

Instruction

APP S 674 pumps

APP S 674 3.0-3.5 / APP S 674 5.1-9.0

APP S 674 21-38



Table of Contents

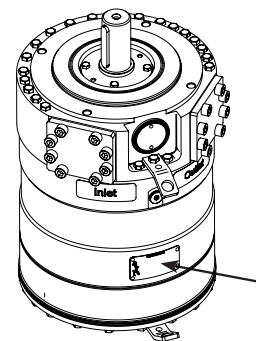
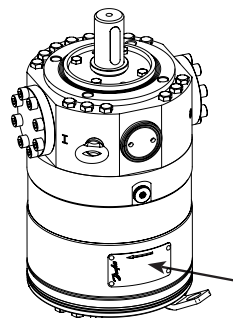
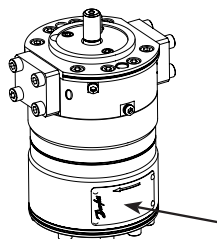
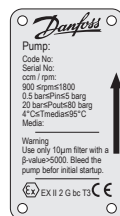
1.	Identification	2
2.	System design	3
2.1	Open system design	3
2.2	RO system with APP S 674 pump	3
2.3	Protection from too high pressures	4
3.	Building up the pump unit	4
3.1	Mounting	4
3.2	Direction of rotation	5
3.3	Orientation	5
3.4	Connections	6
3.4.1	APP S 674 3.0-3.5	6
3.4.2	APP S 674 5.1-9.0	6
3.4.3	APP S 674 21-38	7
4.	Initial start-up	7
4.1	APP S 674 3.0-3.5	7
4.2	APP S 674 5.1-9.0	7
4.3	APP S 674 21-38	8
5.	Technical data	8
6.	Operation	9
6.1	Temperature	9
7.	Long-term shutdown	9
8.	Storage	9
9.	Service and warranty	10
9.1	Repair	10
9.2	Recommended service intervals	11
10.	EC Declaration of Conformity	12

Our CLP RO pumps have changed name as listed below:

CLP674 050-058 RO will now be called APP S 674 3.0-3.5
 CLP674 085-152 RO will now be called APP S 674 5.1-9.0
 CLP674 365-640 RO will now be called APP S 674 21-38

This is ONLY a name change.

1. Identification



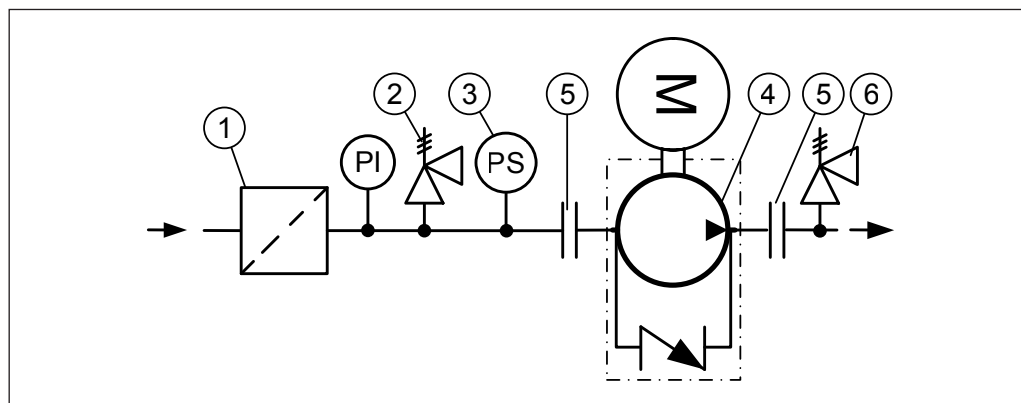
2. System design

2.1 Open system design

- A **Inlet line:**
Minimize pressure loss by allowing for maximum flow, minimum pipe length, as few bends/connections as possible, and fittings with small pressure losses.
- B **Inlet filter:**
Install the inlet filter (1) in front of the APP S 674 pump (4). Please consult the Danfoss filter data sheet for guidance on how to select the right filter.
- C **Monitoring pressure switch:**
Install the monitoring pressure switch (3) between the filter and the pump inlet. Set the minimum inlet pressure according to pump specifications. The monitoring pressure switch stops the pump if inlet pressure is lower than the set minimum pressure.
- D **Monitoring temperature switch when the pump operates in a hazardous area:**
Install the monitoring temperature switch between the filter and the pump, on either side of the monitoring pressure switch. Set the temperature according to pump specifications. The monitoring temperature

- E **Connections:**
Ensure flange loads (5) do not exceed max. allowable loads on process connections according to API 674 3rd edition (pipe size).
- F **Inlet pressure:**
In order to eliminate the risk of cavitation and other pump damage, inlet pressure must be maintained in-between pump specifications.
- G **LP relief valve (2):**
Can be installed in order to avoid system or pump damage in case the pump stops momentarily or spinning backwards.
- H **HP relief valve:**
As the Danfoss APP S 674 pump begins to create pressure and flow immediately after start-up and regardless of any counter pressure, a pressure relief valve (6) should be installed to prevent system damage.

