

Danfoss Water Pumps

type APP 0.6/1.0 , APP 1.8/2.2 and APP 5.1/6.5/7.2/8.2/10.2



Generally

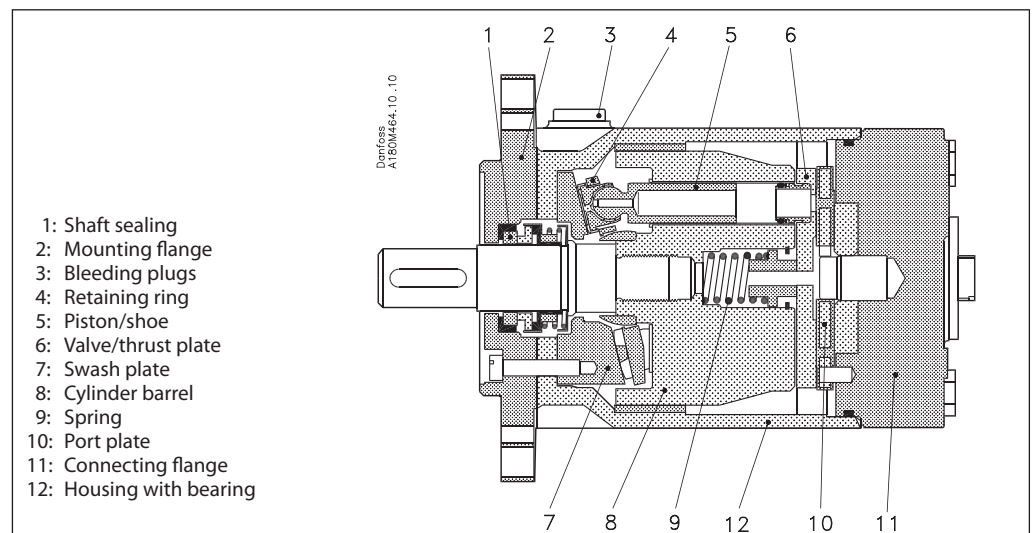
APP 0.6/1.0 , APP 1.8/2.2 APP 5.1/6.5/7.2/8.2/10.2 pumps are designed to supply low viscosity and corrosive fluids under high pressure. The pumps are based on the axial piston principle enabling a very light and compact design.

The pumps are designed so that lubrication of the moving parts in the pumps is provided by the fluid itself. No oil lubrication is thus required.

All parts included in the pumps are designed to provide long service life, i.e. long service life with a constantly high efficiency and minimum of service required.

The pumps are fixed displacement pumps where the flow is proportional to the number of revolutions of the input shaft and the pump displacement.

APP 8.2 cross-section



Benefits

- One of the smallest and lightest pumps on the market (can be installed with direct coupling to an electric motor/combustion engine.)
- Generates insignificant pulsations in the pressure line.
- No preventive maintenance required (no periodic service like e.g. change of lubricant and wear parts).
- Long service life
- All parts of the pump are made of non corrosive materials eg. Duplex and Superduplex stainless steel
- High efficiency

Application examples

- Seawater reverse osmosis filtration
- Ultra and Nanofiltration
- High pressure salt water pumping
- Chemical Pumping

Code numbers

APP 0.6	180B3001
APP 1.0	180B3002
APP 1.8	180B3003
APP 2.2	180B3004
APP 5.1	180B3005
APP 6.5	180B3006
APP 7.2	180B3007
APP 8.2	180B3008
APP 10.2	180B3010

Accessories:

Victaulic® 1 1/2" fittings	180B3202
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All above mentioned pumps are made in duplex and superduplex stainless steel material. Please contact the Danfoss sales organization for further information.

Victaulic® is a registered trademark of Victaulic.

