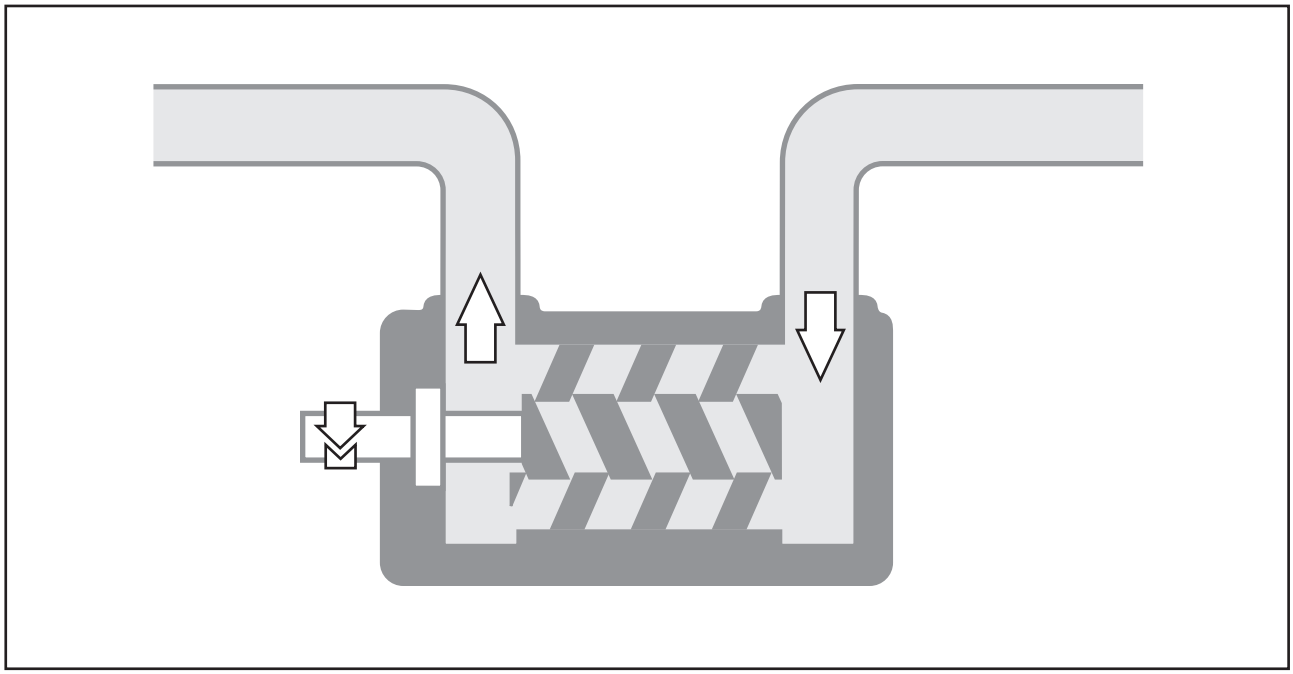
Installation and Start-up Instruction



Valid for ACG 045-070 Opti Line Generation 8

BEFORE COMMENCING ANY WORK,
READ THIS INSTRUCTION CAREFULLY!

Indentification of safety instructions

Non complience of safety instructions identified by the following symbol could affect safety for persons

Safety instructions where electrical safety is involved are identified by:

Safety instructions which shall be considered for reasons of safe operation of the pump or pump unit and/or protection of the pump or pump unit itself are marked by the sign:

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Installation

Design limitations and technical data for each pump are found in the Product description. Installation of IMO AB low pressure pumps does not require special skills. However, these instructions presume that the work is carried out by experienced fitters!

11 Failure to comply with these instructions may cause damage and personal injury

Transport and storage

Always protect the pump against ingress of water and other impurities. Store the pump in a clean, dry and warm environment. The pump is delivered with the internals oiled and with protective covers over the pipe connections and drain openings. These covers should remain in place for as long as possible during the mounting and installation procedure but must be removed before start up.

Lifting of pump

Lifting of the complete pump unit with the lifting device attached to the motor, should be avoided as the motor's lifting provisions may not be able to carry the combined weight of the pump and motor.

