

A Colfax Business Unit

OptiLine ACG8 Screw pump

Maintenance & Start up Instruction



Introduction

A screw pump from IMO is a quality product that is designed for a long problem free operation in tough environments. As all other mechanical products they do however requires a certain grade of maintenance and service in order to guarantee a faultless and economic favourable operation.

A recommendation is to go through the pump each 5 year in order to replace wear details such as ball bearings and certain gaskets and o-rings. A relatively small review of a screw pump from IMO means that the pump in most of the cases will be in a condition "as new" and therefore give the operator another long and problem free operation.

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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List of components

Valid for all ACG Optiline Generation 8 pumps with sizes 045, 052, 060 & 070 and leads K, N & D With version codes NHBP, NJBP, NKBP, NLBP & NMBP.

Pos			Included components in Spare part sets				irt sets
No	Designation	Qty	G012	G054	G057	G070	G098
002	Motor	1					
003	Connecting frame	1					
004	Angle bracket	1					
005	Magnetic coupling complete	1					х
005A	Retaining ring	1		х	х		х
005B	Sealing can	1					х
005C	Inner magnetic rotor	1					х
005D	Outer magnetic rotor	1					х
006A	Screw	4					
007A	Screw	6/8					
007B	O-ring	1		х	х		х
1020	Power rotor	1	х	х			
113	Shaft key	1	х	х			
122	Ball bearing	1		х			
124	Retaining ring	1		х	х		
124A	Support ring	1		х	х		
202	Idler rotor	2	х	х			
401	Pump body	1					
451	Screw	4/6					
453	Screw	4					
462	Plug	2					
462A	Sealing washer	2		х	х		
480	Valve housing	1					
5010	Front cover	1					
502	Plug	2					
506	Gasket	1		х	х		
514	Retaining ring	1		х	х		
556	Gasket	1		х	х		
601	Valve cover	1				х	
602	Sealing washer	1		х	х	х	
605	O-ring	1		х	х	х	
608	Valve spindle	1				х	
608A	Retaining ring	1				х	
612	Regulating nut	1				х	
614	Valve piston	1				х	
615	Valve spring	1				х	
701	Screw	4					
701A	Washer	4					
702	Screw	4					
702A	Washer	4					
703	Screw	3					
703B	Nut	3					
998	Drive hub	1					
998B	Screw	1					

Explanations:

G012: Rotor set G054: G012+G057 + pos. no 122 G057: Joint kit G070: Valve element G098: Magnetic coupling



Before commencing any work, read this instrucion carefully! Failure to comply with these instrutions may cause damage and personal injury!

For more information about the pumps identification code, technical data and performance we refer to the ACG Product description.



Ordering Code

		Part numbers for pump size				np size
Item	Spare Parts sets		045	052	060	070
G012	Rotor set D-lead					193023
	N-lead		193015	193017	193019	193021
	K-lead		193016	193018	193020	193022
G054	Major kit = G012+G057 + pos.no.122		-	-	-	-
G057	Joint kit		193031	193032	193033	193034
G070	Valve element		190990	190990	190984	190984
G098	Magnetic coupling	Η	193035	193035	-	-
		J	193036	193036	-	-
		Κ	193037	193037	193040	193043
		L	193038	193038	193041	193044
		М	193039	193039	193042	193045
122	Ball bearing		192855	192855	192827	192827
480	Valve housing		191022	191025	191028	191031

Recommended Spare Parts Kits and tool kits

Every shutdown for service of a plant is costly. The time for repair should therefore be limited to a minimum which can be accomplished by keeping a spare pump. The changed pump can later be repaired at a suitable place and can then be used as a spare pump. For maintenance the following spare parts kits and tools are recommended:

Kit	Contents	To be used for
G057	Gaskets, o-rings etc.	Dismantling of the pump
G012	Rotorset	Repair after major breakdown or great wear
122	Ball bearing	Repair after major breakdown or great wear
193128	Guide pins pump size 045	For dismantling and assembly of the pump
193129	Guide pins pump size 052	For dismantling and assembly of the pump
193130	Guide pins pump size 060	For dismantling and assembly of the pump
193131	Guide pins pump size 070	For dismantling and assembly of the pump

Service intervals

The intervals for inspection and replacement of wear parts vary greatly with the properties of the pumped liquid and can only be determined by experience. All internal parts of the ACG Optiline pump are lubricated by the pumped liquid. Pumping liquid which contain abrasive materials, or liquid that is corrosive, will significantly reduce service life and call for shorter service intervals. Wear in the pump will normally show as:

- Vibration
- Noise
 Loss of car
- Loss of capacity
 Paduation in flat
- Reduction in flow/pressure
 Loss of the magnetic neuron
- Loss of the magnetic power

We recommend planned inspections and/or overhaul at regular intervals, not exceeding 5 years. It is recommended to always have the spares included in joint spare part kit G057 together with the ball bearing 122 available for a planned inspection.

Inspection of rotors

To reach the idler rotors in a quicker way than described in the dismantling section, loosen the rear cover (480) with the valve. Screw out the idler rotors backwards. Internal clearances in the pump, which are vital for its proper function, may have been affected by wear. Acceptable wear can be determined only by experience of the actual application. As a rule of thumb the following max clearance values may apply: Between rotor and bores: 0.2 mm, Between rotor flanks: 0.4 mm For light duties (low pressure, medium viscosity) even bigger clearances may be acceptable but for low viscosity/high pressure duties the limit will be lower. Also watch if there are major scratches on these parts.

Inspection of the magnetic coupling

The magnetic coupling with all its components is considered to be maintenance free if operated and mounted according to our instructions.

The lifetime of the magnets is well within the lifetime of the pump and exchange of the magnets is only necessary if a major breakdown has occurred as a result of for example excessive amounts of dirt or particles in the pumped fluid.

Common aspects whit magnetic couplings

Permanent magnetic couplings generate a strong magnetic field. The installation must be carried out only by trained staff that has the understanding of how a magnetic coupling acts and all the safety precautions related to it. All installation instructions must be strictly followed. Modifications or changes to the magnetic coupling or its components are not to be allowed under any circumstances. IMO does NOT take any responsibilities for damages caused by improper use or damages related to this.

Magnetic data carriers such as bank cards, floppy disks etc may become unreadable and should always be kept separated from the magnetic field.

DANGER

Installations and maintenance must always take place during complete shutdown in an un-pressurised condition. The drive unit must be secured against inadvertent switching on by means of blocking the electrical supply to the electric motor in order to avoid serious injuries due to rotating parts.



ATTENTION! In areas where permanent magnetic couplings are handled or stored with open access, persons with heart **PACEMAKERS** should keep a distance of 3 meters. For permanent magnetic couplings assembled within a pump a safety distance of 3 meter is sufficient.



Precautions prior to starting maintenance on the pump



If the pumps operating temperature exceeds 60°C, let the pump cool off before any service, maintenance or dismantling work is commenced to avoid burn injury



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



When handling liquids that may harm skin, use gloves and/or protecting clothing!



When handling liquids which may involve fire hazard appropriate precautions to avoid danger are to be taken.



In case of failure for system with elevated pressure, fluid jets may cause injury and/ or damage.



Oil leakage may make the floor slippery and cause personal injury.



Before any maintenance work, ensure that the driver is deenergized and the pump hydraulically isolated.



Connecting and disconnecting of electrical cables must be done only by personnel authorized to do such work.

Dismantling and reassembling the pump

List of tools necessary for dismantling and reassembly



- A = Puller
- B = Spanner various sizes
- C = Plastic mallet
- D = Allen keys various sizes
- E = Mounting Sleeve for ball bearing (sizes see table)
- F = Screw driver
- G = Circlip pliers
- H = Guide Pins (for ordering code, see table page 5)
- J = Oil can

Sectional View



Dismantling



- Turn the electricity OFF.
- Close the valves.
- Disconnect the electric motor.
- For horizontal installation drain the pump by loosen screws 453 3-4 turns and loosen valve housing 480.