Note: If a non-return valve is mounted in the inlet line, a low-pressure relief valve is also required between the non-return valve and the pump to protect against high-pressure peaks.



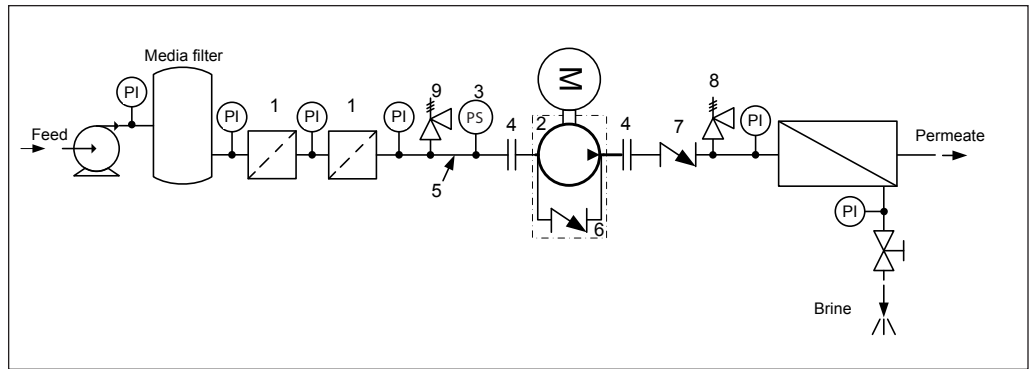
2.2 RO system with APP S 674 pump

The numbers in brackets refer to the drawing on next page.

- A Dimension the inlet line to obtain minimum pressure loss (large flow, minimum pipe length, minimum number of bends/connections, and fittings with small pressure losses).
- B Place an inlet filter (1) in front of the APP S 674 pump (2). Please consult section 10, "Filtration" for guidance on how to select the right filter. Thoroughly clean pipes and flush system prior to start-up.
- C Place a monitoring pressure switch (3) set at min. inlet pressure between filter and pump inlet. The monitoring switch must stop the pump at pressures lower than minimum pressure.
- D Ensure flange loads (4) do not exceed max. allowable loads on process connections according to API 674 3rd edition (pipe size).
- E In order to eliminate the risk of damage and cavitation, a positive pressure at the inlet (5) is always to be maintained at min. inlet pressure and max. inlet pressure. Recom-

- F For easy system bleeding and flushing, a bypass non-return valve (6) is integrated in the APP S 674 pump.
- G A non-return valve (7) in outlet can be installed in order to avoid backspin of the pump. The volume of water in the membrane vessel works as an accumulator and will send flow backwards in case the pump stops momentarily.
- H A safety valve or a pressure relief valve (8) can be installed in order to avoid system damage as the Danfoss APP S 674 pump creates pressure and flow immediately after start-up, regardless of any counter pressure.

Note: If a non return valve is mounted in the inlet line, a low pressure relief valve is also required between non return valve and pump as protection against high pressure peaks.



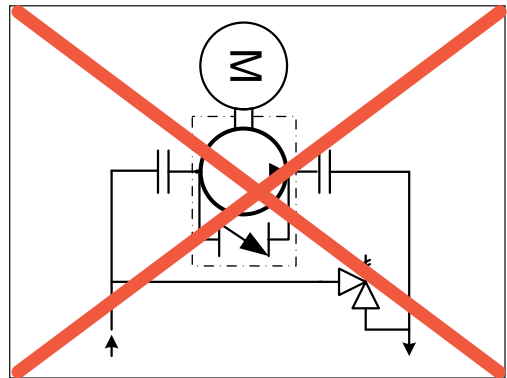
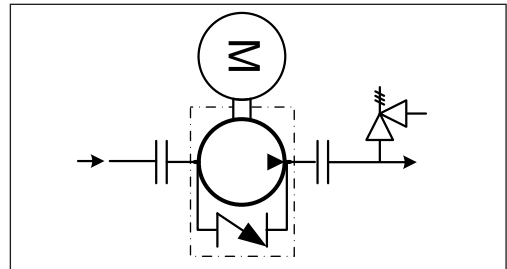
2.3 Protection of too high pressures

The pump should be protected against too high pressure by using a safety valve or a pressure relief valve.