Technical data
Metric-units

APP pumps		0.6	1.0	1.8	2.2	5.1	6.5	7.2	8.2	10.2
Geometric displacement	cm ³ /min ⁻¹	4	6.3	10	12.5	50	63	70	80	100
Max. pressure, cont. ¹⁾	bar	80	80	80	80	80	80	80	80	80
Max. pressure, intermittent ²⁾	bar	100	100	100	100	100	100	100	100	100
Max. pressure, peak ³⁾	bar	140	140	140	140	140	140	140	140	140
Max. speed cont. ⁴⁾	min ⁻¹	3450	3450	3450	3450	1800	1800	1800	1800	1800
Min. speed cont. ⁴⁾	min ⁻¹	700	700	700	700	700	700	700	700	700
Max. flow. cont. at max speed	l/min ⁵⁾	10	17	30	37	85	108	120	137	170
Max. power requirement at 80 bar and max speed:	kW	1.9	2.8	4.4	5.5	13.3	16.8	18.6	21.3	26.7
Weight	kg	5.2	5.2	8.6	8.6	30	30	30	30	30

1) For higher pressure, please contact Danfoss Sales Organization.

2) Intermittent pressure is <10 % every minute.

3) Peak pressure is <1 % every minute.

4) For speeds above 3000 RPM the pump must be boosted at a pressure of 2-5 bar.

5) Flow at max. pressure continuously.

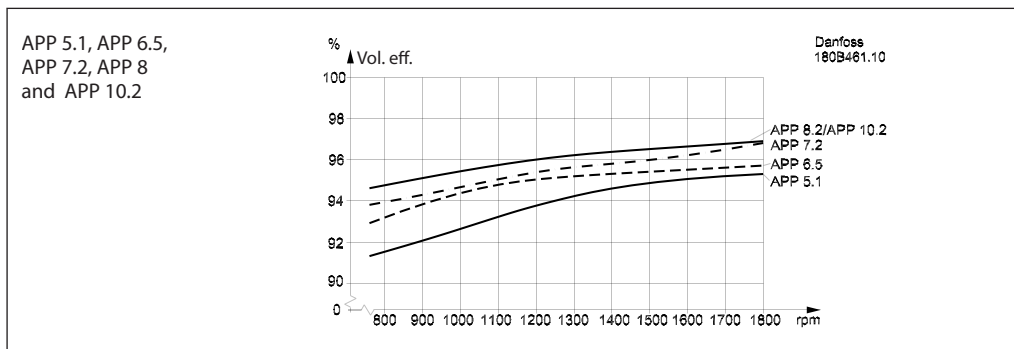
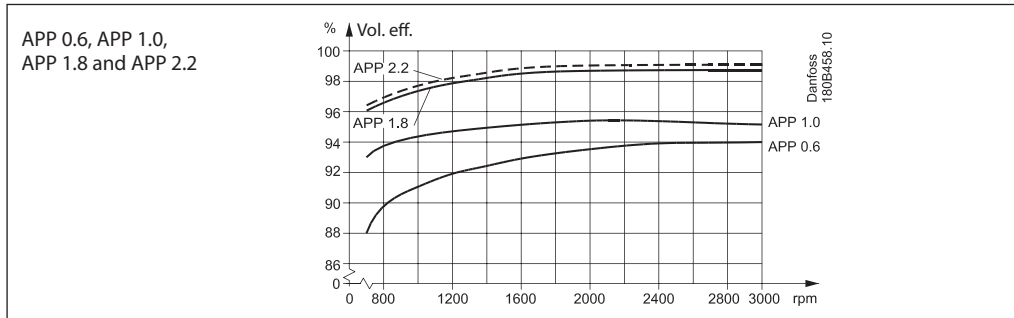
Technical data (continued)

