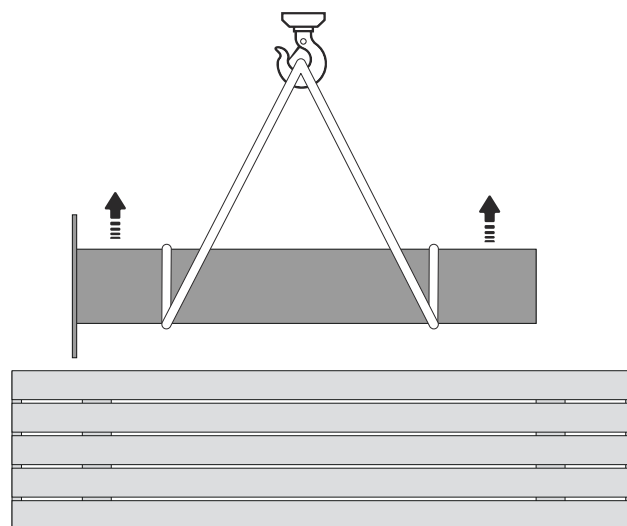
- 1 Prepare an area with required space for unpacking.
- 2 Open the transport enclosure.
- 3 Check your shipment immediately upon arrival and make sure that the port filter received is in accordance with the order specification. In the event of damage, defects or deficiency, immediately report the problem to the transport company and Alfa Laval.
- 4 Remove all additional components such as conical guide ring or other delivered parts from the transport enclosure.
- 5 Lift the port filter from the transport enclosure. Use lifting equipment with straps attached according to picture or by hand for smaller port filters.



CAUTION

Risk of damage to equipment.

Handle the port filter with care to avoid any damage of it. Avoid to expose the port filter for bending forces as risk of collapsing the filter tube increases.



4.2 Before installation

Preparation of the plate heat exchanger before installation of the port filter.

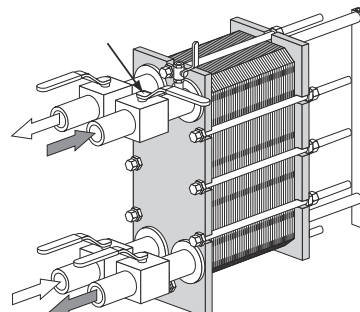
1. Prepare the installation area around the plate heat exchanger and ensure that required space is available.
2. Installing port filter into an existing plate heat exchanger require preparation to ensure that correct port arrangement is in place for the installation. Consult Alfa Laval representative if any hesitation.
3. Shut down, isolate and drain the plate heat exchanger by following the instruction in section [Shut-down](#)
4. Install port filter according to the section [Installation of port filter](#)

4.3 Shut-down

! NOTE

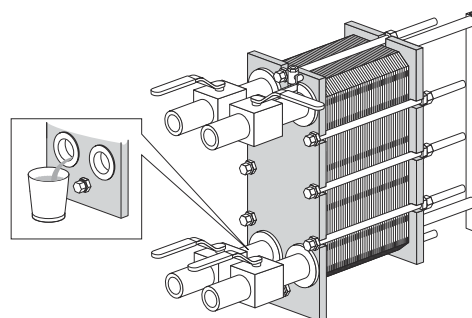
If several pumps are included in the system, make sure you know which one should be stopped first.

- 1 Slowly close the valve controlling the flow rate of the pump you are about to stop.



- 2 When the valve is closed, stop the pump.
- 3 Repeat the two steps for the other side for the second media.

- 4 If the plate heat exchanger is shut down for several days or longer, it should be drained. Draining should also be done if the process is shut down and the ambient temperature is below the freezing temperature of the media. Depending on the media processed, it is also recommended to rinse and dry the plate heat exchanger plates and connections.