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

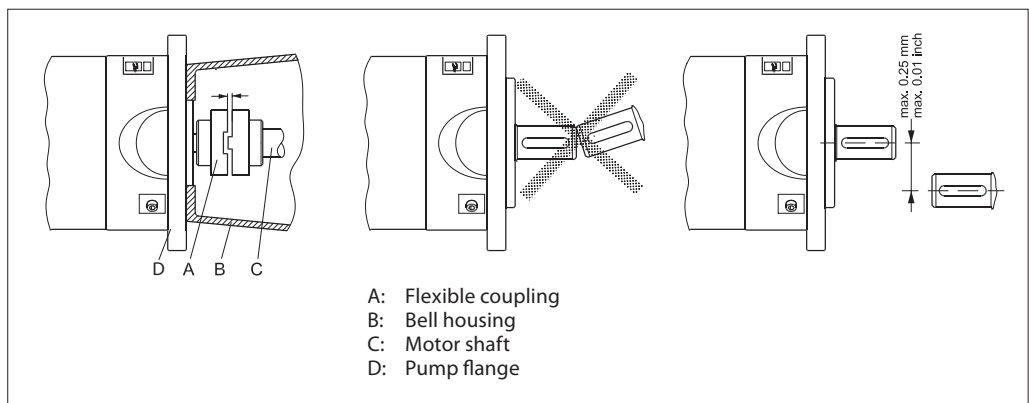
The opening characteristics of the valve must not result in peak pressures higher than 80 bar (1,160 psi).

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



3. Building up the pump unit

3.1 Mounting



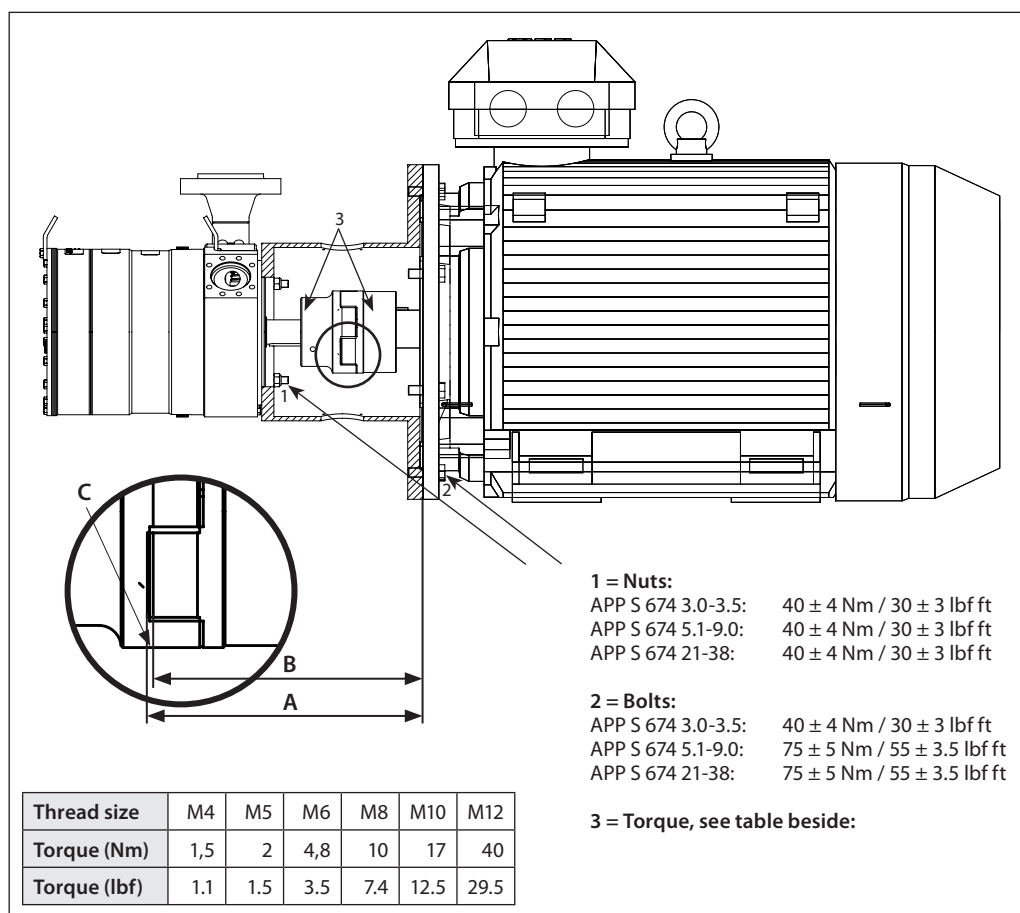
1. Mount the coupling on the pump shaft. Ensure an air gap between coupling and pump flange of min. 4 mm (0.16 in).
2. Mount the bell housing on the pump. Secure nuts with the right torque.
3. Measure the longest distance "A" from top of bell housing to the button of coupling claw.
4. Mount the coupling on the motor shaft. Ensure the coupling and motor flange are not in contact with each other.

