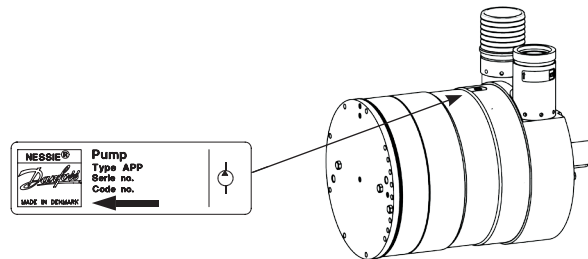


Contents

1. Identification
2. System design
3. Building up the pump unit
4. Initial start-up
5. Operation
6. Service

1. Identification



2. System design

The design of the system must ensure that self-emptying of the pump during standstill is avoided.

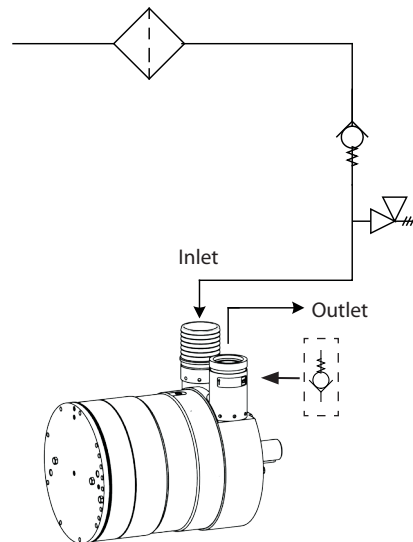
The inlet pressure of the pump must never exceed the outlet pressure. This may typically occur in boosted or open-ended systems with direct water supply.

2.1 Open-ended systems with direct water supply

The pump is supplied with water direct from a booster pump.

The water pressure must be at least 2 bar (30 psi) and it must not exceed 5 bar (73 psi).

To protect the pump from being damaged by peaks of high pressure in case the pump stops momentarily, it is required to mount a low-pressure safety valve on the inlet line.



2.2 Reversible pumps

If exposed to high pressure in the outlet while the electric motor is not energized, the pumps will start spinning backwards. This will not harm the pumps as long as the pressure in the inlet does not exceed the max. pressure of 5 bar.

If a non-return valve is mounted in the inlet line, a low-pressure safety valve is also required as protection against high-pressure pulses and high pressure in general.

Alternatively a high-pressure check valve can be mounted in the pump discharge line to prevent the pump from reversing.

The dotted setup ensures that the inlet pressure does not exceed 5 bar, when a non-return valve is mounted in the inlet.

In order to avoid the risk of cavitation, the inlet pressure at the pump must be min. 2 bar (30 psi).

The inlet line connection must be properly tightened, as possible entrance of air will cause cavitation.

2.4 General comments on

Filtration

A good filtration is vital to ensure a long and trouble free life of the pump.

As water has very low viscosity, the APP pumps have been designed with very narrow clearance in order to control internal leakage rates and improve component performance. Therefore it is important that the inlet water is filtered properly to minimize the wear of the pump.

The main filter must have a filtration efficiency of 99.98% at 10 µm. We recommend that you use precision depth filter cartridges rated 10µm abs. $\beta_{10} > 5000$ (equivalent to a filtration efficiency of 99.98%). Bag filters and string wound filter cartridges typically have only 90% filtration efficiency. This means that for each 100,000 particles reaching the filter, 10,000 particles pass through it compared to only 20 particles in a filter with an efficiency of 99.98%.

For more information on the importance of proper filtration, please consult our publication "Filtration" (code number 521B0861), which also will provide you with an explanation of filtration definitions and a guidance on how to select the right filter.

