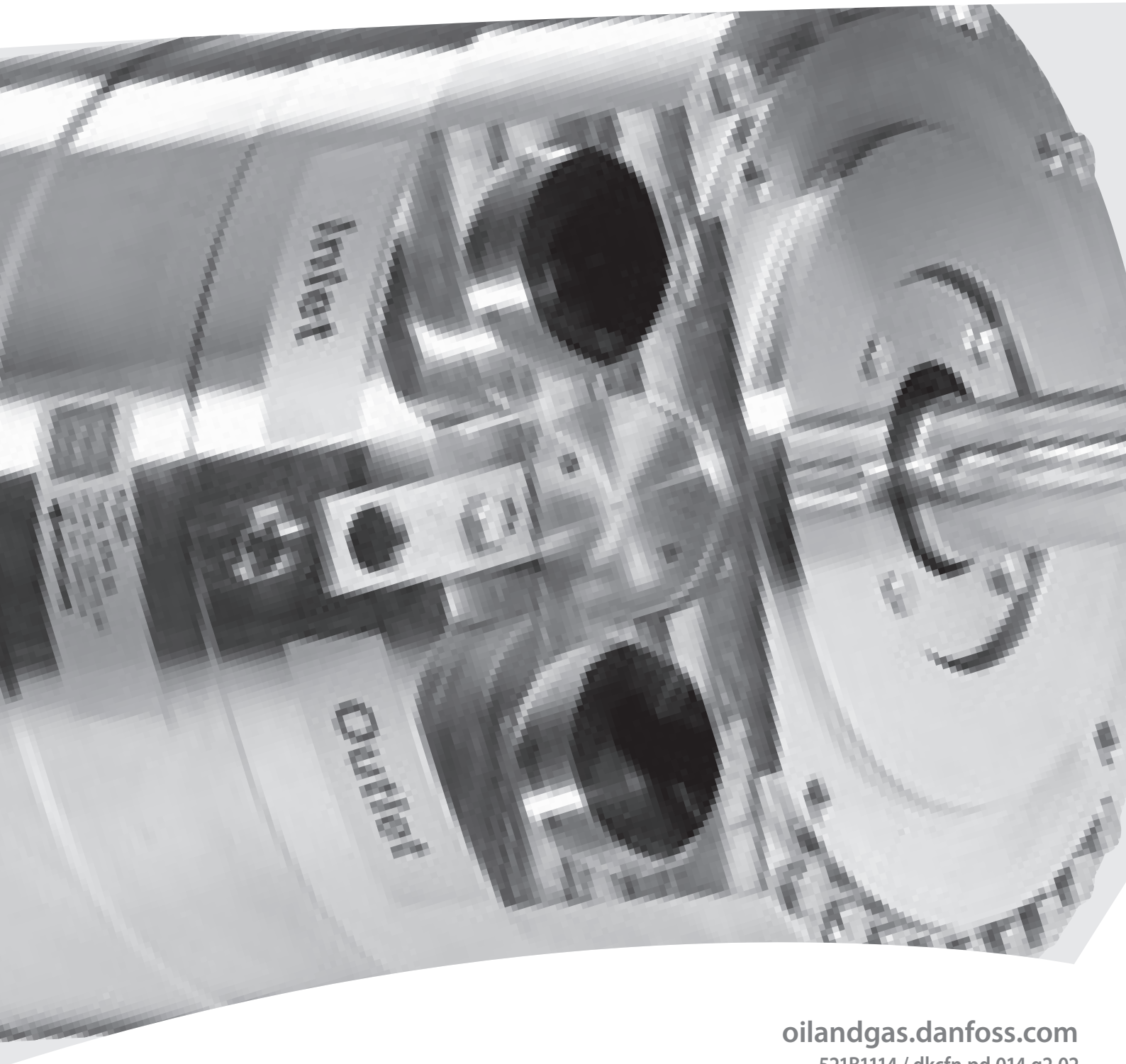


CLP350-500 API674 - Transfer Pump



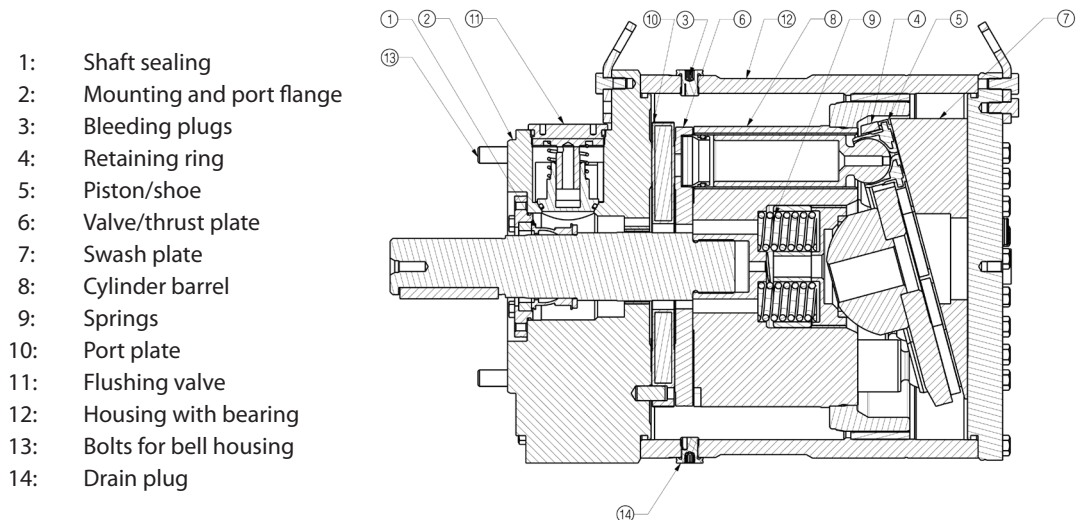


1. General information

CLP350-500 multipurpose pumps are specific designed for various chemicals, liquids, additives and other hard-to-handle fluids in production systems, onshore and offshore. Danfoss CLP pumps are based on the axial piston principle offering long life and high efficiency in the demanding Oil and Gas industry. Danfoss CLP pumps is a very light and compact design, resulting in the smallest footprint on the market.

All parts are designed to provide long service life, i.e. long service life with a constantly high efficiency and minimum of service required. Lubrication of the moving parts in the pumps is provided by the fluid itself. No oil lubrication is thus required.

The pumps are fixed displacement pumps in which the flow is proportional to the number of revolutions of the input shaft and the pump displacement, regardless of any counter-pressure. The pump design ensures a minimal acceleration loss and low pulsation.



2. Benefits

- Constructed to provide maximum reliability
- Designed for a wide range of corrosive, volatile, expensive and other hard-to-handle fluids