! NOTE

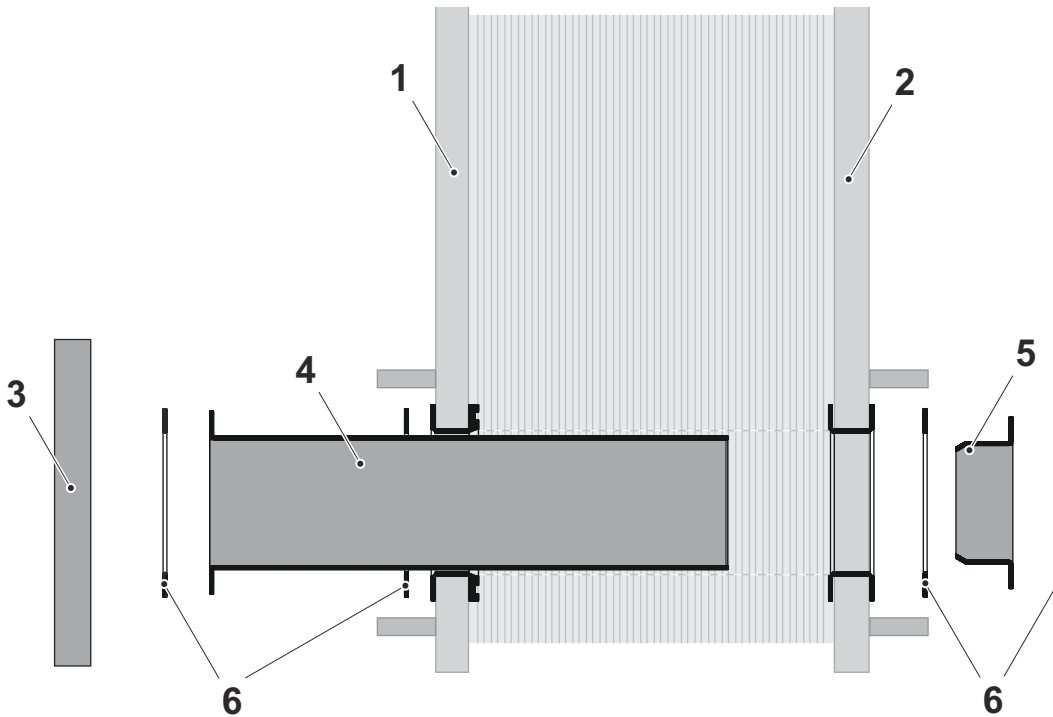
Avoid vacuum in the plate heat exchanger by opening vent valves.

4.4 Installation of port filter

Installation of the port filter can be done when all preparation has been performed with shut-down and isolating the plates heat exchanger.

NOTE

The port filter length is precisely adapted to the specific plate heat exchanger. Modifications to the plate heat exchanger may make the port filter not fit the dimensions of the plate heat exchanger anymore.



1. Pressure plate
2. Frame plate
3. Inspection cover
4. Port filter
5. Conical guide ring
6. Flange gasket

CAUTION Risk of falling.

If the port filter is installed at upper ports take precaution action, see Section [Working at height](#) in Chapter [Introduction](#).

WARNING Risk of personal injury

The edges of the port filter can be sharp.

Wear personal protective equipment when handling the equipment during installation. Handle the equipment with precaution. See Section [Personal protective equipment](#) in Chapter [Safety](#)

- 1 Remove the connection flange pipe on the frame plate by loosening all nuts.



Risk of personal injury.

The connection flange pipe is heavy and it is required to use lifting equipment.

Follow the lifting instructions from the manufacturer of the connection flange pipe.

- 2 Attach one flange gasket at the port in the frame plate if not already in place.
- 3 Insert the conical guide ring into the port of the inlet flow (frame plate).
- 4 Attach one flange gasket to the outside of the conical guide ring flange.

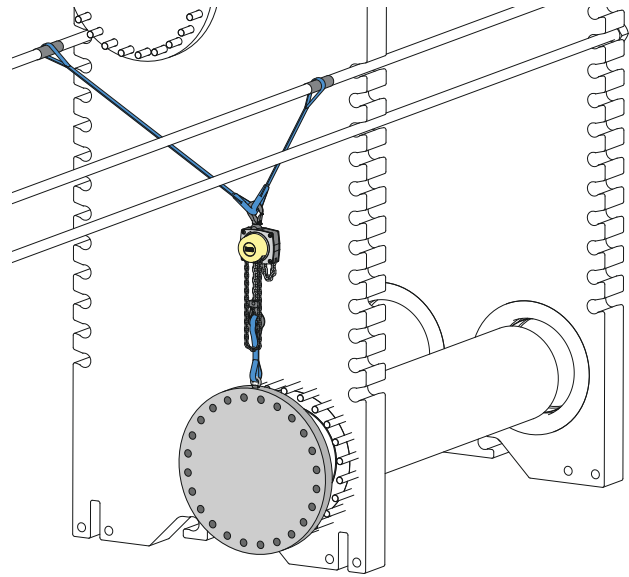
- 5 Remove the inspection cover from the pressure plate by loosening all nuts. Use lifting equipment with straps attached according to picture.