5. Measure from motor flange to the top of the coupling. The measurement "B" shall be 3-5 mm (0.12 - 0.2 in) shorter than the measurement "A".
6. Adjust respectively, verify the measurement, and secure both couplings with the right torques on the locking screws (see coupling operation & mounting instruction).
7. Mount the flexible gear ring and mount the bell housing/pump on the motor. After mounting it must be possible to move the flexible gear ring 3-5 mm (0.12 - 0.2 in) axial "C". The check can be done through the inspection hole of the bell housing. Secure flange bolts with the right torque.

If alternative mounting is desired, please contact Danfoss High Pressure Pumps.

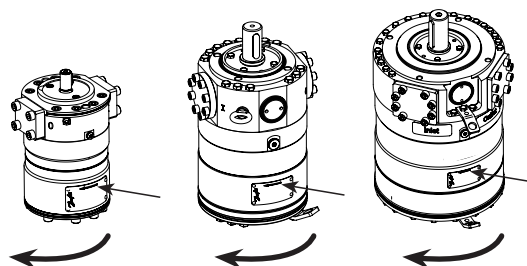
Choose proper tolerances to ensure an easy mounting of the flexible coupling without use of tools.

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

The direction of rotation is indicated by an arrow at the pump label.

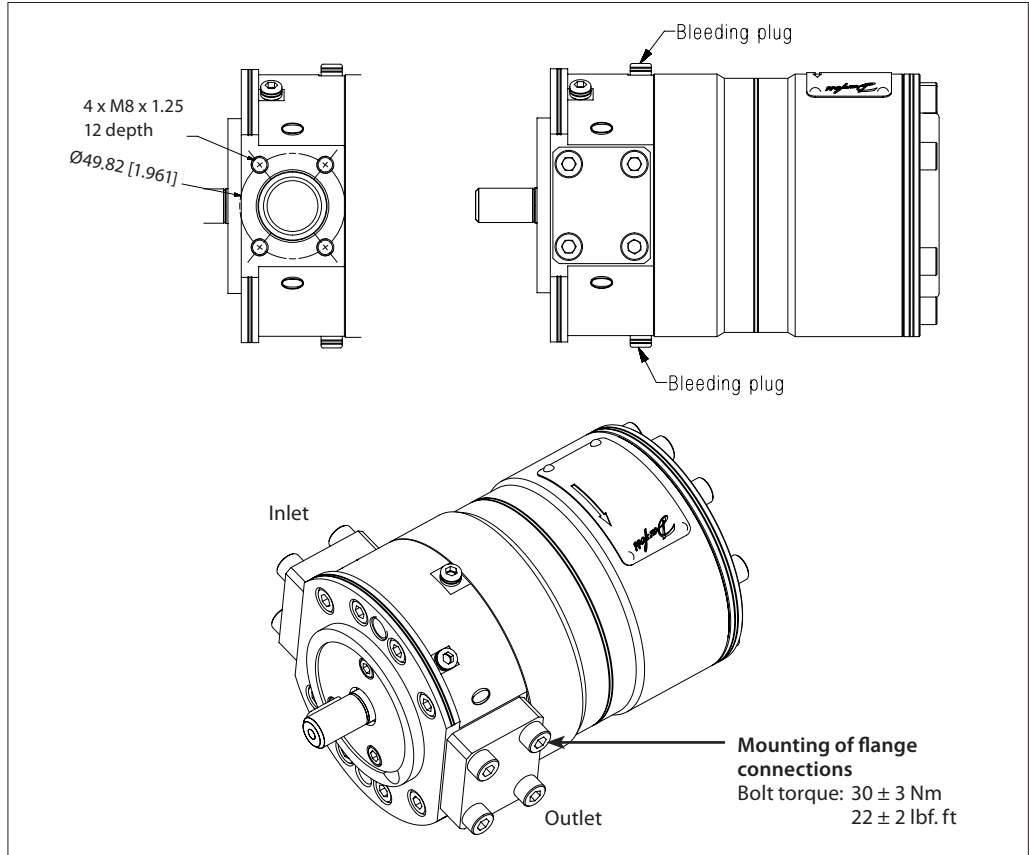


3.3 Orientation

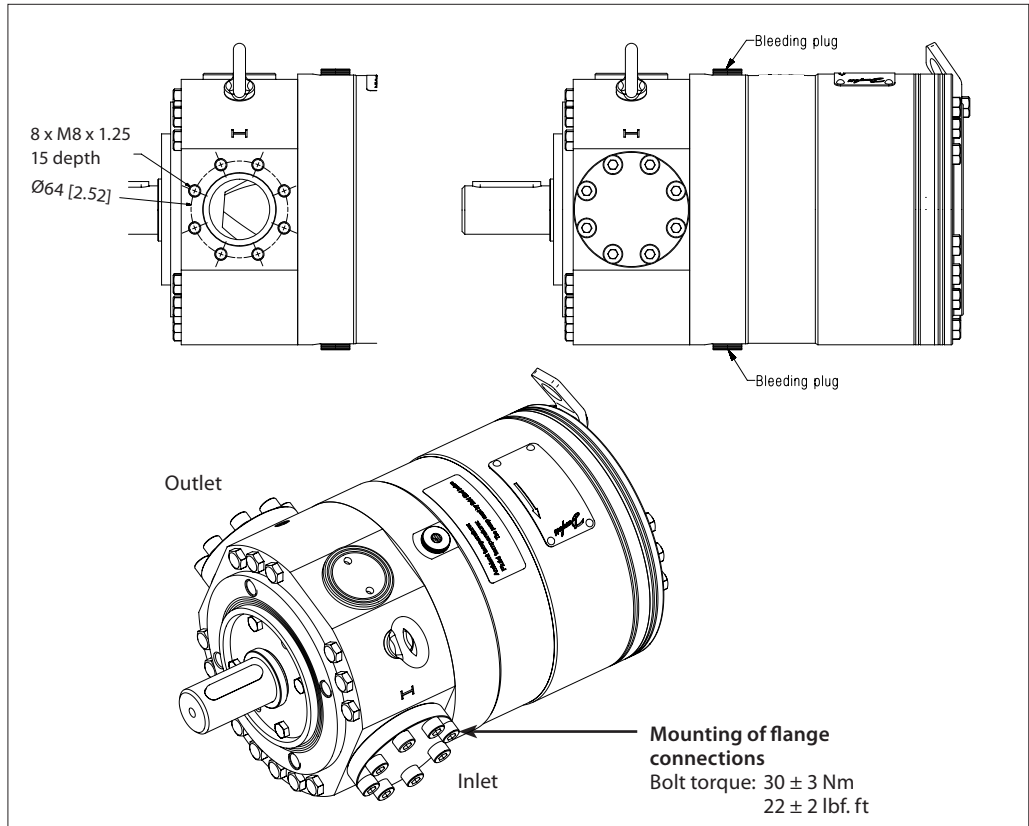
The pump can be mounted/orientated in any horizontal direction; vertically only with the shaft pointing upwards.