- Mount the first half of the 4 guide pins which comes in two parts through the pumps front cover into the connecting frame.
- Attach the dismantling bolts and slowly start to tight them until the pump is separated from the electrical motor.
- Continue to tight the bolts while making sure that the pump and the electric motor with its connecting frame is in a straight line with each other.



• Remove the 4 bolts 701 and the washers 701A



- Mount the extension guide pins when it is possible and continue to separate the pump from the electrical motor in an straight line in order to avoid damages on the magnets.
- The use of a strap or similar devices on the electrical motor in order to stabilize and secure the package from the magnetic force is recommended.









- Unscrew the bolts 451 from the front cover 5010
- Separate the front cover 5010 with its gasket 506 from the pump house 401.













• Unscrew the locking bolt 998B from the coupling 998.





• Use a three arm legged puller and remove the coupling 998 from the electrical motor.

Reassembly



• Mount the coupling half 998 onto the drive shaft of the electrical motor by means of a big washer and a threaded pin and a nut that is tightened in order to press the coupling half onto the shaft.

NOTE: Do not use a hammer as this can Damage the shaft!

DRIVE SHAFT MOTOR									
	Motor Drive shaft		Magnetic coupling						
Pump size	IEC -no.	Ø Shaft	Designation	Act.no.	DST75-10 192856	DST75-20 192857	DST75-30 192858	DST75-40 192859	DST75-60 192860
	ice not	(mm)	besignation		Mounting distance A ±0.2 (mm)				
	100	28	D.C.T.R.C. 440-400	100045			20		
	100		115175-110728	192815	20	20	20	20	0
045/052	112	28	00110 10120						
045/052	112 132	28 38	DST75-110/38	192816	41	41	41	41	21
045/052	112 132 160	28 38 42	DST75-110/38 DST75-110/42	192816 192817	41 73	41 73	41 73	41 73	21 53
045/052	112 132 160	28 38 42	DST75-110/38 DST75-110/42	192816 192817	41 73 DST110-22 192843	41 73 DST110-50 192844	41 73 DST110-80 192845	41 73	21 53
045/052	112 112 132 160	28 38 42 38	DST75-110/38 DST75-110/42 DST75-110/38	192816 192817 192816	41 73 DST110-22 192843 21	41 73 DST110-50 192844 21	41 73 DST110-80 192845 21	41 73	21 53
045/052	112 132 160 132 132 160	28 38 42 38 38 42	DST75-110/38 DST75-110/42 DST75-110/38 DST75-110/42	192816 192817 192816 192816 192817	41 73 DST110-22 192843 21 53	41 73 DST110-50 192844 21 53	41 73 DST110-80 192845 21 53	41 73	21 53
045/052	112 132 160 132 160 180	28 38 42 38 42 48	DST75-110/38 DST75-110/42 DST75-110/38 DST75-110/42 DST75-110/46	192816 192817 192816 192816 192817 192818	41 73 DST110-22 192843 21 53 53	41 73 DST110-50 192844 21 53 53	41 73 DST110-80 192845 21 53 53	41 73	21 53
045/052	100 112 132 160 132 160 180	28 38 42 38 42 48	DST75-110/38 DST75-110/42 DST75-110/38 DST75-110/42 DST75-110/48	192816 192817 192816 192816 192817 192818	41 73 DST110-22 192843 21 53 53 DST135-85 192889	41 73 DST110-50 192844 21 53 53 DST135-135 192890	41 73 DST110-80 192845 21 53 53 DST135-180 192891	41 73	21