12 All pumps should be lifted with straps securely attached to the pump or pump unit, so that the center of gravity is located between the straps in order to avoid tipping of the pump.

Strainer

The pump has to be protected from foreign matters such as weld slag, pipe scale, etc., that could enter the pump via the suction line. If the cleanliness of the system cannot be guaranteed, a strainer must be installed in the inlet pipe near the pump. For practical reasons a suction strainer with 0.8-2.0 mm mesh openings is recommended.
The size of the strainer should be selected so that it is large enough to allow adequate pressure at the pump inlet. The pressure drop across the strainer should preferably not exceed 0.1 bar at max. flow rate and normal operating viscosity. A vacuum gauge between the strainer and the pump inlet is recommended to indicate when the strainer needs cleaning.

13 All work carried out on the pump has to be performed in such a manner that risks for personal injury are observed.

14 Lifting a complete pump unit, using slings or hooks attached to the pump or connecting frame may be dangerous since the centre of gravity of the pump unit may be higher than the points of attachement.

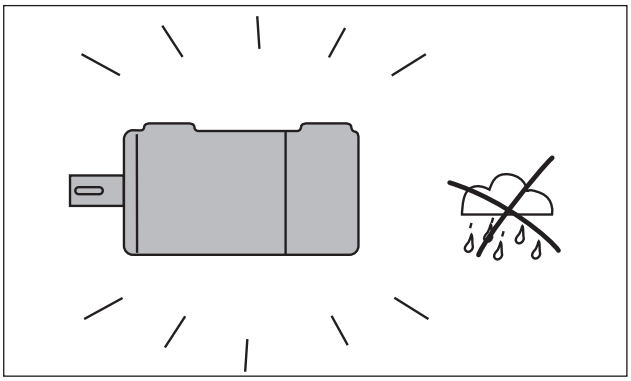

Fig 1. Keep dry and clean

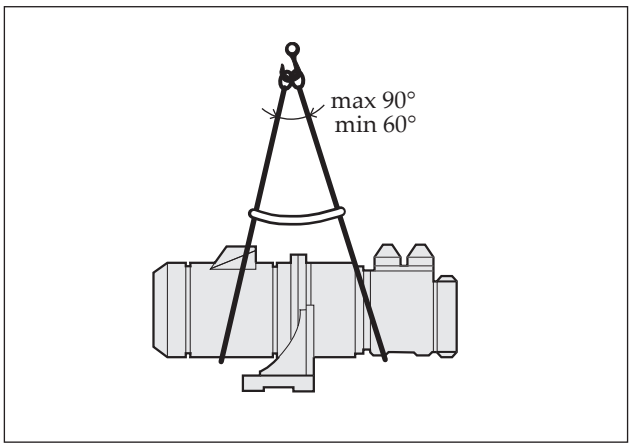

Fig 2. Lifting the pump

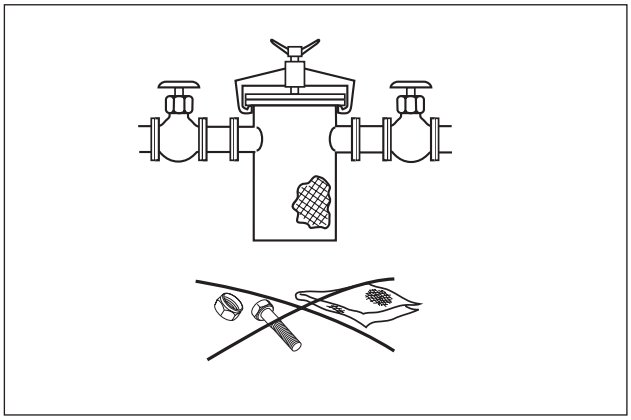

Fig. 3 Strainer

Pipe connections

The pipe work shall be installed and supported so that no pipe stresses are transferred to the pump body. The pipe forces and torque transferred to the pump shall be in accordance with ISO 14847. The pipe work should be tight in order to avoid leakage and infiltration of foreign particles and/or air. Shut off valves should be installed in both suction and discharge pipes, so that the pump can be hydraulically isolated.