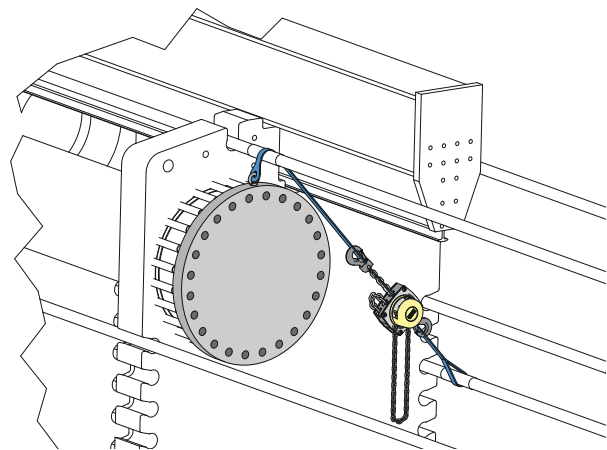
Risk of personal injury.

The inspection cover is heavy and lifting equipment is required. Attach the straps to the lifting eye on the inspection cover.

- a) Lower port: Arrange straps and chain pulley according to picture. Protect the threads of the tightening bolts by sliding a metal tube over the tightening bolt.



- b) Upper port: Arrange straps and chain pulley according to picture. Protect the threads of the tightening bolts by sliding a metal tube over the tightening bolt.



- 6 Attach one flange gasket at the port in the pressure plate if not already in place.

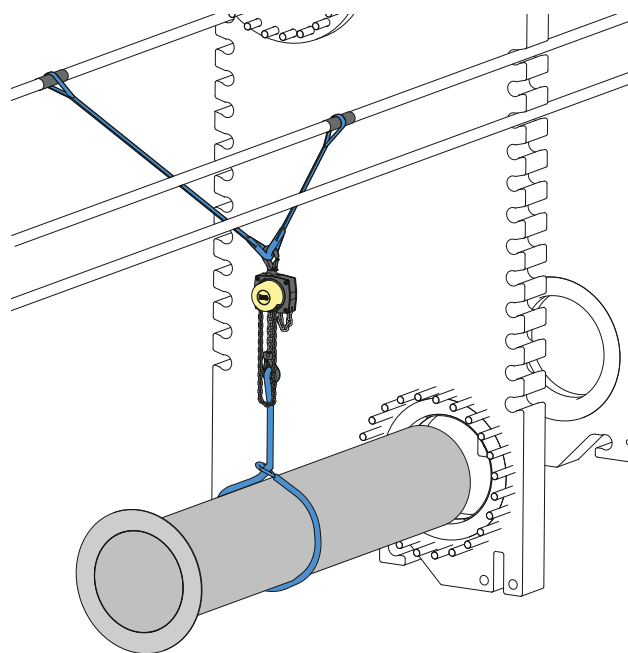
- 7 Insert the port filter into the port in the pressure plate.
- a) For large port filter use lifting equipment.