045/052	132 132 160 132 160 180	28 38 42 38 42 48 38	DST75-110/38 DST75-110/42 DST75-110/42 DST75-110/42 DST75-110/48	192816 192817 192817 192816 192817 192818	41 73 DST110-22 192843 21 53 53 DST135-85 192889 0	41 73 DST110-50 192844 21 53 53 DST135-135 192890 0	41 73 DST110-80 192845 21 53 53 DST135-180 192891 0	41 73	21
045/052	100 112 132 160 132 160 180 132 160	28 38 42 38 42 48 38 42 38 42	DST75-110/38 DST75-110/42 DST75-110/42 DST75-110/42 DST75-110/46 DST75-110/46 DST135/38 DST135/42	192816 192817 192817 192816 192816 192816 192896 192896	41 73 DST110-22 192843 21 53 53 DST135-85 192889 0	41 73 DST110-50 192844 21 53 53 DST135-135 192890 0	41 73 DST110-80 192845 21 53 53 DST135-180 192891 0	41 73	21
045/052	132 132 160 132 160 180 132 160 180	28 38 42 38 42 48 38 42 48	DST75-110/38 DST75-110/42 DST75-110/42 DST75-110/42 DST75-110/48 DST75-110/48 DST135/38 DST135/42 DST135/48	192816 192817 192817 192816 192817 192816 192896 192897 192898	41 73 DST110-22 192843 21 53 53 DST135-85 192889 0 46	41 73 DST110-50 192844 21 53 53 DST135-135 192890 0 46	41 73 DST110-80 192845 21 53 53 DST135-180 192891 0 46	41 73	21 53
045/052 060 070	132 132 160 132 160 180 132 150 180 200	28 38 42 38 42 48 38 42 48 55	DST75-110/38 DST75-110/42 DST75-110/42 DST75-110/42 DST75-110/46 DST755-110/46 DST135/48 DST135/42 DST135/48 DST135/55	192816 192817 192817 192816 192816 192896 192896 192897 192898 192899	41 73 DST110-22 192843 21 53 53 DST135-85 192889 0 46 0	41 73 DST110-50 192844 21 53 53 DST135-135 192890 0 46 0	41 73 DST110-80 192845 21 53 53 DST135-180 192891 0 46 0	41 73	21
045/052 060 070	132 142 132 160 132 160 180 180 180 200 225	28 38 42 38 42 48 38 42 48 55 55	DST75-110/38 DST75-110/42 DST75-110/42 DST75-110/42 DST75-110/42 DST135/48 DST135/48 DST135/48 DST135/45 DST135/55	192816 192817 192816 192816 192816 192896 192896 192897 192898 192899 192899	41 73 DST110-22 192843 21 53 53 DST135-85 192889 0 46 0 29	41 73 DST110-50 192844 21 53 53 DST135-135 192890 0 46 0 29	41 73 DST110-80 192845 21 53 53 DST135-180 192891 0 4.6 0 29	41 73	21 53



• Measure the distance in order to get the same as before the coupling was removed.



• Tight the looking bolt 998B with a suitable hexagon key



• Attach the outer magnet rotor 005D to the coupling half 998 and tight the screws 006A according to the tightening torque table on page 17 in this manual.



• Mount the ball bearing 122 on the power rotor 1020 with the mounting tool described on page 8, use a threaded pin together with a nut and a washer and press down the ball bearing on the shaft carefully. Note: in order to make the ball bearing to slide on easier it is recommended to grease the shaft surface.







onto the pump body 401 with the bolts 451The bolts 451 are to be tightened according to the tightening torque table on page 17 in this

manual.





• Carefully slide the power rotor 1020 with its ball bearing 122 into the pump body 401 with hand force. Note: do not forget to lubricate the rotor prior to the mounting.



• Press the inner magnetic rotor onto the rotor shaft by means of a threaded pin and a nut/ washer, push it into its final position by means of a suitable socket.

NOTE: DO NOT USE A HAMMER AS THIS CAN DAMAGE THE PARTS!



• Mount the circlip 005A with a suitable plier.