SAE-units

APP pumps		0.6	1.0	1.8	2.2	5.1	6.5	7.2	8.2	10.2
Geometric displacement	in ³ /rpm	0.24	0.38	0.61	0.76	3.05	3.84	4.27	4.88	6.1
Max. pressure. cont. ¹⁾	psi	1160	1160	1160	1160	1160	1160	1160	1160	1160
Max. pressure. intermittent ²⁾	psi	1450	1450	1450	1450	1450	1450	1450	1450	1450
Max. pressure. peak ³⁾	psi	2000	2000	2000	2000	2000	2000	2000	2000	2000
Max. speed cont. ⁴⁾	rpm	3000	3000	3000	3000	1800	1800	1800	1800	1600
Min. speed cont. ⁴⁾	rpm	700	700	700	700	700	700	700	700	700
Max. flow. cont. at max speed	US gal/min ⁵⁾	2.64	4.49	7.92	9.77	22.45	28.53	31.7	36.19	44.9
Max. power requirement at 1160 psi and max speed:	hp	2.6	3.8	5.9	7.4	17.9	22.6	25	28.6	35.9
Weight	lb	9.7	9.7	17.0	17.0	70.5	70.5	70.5	70.5	70.5

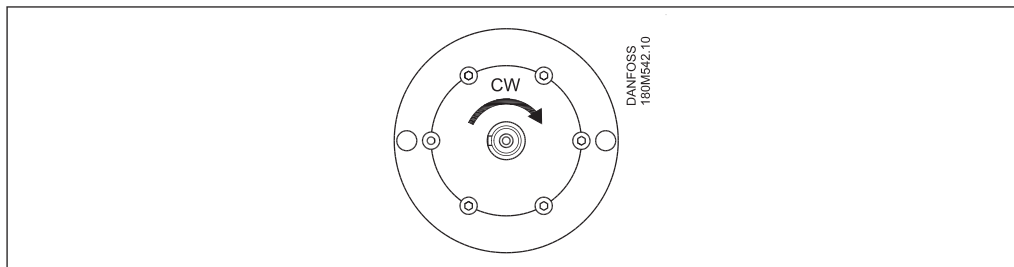
- 1) For higher pressure, please contact Danfoss Sales Organization.
- 2) Intermittent pressure is <10 % every minute.
- 3) Peak pressure is <1 % every minute.
- 4) For higher or lower speed, please contact Danfoss Sales Organization.
- 5) Flow at max. pressure continuously.

Volumetric efficiencies

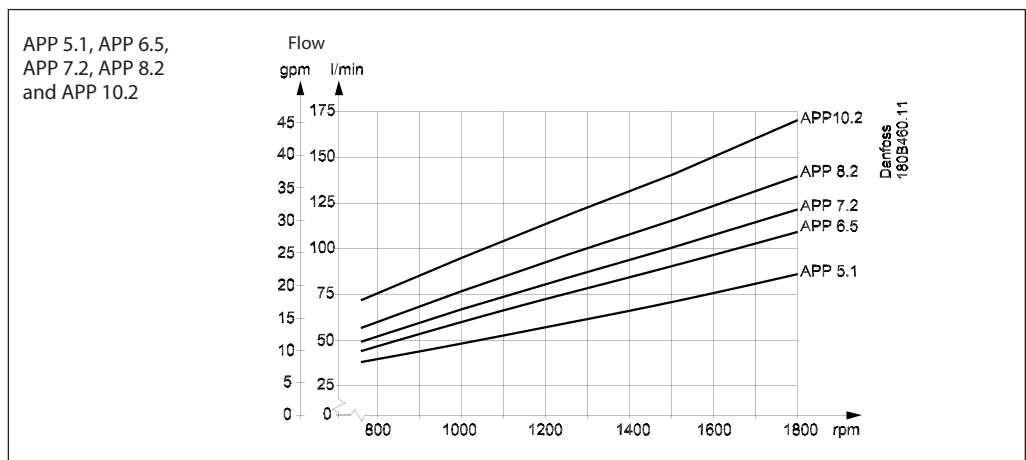
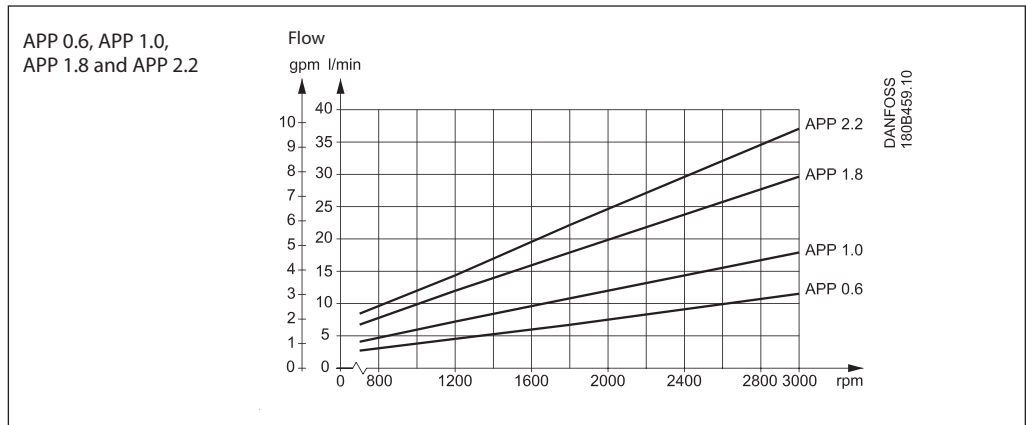