Monitoring

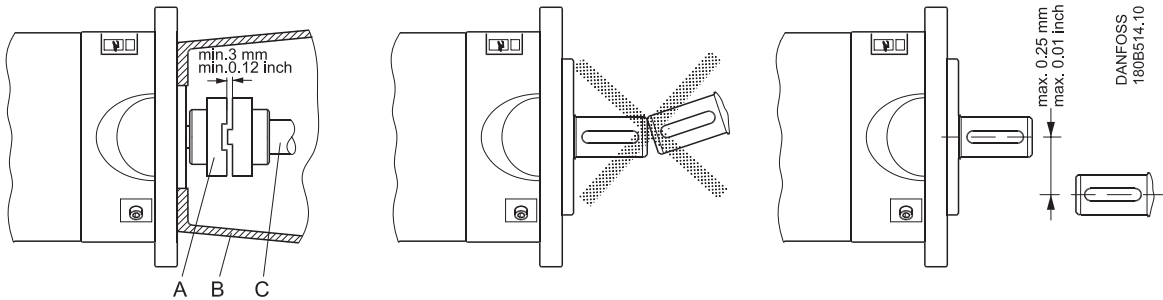
It is recommended to continuously monitor the following conditions:

- filter clogging
- pressure (inlet- and outlet side of the pump)

3. Building up the pump unit

3.1 Mounting (Please also see "Hints in Right and Wrong", code number 521B0810)

- A: Elastic coupling
- B: Bell housing
- C: Motor shaft



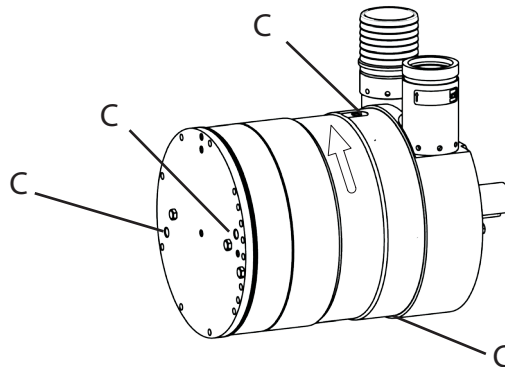
If alternative mounting is desired, please contact the Danfoss Sales Organization.

Choose proper tolerances to ensure an easy mounting of the elastic coupling without use of tools.

Please take care to observe the recommended length tolerances of the chosen coupling, as an axial force on the pump will damage the pump.

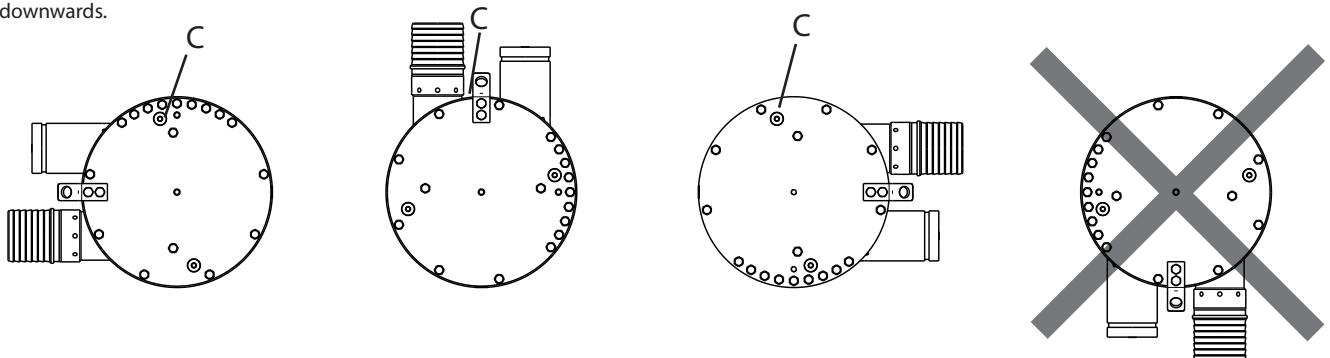
3.2 Direction of rotation

Is indicated by means of an arrow on the pump.



3.3 Orientation

The pump can be mounted/orientated in any horizontal direction with the inlet and the outlet pointing upwards or to either side - but **not** downwards.