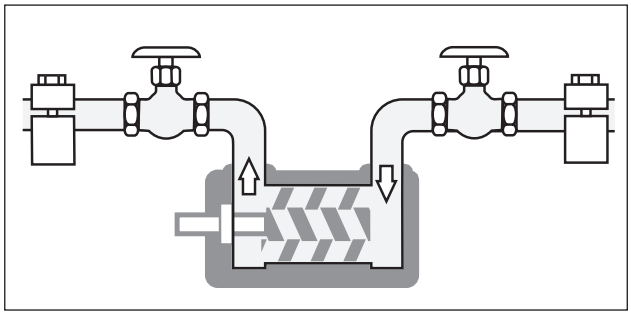

Fig. 4 Pipe connections

Suction line

The suction pipe should be designed so that the total pressure drop, measured at the pump inlet flange, does not exceed the suction capability of the pump. Make a proper calculation of the suction line including components such as valves, strainer, pipe bends etc. Generally, the pressure drop in the suction line should be as low as possible, which is achieved if the suction pipe is short, straight and has a suitable diameter. The velocity in the suction line should be kept in the range 0.5 - 1.2 m/s. For L.O. circulating systems, we recommend to keep it as low as possible. The suction line must be equipped with a port that allows filling the pump before start.

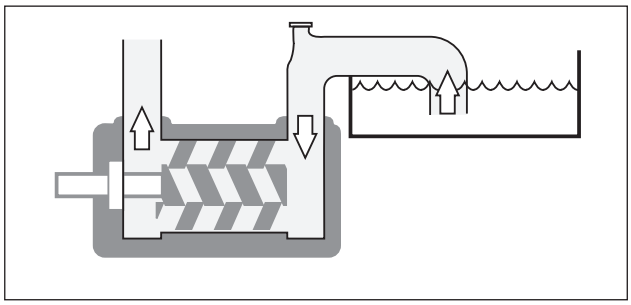

Fig. 5 Suction Line

Discharge line

The discharge line should be dimensioned to keep the velocity in the range 1 - 3 m/s.

Deaeration

In installations with negative suction head, where the pump might be started against a pressurized system, a deaeration pipe with an orifice (2-3 mm is recommended) has to be installed. The deaeration pipe should be connected to the outlet pipe's highest point. This must also be installed when the pump is used as a stand-by pump.

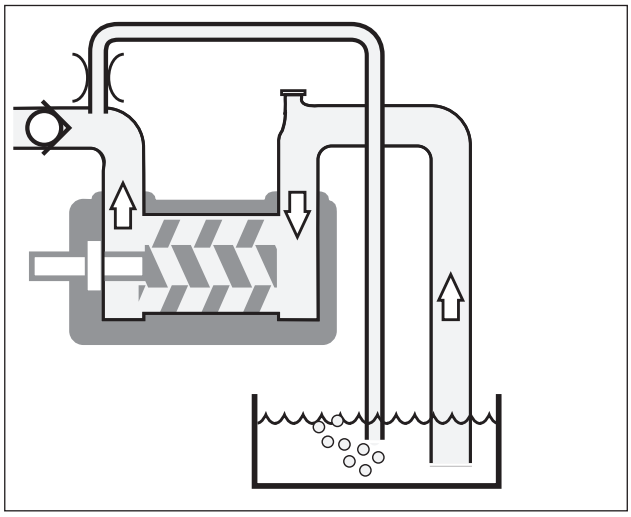

Fig. 6 Deaeration

Liquid trap

In some mounting arrangements the pump may not retain the liquid at stand still. In such installations the suction pipe should be arranged so it forms a liquid trap together with the pump, keeping the pump half filled with liquid.