CAUTION

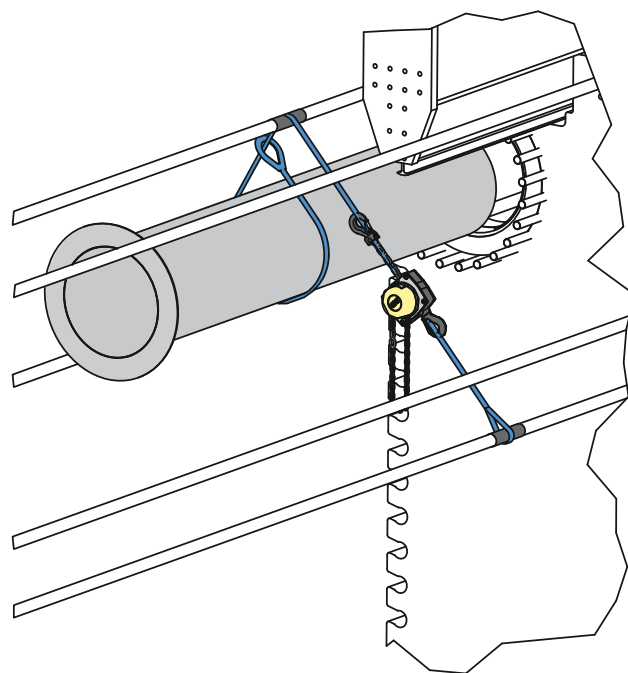
Risk of damage to equipment.

Handle the port filter with care to avoid any damage. Avoid exposure of bending forces as risk of collapsing the filter tube increases.

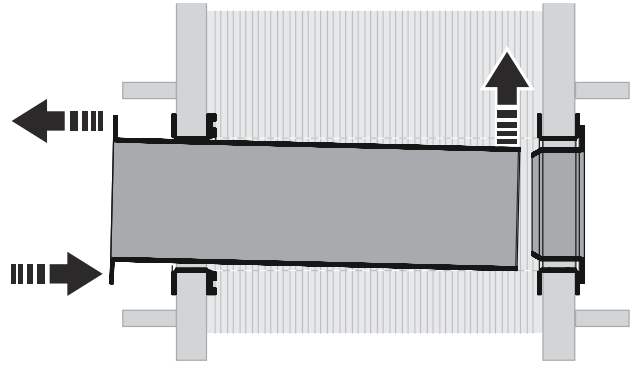
- b) Installation in lower port: Arrange straps and chain pulley according to picture for installation in ports. Protect the threads of the tightening bolts by sliding a metal tube over the tightening bolt.



- c) Installation in upper port: Arrange straps and chain pulley according to picture for installation in ports. Protect the threads of the tightening bolts by sliding a metal tube over the tightening bolt.



- 8 Thread the port filter tube over the cone at the opposite port by pushing the lower part of flange against the port and pull the upper part to guide the tube over the cone. Then push the port filter until the flange reach the lining of the port.



- 9 Attach the flange gasket to the outside of the port filter flange if not already in place.
- 10 Put the inspection cover back in place and fasten the nuts. Use lifting equipment with straps arranged in the same way as in the step of removing the inspection cover earlier in this instruction.

CAUTION**Risk of personal injury.**

The inspection cover is heavy and lifting equipment is required. Attach the straps to the lifting eye on the inspection cover.

- 11 Attach the flange connection and fasten the nuts.

NOTE**Adjusting of pipings**

Be aware that minor adjustment of the piping may be necessary as the thickness of the flange gasket and the flange of the port filter are added to the installation.

5 Operation

5.1 Start-up

During the start-up, check that there are no visible leakages from the plate pack, valves or piping system.

⚠ CAUTION Risk of leakage.

If the temperature of the plate heat exchanger is below the minimum temperature for the gaskets prior to the service, it is recommended to heat the plate heat exchanger above this limit to avoid cold leakage.

! NOTE

If several pumps are included in the system, make sure you know which one should be activated first.

Centrifugal pumps must be started with valves closed and the valves must be operated as smoothly as possible.

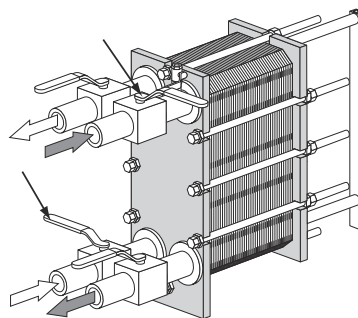
Do not run pumps temporarily empty on the suction side.

! NOTE

Adjustments of flow rates should be made slowly in order to avoid the risk of pressure surge (water hammer).

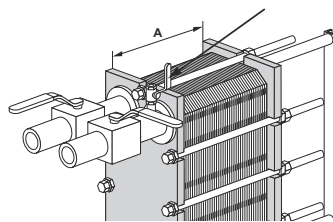
Water hammer is a short lasting pressure peak that can appear during the start-up or shut-down of a system, causing liquids to travel along a pipe as a wave at the speed of sound. This can cause considerable damage to the equipment.