Above volumetric efficiencies are measured at 80 bar / 1160 psi, and are typical average values.

Direction of rotation

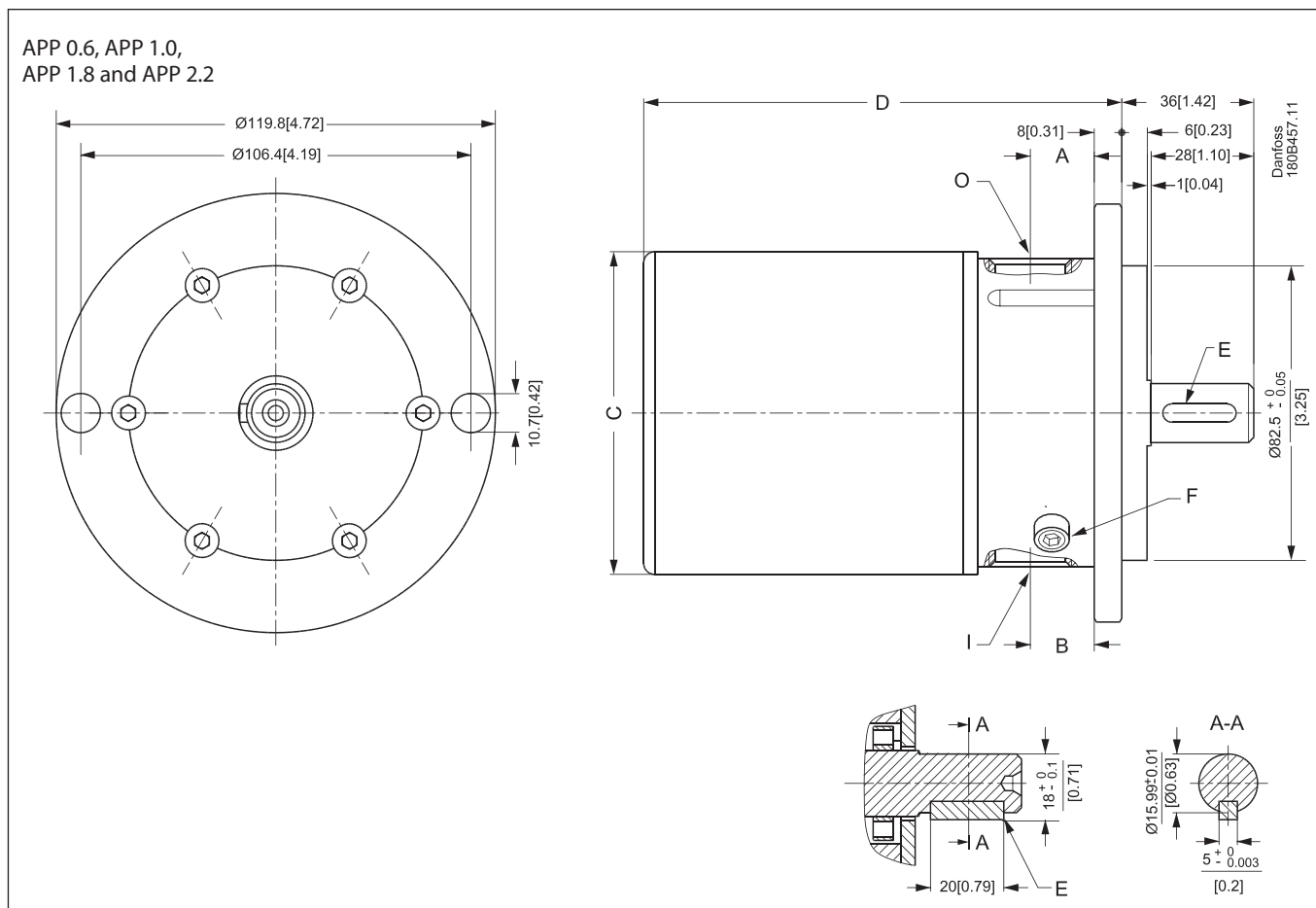