- All parts are made of Duplex (SAF 2205/EN1.4462) and Super-duplex (SAF 2507/EN1.4410) and carbon reinforced PEEK
- Generates insignificant pulsations in the pressure line
- One of the smallest and lightest pumps on the market
- No oil lubrication is required
- Long service life and easy maintained
- High efficiency
- ATEX

3. Technical data

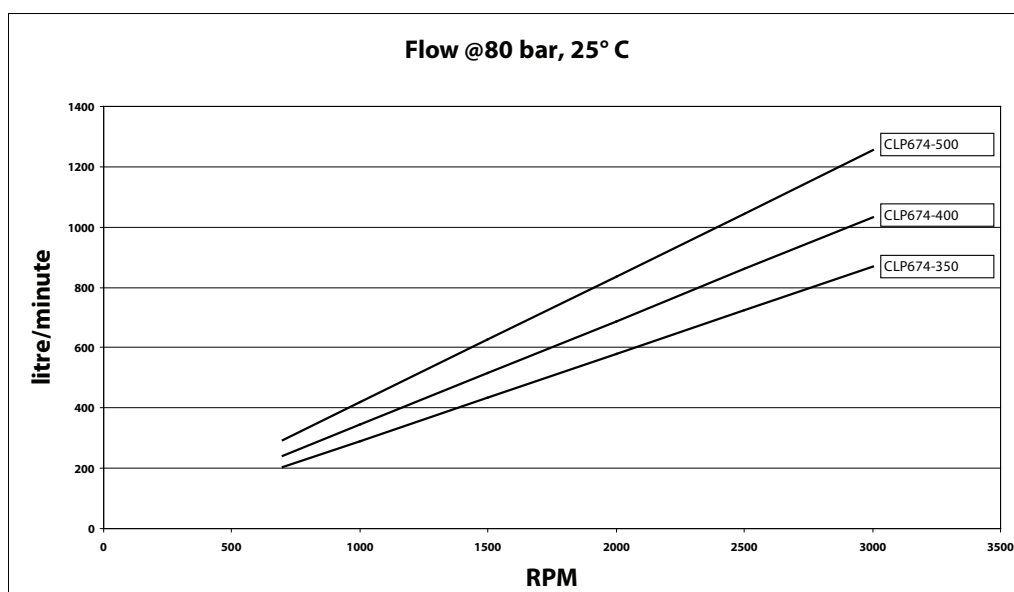
Code number		180B7054		180B7055		180B7056	
CLP674		CLP674-350		CLP674-400		CLP674-500	
Geometric displacement	cm ³ /rpm (in ³ /rpm)	308	(18,8)	362	(22,1)	444,0	(27,1)
Flow (1200 rpm) @ 80 bar	l/min (gpm)	348	(92)	412	(109)	502	(133)
Min. outlet pressure	bar (psi)	40	(580)	40	(580)	40,0	(580)
Max. outlet pressure	bar (psi)	80	(1160)	80	(1160)	80,0	(1160)
Min. inlet pressure cont.		2	(29)	2	(29)	3	(44)
Max inlet pressure cont.	bar (psi)	6	(87)	6	(87)	6	(87)
Max inlet pressure peak	bar (psi)	10	(145)	10	(145)	10	(145)
Maximum speed	rpm	1200		1200		1200	
Minimum speed	rpm	700		700		700	
Power requirement at max. speed and 80 bar (1160 psi):	kW(hp)	55	(73,7)	65	(87,1)	81	(108,6)
Torque	Nm (lb-ft)	436	(321)	512	(377)	642	(473)
Weight, pump only	kg (lb)	105	(231,5)	105	(231,5)	105	(231,5)
Flushing valve Kv value (Δp = 1 bar)	m ³ /h (gpm)	14,4	(63,4)	14,4	(63,4)	14,4	(63,4)