3.4 Connections

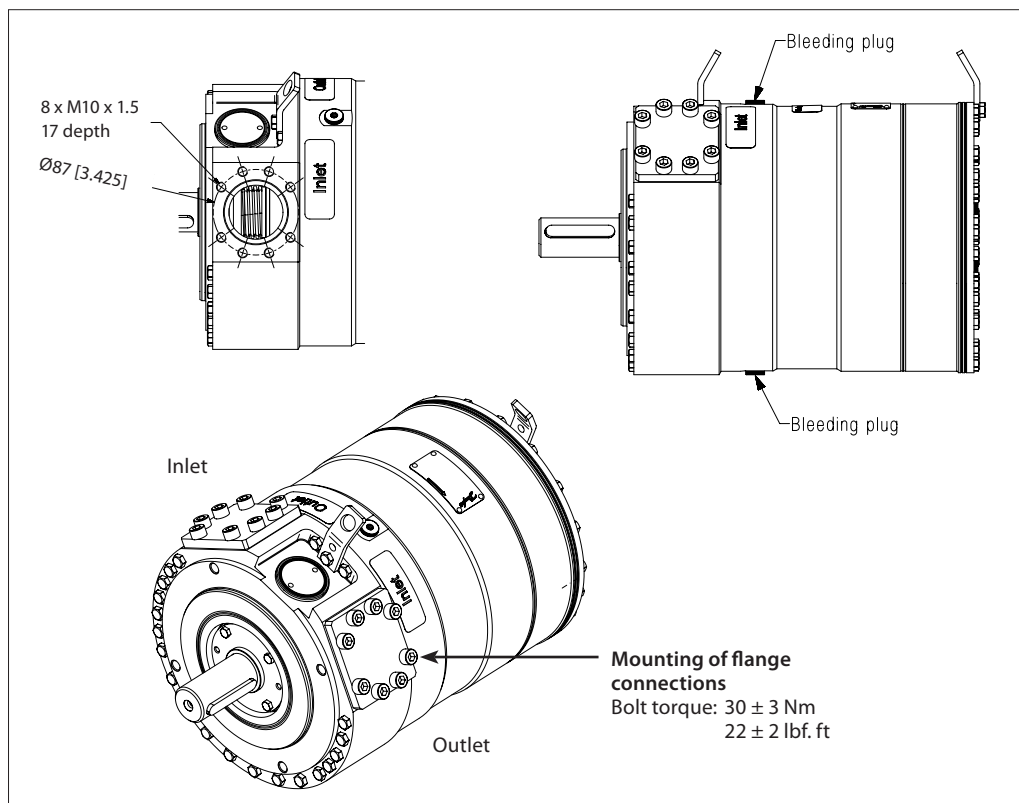
3.4.1 APP S 674 3.0-3.5



3.4.2 APP S 674 5.1-9.0



3.4.3 APP S 674 21-38

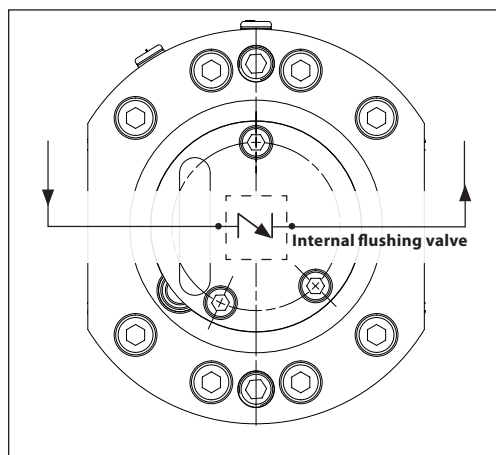


4. Initial start-up

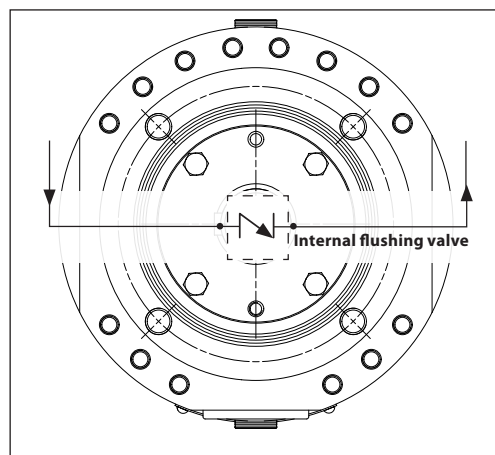
1. Flush inlet line before connecting the pump, to remove possible impurities from pipes, hoses etc.
2. Connect pump inlet to inlet line and flush the pump for 5 min. by using an internal flushing valve, to remove possible impurities from pipes, hoses etc.
3. Loosen top bleeding plug (see item 3.4) using an Allen key (only plugs with internal hexagan sockets). Retighten the plug, when water appears from the bleeding plug.
4. Make sure that the direction of rotation of the electric motor corresponds to the direction of rotation of the pump (see label on pump).
5. Now the pump is ready for start-up.

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 feed pump.

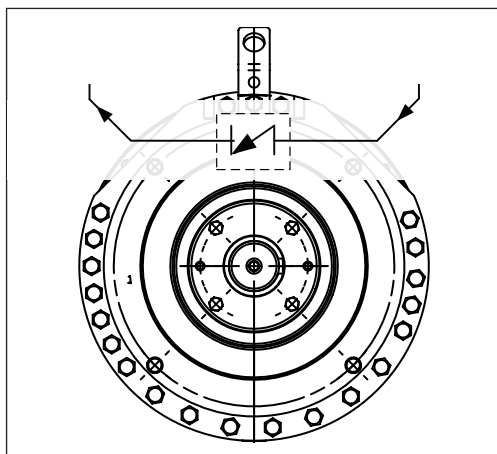
4.1 APP S 674 3.0-3.5



4.2 APP S 674 5.1-9.0



4.3 APP S 674 21-38