Flow at different rpm



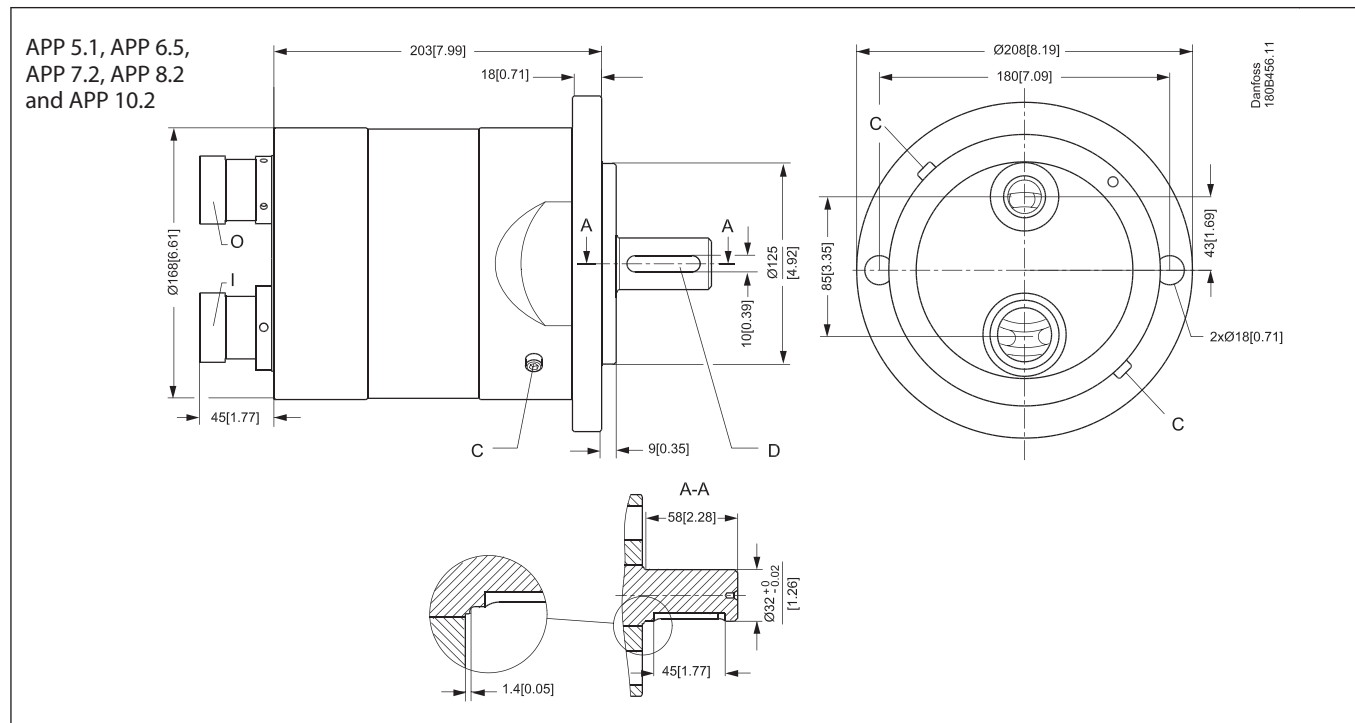
Above flows are measured at 80 bar / 1160 psi,
and are typical average values.