- [1] Standard seal material is NBR, for other materials please contact Danfoss Oil&Gas sales organization
 [2] For lower pressure, please contact Danfoss Oil&Gas sales organization
 [3] For higher pressure, please contact Danfoss Oil&Gas sales organization

4. Flow

Flow at 80 bar, 25° C

Using the diagram shown below, it is easy to select the pump which fits the application best if the flow required and the rotation speed (rpm) of the pump are known.



Furthermore, this diagram shows that the flow can be changed by changing the rotation speed of the pump. The flow/rpm ratio is constant, and the 'desired' flow can be obtained by changing the rotation speed to a corresponding value. Thus, the required rpm can be determined as:

$$\text{Required rpm} = \frac{\text{Desired flow} \times \text{Rated rpm}}{\text{Rated flow}}$$

5. Power requirements

Pump model	Flow			Pressure			rpm	Calc. factor
				60 bar	70 bar	80 bar		
	l/min	m ³ /h	gpm	870 psi	1015 psi	1160 psi		
CLP674-350	374,49	20,88	92,06	41,13 kW	41,99 kW	54,84 kW	1200	508,7
CLP674-400	309,51	18,57	81,88	36,2 kW	42,23 kW	48,27 kW	900	514
CLP674-500	292,6	17,56	77,41	33,85 kW	39,49 kW	45,13 kW	700	519

The power requirements can be determined using one of the following guiding equations:

$$\text{Required power} = \frac{\text{l/min} \times \text{bar}}{\text{Calc. factor}} \text{ [kW]} \text{ or } \frac{16.7 \times \text{m}^3/\text{h} \times \text{bar}}{\text{Calc. factor}} \text{ [kW]} \text{ or } \frac{0.26 \times \text{gpm} \times \text{psi}}{\text{Calc. factor}} \text{ [kW]}$$

1 hp = 0.75 kW
1 kW = 1.34 hp
1 gpm = 3.79 l/min

1 l/min = 0.26 gpm
1 m ³ /h = 4.40 gpm
1 gpm = 0.23 m ³ /h

6. Inlet pressure

Liquid supply to the pump is either made from a tank placed above the pump or directly from a feed pump. The pressure at the pump inlet (l) must be in the range: 2-6 bar (29-72,5 psi) for CLP674 350-400, 3-6 bar (44-72,5 psi) for CLP674-500.

7. Noise level

The noise from the CLP 350-500 is typically 84 dB(A) at 60 bar / 1200 rpm.

Generally, noise will be reduced if speed is reduced and vice versa. Use flexible hoses in order to minimize vibrations and noise.

Since the pump typically is mounted on a bell housing or frame, the noise level can only be determined for the complete unit (system).

It is therefore very important that the pump is mounted correctly on a frame with vibration absorber to minimize vibrations and noise.

The noise level is influenced by:

- The speed of the pump, high rpm create more noise than low rpm
- Rigid mounting of the pump generates more noise than flexible mounting
- Pipe mounting direct to the pump increases the noise level