• Make sure that the lubrication slots are pointing backwards



• Mount the sealing can 005B with its o-ring 007B onto the pump and tight the bolts 007A according to the tightening torque table on page 17 in this manual.



- Mount the pumps internal relief valve into the back cover by means of letting the inner threaded ring be mounted first with a distance to the outer one of 1-2 mm
- Do not forget to include the seal ring 602
- Tight the nut accordingly with a suitable spanner.

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• Mount the guiding pins into the connecting frame 003.



• Attach 4 bolts in the pumps front cover in order to avoid a to rapid mounting due the magnetic forces that will take place when the pump package is joined.



- Slowly lower the electric motor with the connecting frame towards the pump until the stop bolts touches the frame.
- Avoid side forces that could damage the magnets as it is crucial that the package is connected in a straight line

NOTE: The magnetic forces are very high at this point and can easily cause severe injuries DO NOT EVER PUT YOUR FINGERS OR HANDS BETWEEN THE CONNECTING FRAME AND THE PUMP AS AN ACCI-DENTAL SLIP DOWNWARDS EASILY CAN CRUSH A HAND OR EVEN CUT A FINGER.



- Unscrew the stopping bolts and allow the pump to completely join with the electrical motor/connecting frame
- Avoid side forces that could damage the magnets as it is crucial that the package is connected in a straight line
- Unscrew the last part of the guide pins. NOTE: The magnetic forces are very high at this point and can easily cause severe injuries DO NOT EVER PUT YOUR FINGERS OR

HANDS BETWEEN THE CONNECTING FRAME AND THE PUMP AS AN ACCI-DENTAL SLIP DOWNWARDS EASILY CAN CRUSH A HAND OR EVEN CUT A FINGER.



• Tight the bolts 701 with its washers 701A with a suitable spanner according to the torque tight-ening table on this page.

Tightening torque (Nm)					
Pos.No Size	045	052	060	070	
006A	10	10	10	10	
007A	20	20	20	20	
451	47	47	81	81	
453	47	47	81	61	
462	74	74	74	74	
502	47	47	47	47	
301	13	20	47	47	
702/IEC 100-132	30	30	30	30	
702/IEC 160-225	74	74	74	74	
703B/IEC 100-132	81	81	81	81	
703B/IEC 160-225	197	197	197	197	
998B	15	15	15	15	

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:



ACG80601.01GB

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!



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.



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.

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

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.

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.

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.

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.



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

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



Fig. 4 Pipe connections



Fig. 5 Suction Line



Fig. 6 Deaeration



Fig. 7 Liquid trap

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.

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.





Fig. 8 Gauges



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.



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



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



Fig. 12 Direction of rotation



Fig. 13 Differential Pressure

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

Problem	Cause	What to do
Pressure too high	- The pressure relief valve is set too high.	Readjust the pressure relief valve.
	- The oil is too cold (or has higher viscosity than anticipated).	Reduce the pressure setting until opera- tional temperature has been reached.
	- Counter pressure in the discharge line is too high.	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.	See above: Pressure too high. Readjust the pressure relief valve to a lower value. Thus the power consump- tion 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.
	- Motor is undersized for the prevail- ing conditions.	Check the motor.
	- Electrical power supply faulty.	Check the motor and motor connection.
	- Motor overload relay set too low or is faulty.	Readjust or replace the relay.
	- Incorrect setting of Y/D starter.	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	- The flow to the pump is insufficient.	See chapter: The flow is too low.
	- Insufficient support of pipe work.	Check for pipe vibrations in the pump
21 Monitor the numerican		connections. Check that the pipes are sufficiently clamped.
and shut down	- Bad alignment	Check alignment, see page 4.
if any sign of	- Air leakage into the suction line.	Check the suction line for air leakage.
malfunction is noticed	- Free air in the liquid or gas cavita- tion.	For pumps with Tuning: Contact your IMO representative or IMO service department.
	- Faulty electrical supply.	Check all three phases of the supply.



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