Dimensions, mm (in)



	Description	APP 0.6 and APP 1.0	APP 1.8 and APP 2.2
A	Port position, mm (in)	15.9 (0.63)	18.8 (0.74)
B	Port position, mm (in)	15.9 (0.63)	21.0 (0.83)
C	mm (in)	∅ 88 (3.5)	∅ 105 (4.1)
D	mm (in)	131 (5.2)	166 (6.5)
E	Parallel key, DIN 6885	5 × 5 × 20 (0.20 × 0.20 × 0.78)	5 × 5 × 20 (0.20 × 0.20 × 0.78)
F	Bleeding	M6, Hexagon AF = 5 mm	M6, Hexagon AF = 5 mm
I	Inlet connection	BSP G½"; 15 (0.59) deep	BSP G¾"; 15 (0.59) deep
O	Pressure connection	BSP G½"; 15 (0.59) deep	BSP G½"; 17 (0.67) deep
	Pump mounting flange	SAE A 2	SAE A 2

Dimensions, mm (in)



Description		APP 5.1; 6.5; 7.2; 8.3 and 10.2
C	Bleeding	M6, Hexagon AF = 5mm
D	Parallel key, DIN 6885	10 × 8 × 45 (0.39 × 0.31 × 1.77)
I	Inlet connection (IN)	Fittings, alternative 1 Fittings, alternative 2
O	Pressure connection (OUT)	Fittings, alternative 1 Fittings, alternative 2

Suction pressure

Water supply to the pump is either made from a tank placed over the pump or directly from the mains. The pressure at the pump inlet (I) must be in the range: 1 - 5 bar abs. (14.5 - 72.5 psi abs.)

Temperature

Storage temperature:

- 40°C to +70°C – provided that the pump is drained of fluid and stored "plugged"

Operation on (clean) water:

- Fluid temperature and ambient temperature: +3°C to +50°C

Operation on water containing antifreeze:

- Fluid temperature and ambient temperature: -30°C ¹⁾ to +50°C

1) please see paragraph on antifreeze protection

Antifreeze protection

If a pump requires antifreeze protection, Danfoss recommends Dowcall N or Chillsafe mono propylene glycol from the Dow Chemical Company and Arco Chemical Company, respectively. Both antifreezes are biologically degradable and must be used together with demineralized water. Mixing ratio must be:

- min. 30% antifreeze and 70% demineralized water providing frost protection to -13°C and preventing biofilm in the system.
- max. 50% antifreeze and 50% demineralized water due to increased viscosity, providing frost protection to -30°C.

Shaft load

The pump is neither to be exposed to axial nor radial loads. We therefore recommend to use a flexible coupling for connection to the electric motor or the combustion engine.

Noise level

The chart indicates the noise level in dB(A) measured at a distance of 1 m from the pump at 1500 rpm in a reverberation room. The anechoic noise level is calculated by subtracting 3 dB(A) from the values stated.

	40 bar (580 psi)	140 bar (2000 psi)
APP 0.6	58	72
APP 1.0	61	72
APP 1.8	73	71
APP 2.2	73	71
APP 5.1	74	78
APP 6.5	74	78
APP 7.2	74	78
APP 8.2	74	78
APP 10.2	74	78

Filtration

The applied water must be filtered through a 10 µm abs., β₁₀-value > 5000 filter.

Installation

1. Systems with water supply from tank.

In order to eliminate the risk of cavitation, a positive inlet pressure should always be maintained by observing the following guidelines:

- 1) Place the tank above pump inlet (water level in the tank should always be above the pump).
- 2) Place filter in the water supply line before the tank.
- 3) Dimension the inlet line with minimum pressure drop (large internal diameter, minimum length of pipe, avoid bends, and fittings with small internal diameter.)