5. Technical data

Pumps size		APP S 674 3.0-3.5	APP S 674 5.1-9.0	APP S 674 21-38
Outlet min. pressure, continuous ¹⁾	barg	20	30	30
	psig	290	435	435
Outlet max. pressure, MAWP	barg	80	80	80
	psig	1,160	1,160	1,160
Inlet operating pressure ²⁾	barg	0.5-10	2.0-10	2.0-10
	psig	7.25-145	29-145	29-145
Inlet design pressure	barg	15	15	15
	psig	217	217	217
Min. speed, continuous	rpm	700	700	700
Max. speed, continuous	rpm	3,000	1,800	1,500
Media temperatur ³⁾	°C	2-50	2-50	2-50
	°F	36-122	36-122	36-122
Ambient temperatur	°C	0-50	0-50	0-50
	°F	32-122	32-122	32-122
Storage temperature	°C	-40 to +70	-40 to +70	-40 to +70
	°F	-40 to +158	-40 to +158	-40 to +158
Weight	Kg	15	40	110
	lb	33	88	242

¹⁾ For lower pressure, please contact Danfoss High Pressure Pumps

²⁾ If inlet pressure exceeds inlet operating pressure, Danfoss recommends inspection of the pump and shaft seal

³⁾ Dependent on the NaCl concentration

Inlet pressure:

If using lower inlet pressure than stated in above table, the pump will cavitate, which will damage the pump.