15 When handling liquids that may harm skin use gloves and/or protective clothing

16 When handling liquids shich may involve fire hazards appropriate precautions to avoid danger are to be taken.

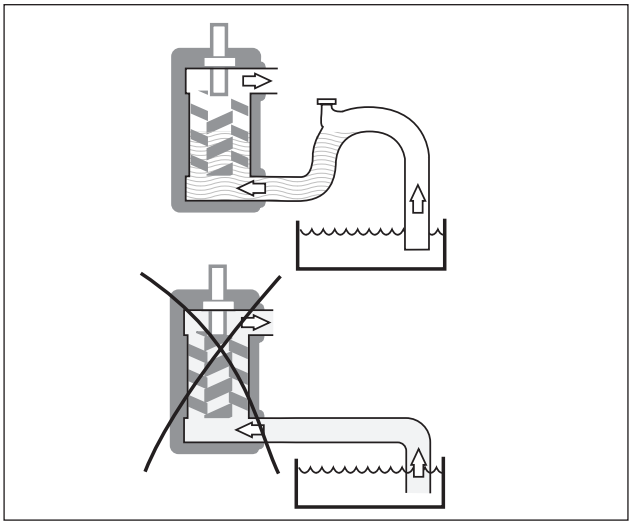

Fig. 7 Liquid trap

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Gauges

Gauges for monitoring the pump's working conditions are recommended. These gauges should be placed readable as close to the pumps in- and outlet flanges as possible. On the ACG Optiline standard pumps there are gauge connections for both in- and outlet.

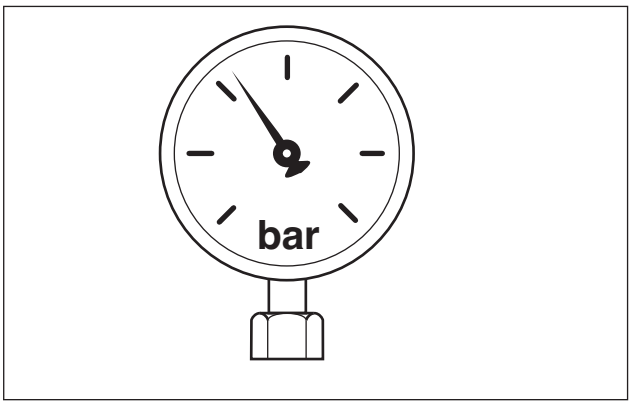

Fig. 8 Gauges

Pressure relief valve

All systems with screw pumps must be equipped with a pressure relief valve installed immediately adjacent to the pump. In the standard versions of IMO ACG Optiline pumps, this pressure relief valve is an integral part of the pump to protect the system against excess pressure. When liquid is circulated through the valve it heats up in proportion to the set pressure level and the percentage of by-passed liquid. 100% bypass can only be tolerated for less than about 3 minutes, 50 %by-pass generally for unlimited periods of time. If more than 50% recirculation is anticipated, a value specific to each application should be determined by closely monitoring the pump body temperature. If the pump is operating in line with a separate pressure control valve (see fig. 9), the setting of the relief valve should be high enough so as not to interfere with the control valve. Likewise, if two pumps are operating in parallel, the setting should be such that interference between the two valves is avoided.
Also remember that a total bypass by the pumps internal relief valve will cut of the cooling flow to the pumps magnetic coupling and cause an overheating with destroyed magnets as a result quite fast.