2. Systems with direct water supply

In order to eliminate the risk of cavitation, a positive inlet pressure is always to be maintained at min. 1 bar abs. and max. 5 bar abs. (14.5 - 72.5 psi abs.)

- 1) Place the filter in the water supply line before the pump.
- 2) Place a monitoring pressure switch set at min. 1 bar abs (14.5 psi abs) between filter and pump inlet. The monitoring switch must stop the pump at lower pressure than min. 1 bar abs (14.5 psi abs).

Mounting

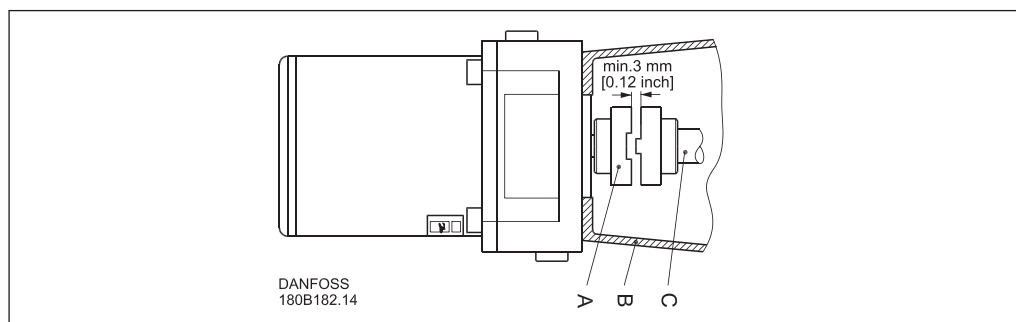
Below figure illustrates how to mount the pump and connect it to electric motor/ combustion engine.

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

If alternative mounting is required, please contact Danfoss Sales Organization for further information.

To ensure easy mounting of the flexible coupling without using tools, the tolerances must be dimensioned accordingly.

Make sure to observe the recommended mounting tolerances for the flexible coupling used, as any axial load on the shaft must be avoided.



Operation**Start-up:**

The system has to be flushed prior to start-up to remove possible impurities from pipes, hoses etc. Before starting the pump, the top bleeding plug "C" is loosened. When water appears from the bleeding plug, the pump is filled with water, and the plug is retightened. Make sure that rotation direction of the pump is correct.

With its inlet line connected to the water supply the pump is now started with open outlet port (O).

Safeguarding of Pump during Operation:

When running, the pump must always be connected to the water supply to prevent the pump from running dry.

In systems with water tank it is recommended to build in a level gauge which will make the pump stop at too low water level.

In systems without tank it is recommended to build in a pressure switch between filter and pump inlet-port to make the pump stop at min. 1 bar abs (14.5 psi abs) to prevent the pump from running dry.

For all systems it is recommended to install a temperature gauge for stopping the pump when the temperature exceeds 50°C (122°F).

During a long period of standstill the pump must be flushed with fresh tap water or integrated in the membrane CIP cleaning cycle.

Disconnection:

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

Before starting the pump again, the starting procedure described in the Start-up-paragraph must be followed.

Transport and storage precautions

If there is risk of exposure to temperatures below the freezing point during transport or storage, the system likewise has to be flushed with a glycol mixture (minimum 30% monopropylene glycol - please see paragraph on antifreeze protection).

Recommended procedure:

1. Systems with direct water supply:
 - 1.1 Disconnect the water supply to the pump/system.
 - 1.2 Empty the pump through the lower bleeding plug. Retighten the plug when the pump is empty.
 - 1.3 Connect the pump to a tank with anti-freeze additive. Connect a hose to the pump port (O) and the other end of the hose back to tank.
 - 1.4 Quickly start and stop the pump. Make sure that the pump does not run dry.
 - 1.5 Empty pump of anti-freeze medium (through the lower bleeding plug). Remount and retighten the bleeding plug, when the pump is empty.
 - 1.6 The pump is now protected against frost.

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