- 1 Check that the valve is closed between the pump and the unit controlling the system flow rate to avoid pressure surge.



- 2 If there is a vent valve installed at the exit, make sure it is fully open.
- 3 Increase the flow rate slowly.

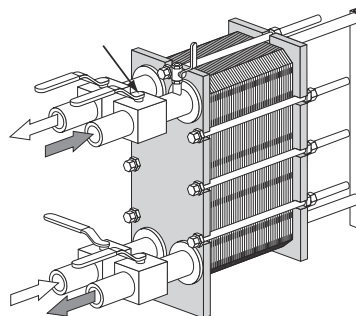
- 4 Open the air vent and start the pump.



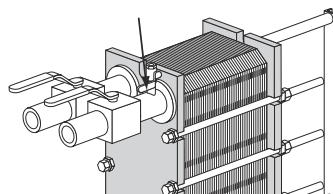
- 5 Open the valve slowly.

! NOTE

Avoid rapid temperature changes in the plate heat exchanger. With media temperatures over 100 °C, slowly increase the temperature, preferably at least for one hour.



- 6 When all the air is expelled, close the air vent.



- 7 Repeat the procedure for the second media.

6 Maintenance

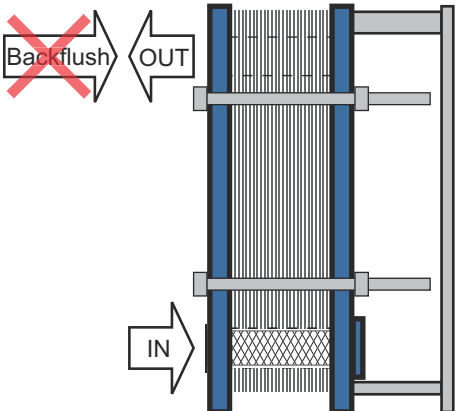
To keep a high performance of the plate heat exchanger the port filter needs to be cleaned at regular intervals. The frequency depends on volume of clogging or impurities in the media.

Indicators of clogging filters can be pressure drop over the plate heat exchanger or difficulties to reach design temperature.

Cleaning of port filters can be done by manual cleaning of port filter, see instruction [Manual cleaning of the port filter](#)

⚠ CAUTION Risk of damage to equipment.

Backflush (reverse flow) is not allowed with port filter installed. Risk of collapsing the port filter.



6.1 Manual cleaning of the port filter

⚠ WARNING Risk of falling.

For any kind of work at height, always ensure that safe means of access is available and used. Follow local work at height regulations and guidelines. Use scaffolds or a mobile work platform and a safety harness. Create a safety perimeter around the working area and secure tools or other objects from falling.

- 1 Shut-down the plate heat exchanger according to the instruction [Shut-down](#).

- 2 Close the valves and isolate the plate heat exchanger from the rest of the system.

NOTE

The plate heat exchanger must be pressureless before disconnecting it.

WARNING**Risk of personal injury.**

The plate heat exchanger can be hot.

Wait until the plate heat exchanger has cooled down to about 40 °C (104 °F).

WARNING**Risk of personal injury**

Depending on type of media take precaution action.

Wear personal protective equipment when handling the equipment during installation. Handle the equipment with precaution. See Section [Personal protective equipment](#) in Chapter [Safety](#)

- 3 Remove the inspection cover on the pressure plate by loosening all nuts. Use lifting equipment and arrange it according to instruction in [Installation of port filter](#).

CAUTION**Risk of personal injury.**

The inspection cover is heavy and lifting equipment is required. Attach the straps to the lifting eye on the inspection cover.

- 4 Remove flange gasket
- 5 Grip around the port filter flange and pull out the port filter. If stuck, use a sharp tool to loosen it from the gasket. Use lifting equipment and arrange it according to instruction in [Installation of port filter](#).
- 6 Flush the port filter with water and brush to remove all clogging.

-
- 7 If clogging is present in the plate pack follow instruction in the Instruction Manual for the plate heat exchanger.
 - 8 Re-insert the port filter, follow instruction in *Installation of port filter*.
-