17 Oil leakage may make the floor slippery and couse personal injury.

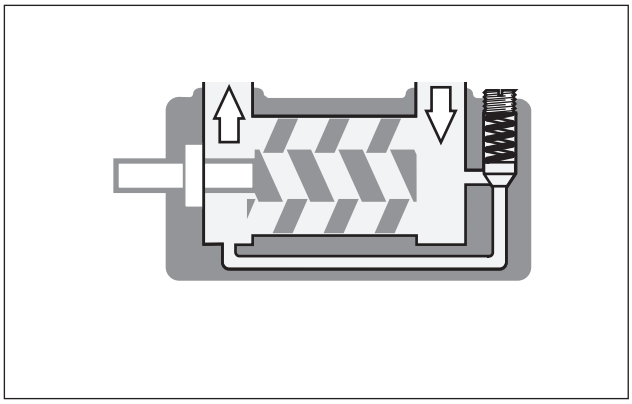

Fig. 9 Pressure Relief Valve

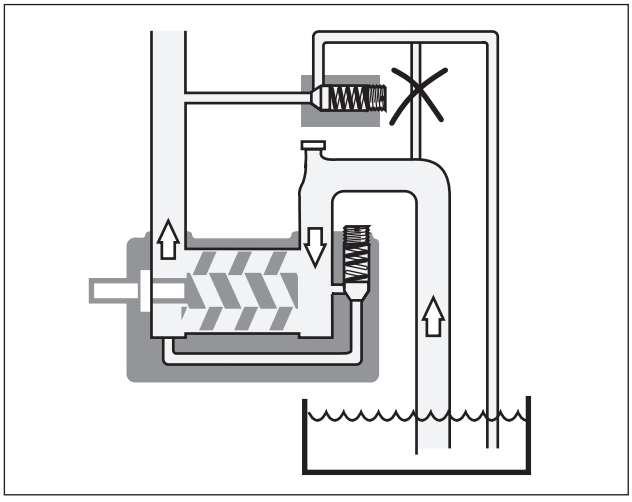

Fig. 10 External control with presssure relief valve

Startup

Pressure testing and flushing

The system must be flushed and pressure tested before connecting the pump. If corrosive liquid, such as water is used, the system must be thoroughly drained, dried and protected against corrosion after having been flushed.

Before starting:

After installation and whenever it can be assumed that the pump has been emptied, the pump must be thoroughly filled with liquid. See fig 11.

18 Make sure the prime mover is locked out and can not be started accidentally.

Direction of rotation

When the pump is ready to be started, switch the motor briefly on and off and check that the drive motor rotates in the correct direction as indicated by the rotation arrow. The arrow is placed on the side of the front cover 5010 as well as on riveted steel plates on the connecting frame 003.

Differential pressure

Differential pressures bellow 1 bar is strictly forbidden as the magnetic coupling under these conditions may loose its cooling flow and cause an overheating of the magnetic coupling with a risk of a potential fire as a result. We do strongly recommend magnetic coupled pumps to be equipped with a differential pressure monitoring device that stops the pump automatically if the differential pressure for some reason should drop to below 1 bar.

Air in the pumped fluid

It is forbidden to use the ACG Optiline pump with fluids that contains more than 0,2% of air due to the risk of ignition during an eventual overheating of the pump.