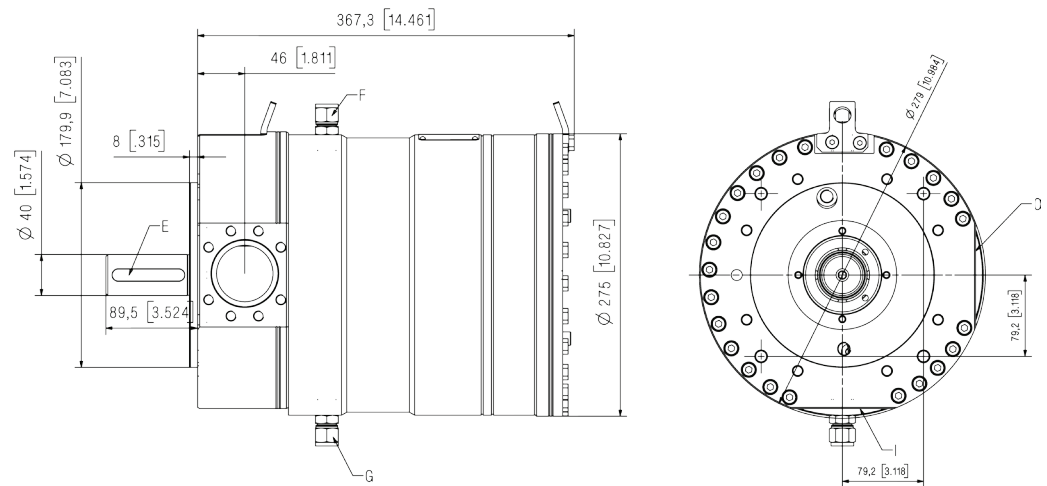
8. Filtration

As many chemicals has very low viscosity, the CLP 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 liquid 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. β10>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 521B1009), which also will provide you with an explanation of filtration definitions and a guidance on how to select the right filter.

9. Pump dimensions



Description		CLP 350-500
E	Parallel key, DIN 6885, mm (in)	12 × 8 × 70 (0.47 × 0.31 × 2.76)
F	Bleeding	½" NPT
G	Drain	½" NPT
I	Inlet port	2" special flange
O	Outlet port	2" special flange
Pump mounting flange		180 B 4

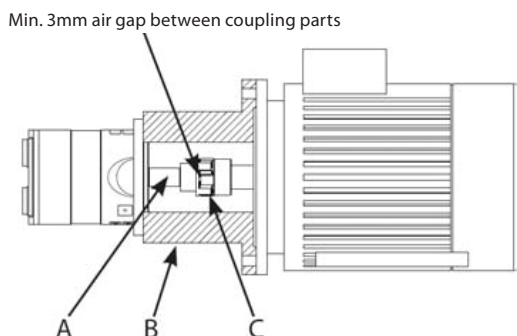
Pump	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	IEC Electric motor
CLP 350-433	550	635	250	406	349	770	55 kW, IEC 250 M-4
CLP 400-433	550	693	280	457	368	845	75 kW, IEC 280 S-4
CLP 433-500	550	693	280	457	419	895	90 kW, IEC 280 M-4
CLP 500	660	810	315	508	406	990	110kW, IEC 315 M-4

10. Installation

The figure below illustrates how to mount the pump and connect it to electric motor/combustion engine.

10.1 Mounting

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



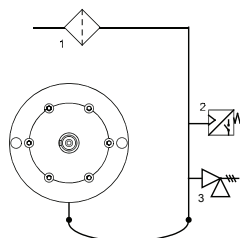
If magnetic drive is required, please contact Danfoss Oil&Gas sales organization for further info. To ensure easy mounting of the flexible coupling without using tools, the tolerances must be dimensioned accordingly.

Note: Any axial and/or radial loads on the shaft must be avoided, see "User guide" (521B1000).

10.2 Open-ended system with direct supply

In order to eliminate the risk of cavitation, a positive inlet pressure is always to be maintained at min. 2 bar (29 psi) for CLP 350-433, 3 bar (44 psi) for CLP 500 and max. 6 bar (72.5 psi).

1. Place the filter (1) in the water supply line in front of the pump.
2. Place a monitoring pressure switch (2) set at min. inlet pressure between filter and pump inlet. The monitoring switch must stop the pump at pressures lower than min. inlet pressure.
3. Install a safety valve (3) in order to avoid system or pump damage in case the pump stops momentarily.
4. NPSHR 30m, 100ft. at max speed. At reduced speed NPSHR is also reduced, contact Danfoss Oil & Gas.



11. Service

The pump must be running according to the Danfoss specifications on pre-filtration, pressure, and rotation speed. To prevent a breakdown, Danfoss recommends a pump inspection after 2000 hours, at which any worn parts must be replaced.

Note: It is 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 CLP 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.

The shaft sealing in the CLP pump is made of AISI 316. At high fluid temperature, the service life of the shaft sealing can be reduced. For these applications it is recommended to replace the shaft sealing after approx. 1000 hours operation.

11.1 Periodic maintenance

The pumped fluid act as lubricant in the CLP. Thus there is no oil in the pump.

11.2 Repair

In case of irregular function of the CLP, please contact the Danfoss Oil&Gas sales organisation.