3.4 Protection from too high pressures

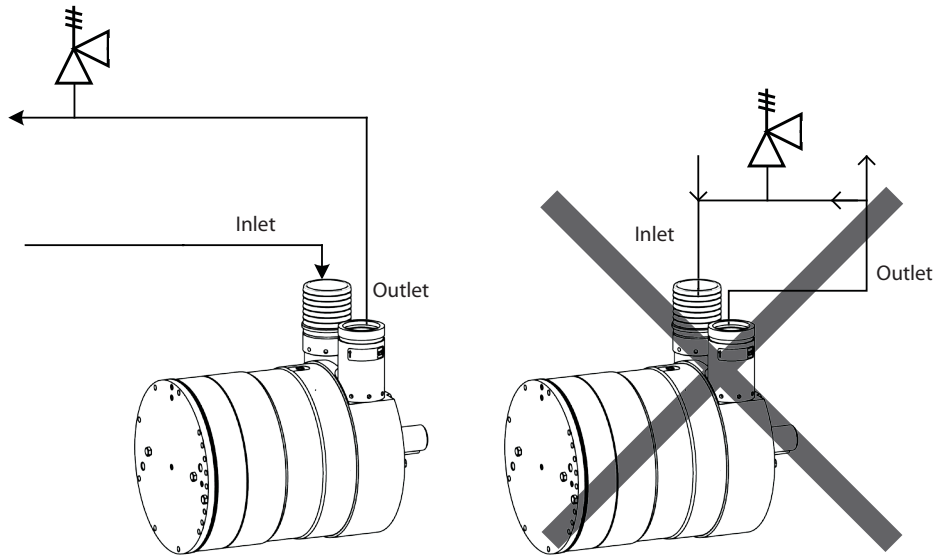
The pump should be protected against too high pressure by means of a safety valve.

The valve should be placed as close to the pump as possible.

The opening characteristics of the valve must not result in peak pressures higher than 100 bar (1450 psi).

Both the inlet and outlet lines must be flexible soft hoses.

The safety valve outlet must not be connected directly to the pump suction line. It must be connected directly to the drain.



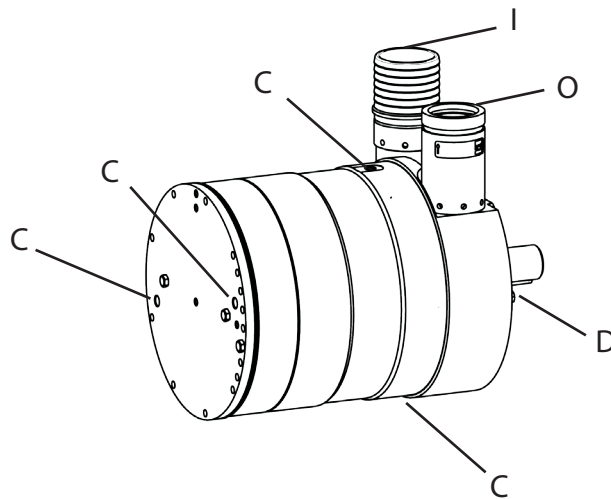
3.5 Connections

I: Inlet

O: Outlet

C: Bleeding

D: Parallel key



4. Initial start-up

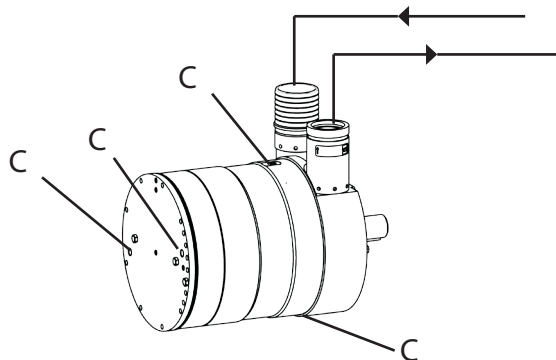
Prior to start-up the system must be flushed – without the pump being connected.

Before start-up, loosen the top bleeding plug "C" (see item 3.3) using an Allen key (only plugs with internal hexagon sockets). When water appears from the bleeding plug, retighten the plug. With its inlet line connected to the water supply, the pump is now started with open outlet port.

At the initial start of the system, the pump should be flushed for about 5 minutes, thus removing possible impurities from pipes, hoses, etc. from the high-pressure side of the pump.

Warning:

Make sure that the direction of rotation of the electric motor corresponds to the direction of rotation of the pump (see label on pump). Otherwise the pump will be damaged if a check valve is placed between pump and tank.