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

Outlet pressure:

MAWP (Maximum Allowable Working Pressure) must be within specifications.

If pump operates below minimum outlet pressure, it may cause cavitation/erosion in the pump.

Note: We recommend that the pump unit includes a pressure gauge at inlet and outlet.

Dry running:

When running, the pump must always be connected with water supply in order to avoid pump damage.

Disconnection:

If inlet line is disconnected from the water supply, the pump will be emptied which will cause dry running.

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

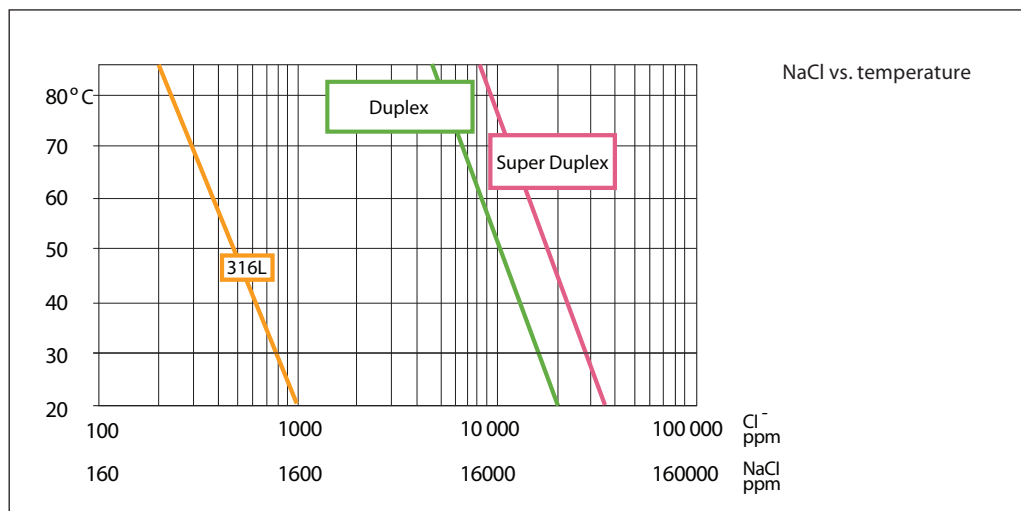
6. Operation

6.1 Temperature

In case of lower operating temperatures, please contact Danfoss High Pressure Pumps.

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

The chart below illustrates the corrosive resistance of different types of stainless steel related to NaCl concentration and temperature. The APP S 674 pump is made of Super Duplex.



7. Long-term shutdown

For a long-term shutdown period, the SWRO system including the pump must be flushed with fresh water (permeate) to remove any salt.

It is recommended to make few turns on the pump to flush it properly.

8. 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.

3. Connect the pump to a tank containing anti-freeze additive. Connect a hose to the inlet port of the pump and through another hose return the flow from the outlet port to the tank with anti-freeze additives.

For further information on anti-freeze media, please contact Danfoss High Pressure Pumps.

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.

Recommended procedure:

1. Disconnect water supply to the pump.
2. Through the lower bleeding plug, empty the pump housing for water and close it again.

9. Service and warranty

Danfoss APP S 674 pumps are designed for long operation, low maintenance and reduced lifecycle costs.

Provided that the pump has been running according to the Danfoss specifications, Danfoss guarantees 8,000 hours service-free operation, however, max 18 months from date of production.

If Danfoss recommendations concerning system-design are not followed, *it will strongly influence the life of the APP S 674 pumps.*

Maintenance:

After 8,000 hours of operation, it is strongly recommended to inspect the pump and change any worn parts, e.g. pistons. This is done in order to prevent a potential breakdown of the pump.

If the parts are not replaced, more frequent inspection is recommended according to our service intervals.

Standstill:

The APP S 674 pumps are made of Super Duplex materials with excellent corrosion properties.

It is always recommended to flush the pump with freshwater when the system is shut down.

9.1 Repair

In case of irregular function of the APP S 674 pump, please contact Danfoss High Pressure Pumps.