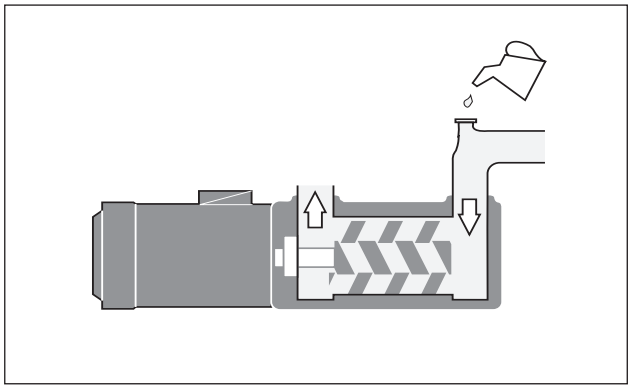

Fig. 11 Filling the pump

19 Don't mix up with arrow for inlet and outlet!

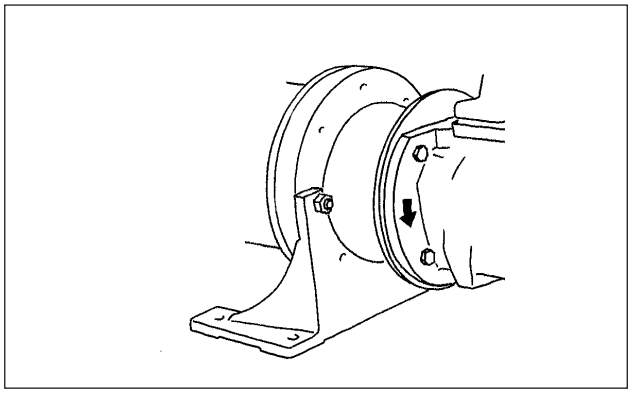

Fig. 12 Direction of rotation

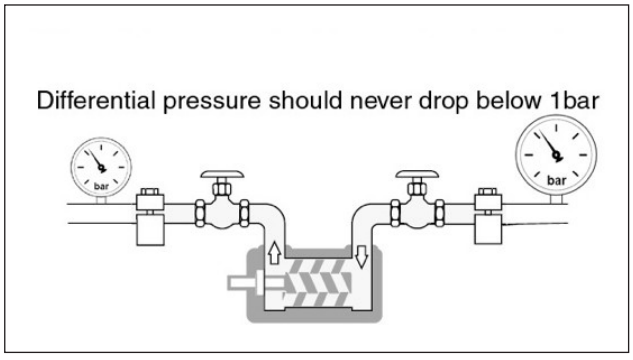

Fig. 13 Differential Pressure

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Trouble shooting

Problem	Cause	What to do
Wrong direction of rotation	- Electric cables to motor wrongly connected.	Reverse the terminal connection on electric motor. 20  Connecting and disconnecting of electric cables must be done only by personnel authorized to do such work.
The pump cannot be primed	- Wrong direction of rotation. - Suction line is not open or pressure drop in the suction line is too high. - Major air leakage into the suction line. - The pump cannot evacuate the air through the discharge line due to excessive counter pressure.	See above. Check all components in suction line. The inlet condition should be checked with a vacuum gauge at the pump inlet. Check the suction line. See the chapter on Deaeration (see page 22).
No flow	- The pump is not primed. - The pressure relief valve is set below the counter pressure.	See above. Readjust the pressure relief valve to a value above counter pressure.
Flow too low	- The pressure relief valve is set too low (Discharge pressure also low). - Something is restricting the flow in the suction line. (This would usually cause noise). - The pumped liquid contains a significant amount of compressible gas, such as free air. (This would usually cause noise).	Readjust the pressure relief valve Check all components in the suction line (strainers, valves etc.). See the chapter on Noise and Vibration. (Page 11).
Pressure too low	- The pressure relief valve is set too low. - Counter pressure in the discharge line is too low due to a major leakage. - The valve piston is stuck in open position. - Something is restricting the flow in the suction line. (This would usually cause noise). - The pumped liquid contains a significant amount of compressible gas, such as free air. (This would usually cause noise). - A too small pump has been chosen.	Readjust the pressure relief valve. Check the components in the discharge line inclusive the recipients. Check the valve. See Maintenance and Service instruction for respective pump. Check all components in the suction line (strainers, valves etc.). See the chapter on Noise and Vibration. (Page 11). Contact your IMO AB representative.

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Problem	Cause	What to do
Pressure too high	- The pressure relief valve is set too high. - The oil is too cold (or has higher viscosity than anticipated). - Counter pressure in the discharge line is too high.	Readjust the pressure relief valve. Reduce the pressure setting until operational temperature has been reached. Check the discharge line.
Drive motor difficult to start or tends to stop by tripping the motor overload relay	- Counter pressure too high. - Liquid too cold. - Motor is undersized for the prevailing conditions. - Electrical power supply faulty. - Motor overload relay set too low or is faulty. - Incorrect setting of Y/D starter.	See above: Pressure too high. Readjust the pressure relief valve to a lower value. Thus the power consumption for the pumping is relieved and overloading due to the high viscosity may be avoided. When the liquid has reached normal temperature and thus flows easily, the relief valve is reset to normal pressure. Check the motor. Check the motor and motor connection. Readjust or replace the relay. Readjust the setting of the starting sequence. The time before the motor overload relay is tripped should not exceed 10-15 seconds.
Noise and vibration 21 Monitor the pump function and shut down if any sign of malfunction is noticed	- The flow to the pump is insufficient. - Insufficient support of pipe work. - Bad alignment - Air leakage into the suction line. - Free air in the liquid or gas cavitation. - Faulty electrical supply.	See chapter: The flow is too low. Check for pipe vibrations in the pump connections. Check that the pipes are sufficiently clamped. Check alignment, see page 4. Check the suction line for air leakage. For pumps with Tuning: Contact your IMO representative or IMO service department. Check all three phases of the supply.

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