5. Operation

5.1 Temperature

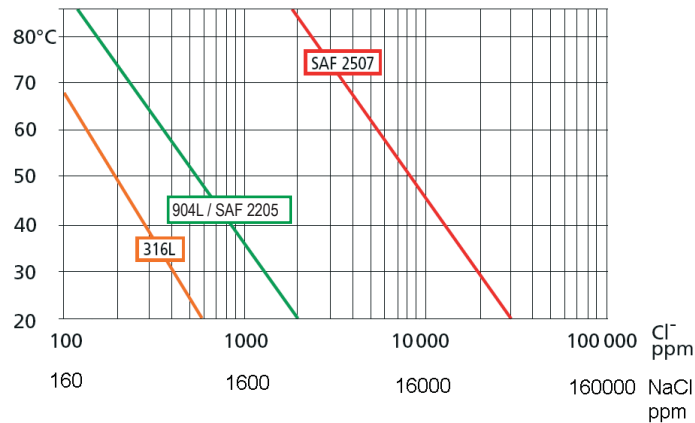
Fluid temperature:	Min. +3°C to max. +50°C (Min. +37.4°F to max. +122°F)
Ambient temperature:	Min. 0°C to max. 50°C (Min. +32°F to max. +122°F)
Storage temperature:	Min. -40°C to max. +70°C (Min. -40°F to max. +158°F)

In case of lower operating temperatures, please contact the Danfoss RO Solutions Sales Organization.

The chart below illustrates the corrosive resistance of different types of stainless steel related to NaCl concentration and temperature.

The APP water pump is made of SAF 2507 and SAF 2205.

If the water pump is operated above the SAF 2507 line, always flush the the water pump with fresh water at operation stop in order to minimise the risk of crevice corrosion.



NaCl vs. temperature

5.2 Pressure

The inlet pressure must be min. 2 bar (30 psi) and max. 5 bar (73 psi). At lower pressures the pump will cavitate, resulting in damage of the pump. Max. pressure on the pump's outlet line should be limited at 80 bar (1160 psi) continuously.

Short-term pressure peaks (e.g. in connection with closing of a valve) of up to 100 bar (1450 psi) are acceptable.

NB: The pump unit should include a pressure gauge on the high pressure side.

5.3 Dry running

When running, the pump must always be connected to the water supply in order to avoid damage if it should run dry.

5.4 Disconnection

If the inlet line is disconnected from the water supply, the pump will be emptied of water through the disconnected inlet line.

When starting up again, follow the bleeding procedure described under section 4: Initial start up.

5.5 Storage

When preparing the pump for long-term storage or for temperatures below the freezing point, flush the pump with an anti-freeze medium type monopropylene glycol to prevent internal corrosion or frost in the pump.

For further information on anti-freeze media, please contact the Danfoss RO Solutions Sales Organization.

Recommended procedure:

1. Disconnect the water supply to the pump.
2. Through the lower bleeding plug, empty the pump housing of water and close it again.
3. Connect the pump to a tank containing anti-freeze additive. Connect a hose to the inlet port of the pump and via another hose return the flow from the outlet port to the tank with anti-freeze additives.
4. Quickly start and stop the pump.
Make sure that the pump does not run dry. The pump is now protected against internal corrosion and frost.

6. Service

Provided that the pump has been running according to the Danfoss specifications on pre-filtration, pressure, and rotation speed, Danfoss guarantees minimum 8000 hours operation, however max. 18 months from date of sale.

To prevent a total and disastrous breakdown, Danfoss recommends a pump inspection after max. 4000 hours – at which any worn parts must be replaced.

Note: It is always recommended to replace pistons and shaft sealing if another service-free period is to be obtained.

If the pistons are not replaced, more frequent inspection is recommended.

The APP pump is made of duplex/super duplex materials with fine corrosion properties. However, **it is always recommended to flush the pump when the system is shut down.**

6.1 Periodic maintenance

Water acts as lubricant in the APP. Thus there is no oil in the pump.

By operation below the curve for SAF 2507 in the figure in section 5.1, no parts are expected to be replaced within the first 8000 hours of operation.

6.2 Repair

In case of irregular function of the APP, please contact the Danfoss RO Solutions Sales Organisation.