9.2 Recommended service intervals

The recommended service intervals on the different parts in the APP S 674 pumps appear from the table below:

Position	Qty. for all pump sizes			Description	Material	Service interval
	3.0-3.5	5.1-9.0	21-38			
1	1	1	1	Housing, main bearing	Super Duplex, PEEK	No need for service
121	1	1	1	Port flange	Super Duplex	No wear part
31	1	1	1	Swash plate	Super Duplex	40,000 hours
66	7	9	9	Pistons	Super Duplex, PEEK	Recommended inspection on a yearly basis; evaluate, if replacement is needed
92	1	1	1	Valve plate	Super Duplex	24,000 hours
91	1	1	1	Port plate	Super Duplex, PEEK	24,000 hours
61	1	1	1	Cylinder barrel	Super Duplex	40,000 hours
65	1	1	1	Retainer plate	Super Duplex	24,000 hours
64	1	1	1	Retainer ball	Super Duplex	40,000 hours
71		1	1	Retainer guide	Super Duplex, PEEK	40,000 hours
62	1	1	4	Spring	Hastelloy, C4	40,000 hours
63	1			Spring guide	PEEK	40,000 hours
142		1	1	Stop for shaft seal	Super Duplex	No wear part
124	1	1	1	Shaft seal	Hastelloy and NBR/FFKM	It is good practice to change the seal after each disassembly of the pump
125	1	1	1	Flange for shaft seal	Super Duplex	No wear part
93	7	9	9	Back-up ring	Teflon	24,000 hours
				O-ring (overall)	NBR	24,000 hours
5, 123, 126, 127, 128, 133, 147, 153				Screw (overall)	AISI 316	No wear part
				Pin (overall)	AISI 316, PEEK	
				Pin (overall)	AISI 316, Super Duplex	No wear part
152	1	1	1	Valve cone (flushing valve)	Super Duplex, PEEK	40,000 hours
134	2			Bleeding screw	Super Duplex	No wear part
3		2	4	Bleeding screw	Super Duplex	No wear part
67	1	1	1	Parallel key	AISI 316	40,000 hours

EC Declaration of Conformity

Danfoss A/S

Danfoss High Pressure Pumps
 Nordborgvej 81
 6430 Nordborg
 Denmark

EG-Konformitätserklärung gemäß EG-Richtlinie 2006/42/EG	EC Declaration of Conformity according to Directive 2006/42/EC	Déclaration de conformité CE conformément à la Directive 2006/42/CE
Hiermit erklären wir, dass die Maschine gemäß 2006/42/EG entwickelt ist.	We hereby declare that the machine is designed according to the directive 2006/42/EC.	Par la présente, nous déclarons que la machine est conçue conformément à la Directive 2006/42/CE.
Beschreibung der Maschine Hochdruck-Pumpe	Machine description High pressure pump	Description de la machine Pompe haute pression
Maschinentyp APP S 674 3.0 / APP S 674 3.5 APP S 674 5.1 / APP S 674 6.5 APP S 674 7.2 / APP S 674 8.2 APP S 674 9.0 APP S 674 21 / APP S 674 24 APP S 674 26 / APP S 674 30 APP S 674 33 / APP S 674 38	Machine designation APP S 674 3.0 / APP S 674 3.5 APP S 674 5.1 / APP S 674 6.5 APP S 674 7.2 / APP S 674 8.2 APP S 674 9.0 APP S 674 21 / APP S 674 24 APP S 674 26 / APP S 674 30 APP S 674 33 / APP S 674 38	Type de machine APP S 674 3.0 / APP S 674 3.5 APP S 674 5.1 / APP S 674 6.5 APP S 674 7.2 / APP S 674 8.2 APP S 674 9.0 APP S 674 21 / APP S 674 24 APP S 674 26 / APP S 674 30 APP S 674 33 / APP S 674 38
Seriennummer N/A	Serial number N/A	Numéro de série N/A
Technisches Dossier, Kontaktperson Leiter Qualitätsabteilung	Technical dossier, Contact person Manager Quality Department	Personne de contact pour le dossier technique Manager département qualité
Angewandte harmonisierte Normen DS/EN ISO 12100: 2011	Used harmonised standards DS/EN ISO 12100: 2011	Normes harmonisées appliquées DS/EN ISO 12100: 2011

Hersteller-Unterschrift / Titel:

Manufacturer's signature / Title:

Signature du fabricant / Titre:



2012 - 12 - 19
Datum

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Date

2012 - 12 - 19
Date

Welm Friedrichsen
Leiter F&E

Welm Friedrichsen
Director R&D

Welm Friedrichsen
Directeur R&D

Danfoss A/S
High Pressure Pumps
DK-6430 Nordborg
Denmark

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