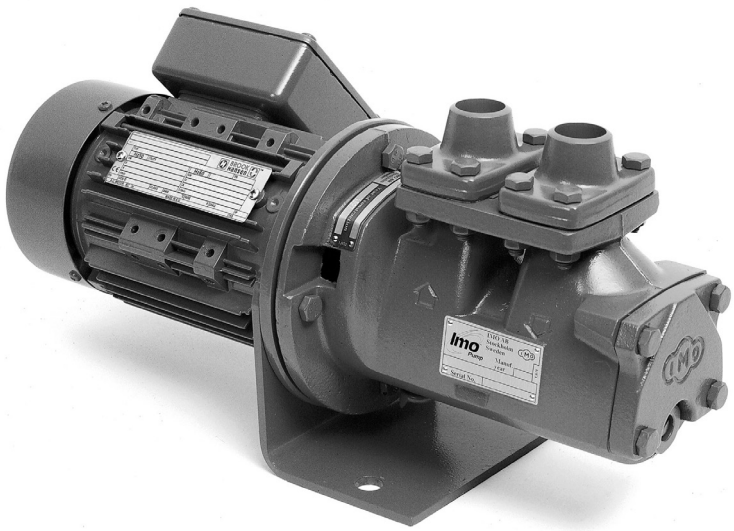
Screw pumps

ACD

Original Operating Manual



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

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Introduction

Other applicable documents

Order data sheet	Technical specifications, conditions of operation
Technical description	Technical specifications, operating limits
Supplier documentation	Technical documentation for parts supplied by subcontractors, e.g. drive system, coupling or auxiliary operating system.
Spare parts list	Ordering spare parts
Declaration of conformity	Conformity with standards, Content of the declaration of conformity

Safety

ATTENTION The manufacturer accepts no liability for damages caused by disregarding any of the documentation.

Intended use

• Only use the pump to pump the agreed pumped liquids (→ order data sheet).
• Adhere to the operating limits.
• Avoid dry running:
  – Make sure the pump is only operated with, and never without, pumped liquid.
• Avoid cavitation:
  – Open the pressure-side fitting completely.
• Avoid damage to the motor:
  – Do not switch on themotor more that themaximumpermissible number of times per hour (→ manufacturer's specifications).
• Consult the manufacturer about any other use of the pump.
• Pumps delivered without a motor must be assembled into a pump unit according to the provisions of EC Machine Directive 2006/42/EC.

Prevention of obvious misuse (examples)

• Note the operating limits of the pump with regard to temperature, pressure, viscosity, flow rate and motor speed (→ order data sheet).
• When using auxiliary systems, ensure there is a continuous supply of the appropriate operating medium.
• Do not operate the pump while the pressure-side fitting is closed.
• Only select the setup type according to this operating manual. For example, the following are not allowed:
  – Hanging pumps in the pipe
  – Overhead installation
  – Installation in the immediate vicinity of extreme heat or cold sources

General safety instructions

ATTENTION Observe the following regulations before carrying out any work.

Product safety

The pump has been constructed according to the latest technology and recognized technical safety rules. Nevertheless, operation of the pump can still put the life and health of the user or third parties at risk or damage the pump or other property.
• Only operate the pump if it is in perfect technical condition and only use it as intended, remaining aware of safety and risks, and adhere to the instructions in this manual.

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• Keep this manual and all other applicable documents complete, legible and accessible to personnel at all times.
• Refrain from any procedures and actions that would pose a risk to personnel or third parties.
• In the event of any safety-relevant malfunctions, shut down the pump immediately and have the malfunction corrected by the personnel responsible.
• In addition to the entire documentation for the product, comply with statutory or other safety and accident-prevention regulations and the applicable standards and guidelines in the country where the system is operated.

Obligations of the operating company

Safety-conscious operation
• Ensure that the following safety aspects are observed and monitored:
  – Intended use
  – Statutory or other safety and accident-prevention regulations
  – Safety regulations governing the handling of hazardous substances
  – Applicable standards and guidelines in the country where the pump is operated
• Make personal protective equipment available.

Qualified personnel
• Make sure all personnel tasked with work on the pump have read and understood this manual and all other applicable documents, especially the safety, maintenance and repair information, before they start any work.
• Organize responsibilities, areas of competence and the supervision of personnel.
• Ensure that all work is carried out by specialist technicians only:
  – Fitting, repair and maintenance work
  – Work on the electrical system
• Make sure that trainee personnel only work on the pump under the supervision of specialist technicians.

Safety equipment
• Provide the following safety equipment and verify its functionality:
  – For hot, cold and moving parts: on-site safety guards for the pump
  – For possible electrostatic charges: provide the necessary grounding
  – If there is no pressure relief valve in the pump: Provide an appropriate safety valve on the pressure side between the pump and the first shut-off device

Warranty
• Obtain the manufacturer's approval prior to carrying out any modifications, repairs or alterations during the warranty period.
• Only use genuine parts or parts that have been approved by the manufacturer.

Drive system
For pumps delivered without a drive system, comply with the following requirements for the drive system:
• When using three-phase asynchronous motors, observe IEC 60034-30-1.
• Power of the drive according to EN ISO 5199 is recommended (EN ISO 5199 also applicable for drives of screw pumps).
• For stub shaft coupled pumps (LPD and ACD) connect motor and stub shaft directly.
• For other series use elastic coupling according to DIN 740-2.
• Use coupling guard with the following requirements:
  – Fastening elements must be connected to the pump unit in undetachable design (cannot get lost).
  – Safety distances against the reaching of hazardous areas according to EN ISO 13857 must be complied with.

Obligations of the operating company

• All directions given on the pump must be followed (and kept legible), e.g. the arrow indicating the sense of rotation and the markings for fluid connections.
• Pump, coupling guard and components:
  – Do not step on them or use as a climbing aid
  – Do not use them to support boards, ramps or beams
  – Do not use them as a fixing point for winches or supports
  – Do not use them for storing paper or similar materials
  – Do not use hot pump or motor components as a heating point
  – Do not de-ice using gas burners or similar tools
• Do not remove the safety guards for hot, cold or moving parts during operation.
• Use personal protective equipment whenever necessary.
• Only carry out work on the pump while it is not running.
• Isolate the motor from its supply voltage and secure it against being switched back on again when carrying out any fitting or maintenance work.
• Reinstall the safety equipment on the pump as required by regulations after any work on the pump.

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Specific hazards

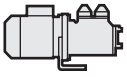
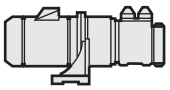
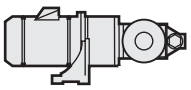
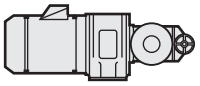
Hazardous pumped liquids

• Observe the safety regulations for handling hazardous substances (e.g. hot, flammable, poisonous or potentially harmful) when handling hazardous pumped liquids.
• Use personal protective equipment when carrying out any work on the pump.
• Noise level:

– Check individual pump series noise level in respective Product Description

These instructions are valid for all low pressure pumps as specified in the Pump identification chart below.

Pump identification

Pump name	Size (1)	Rotor lead (1)	Design modification	Material pump-body (1)	Shaft-seal design (1)	Mounting (2)	Valve (3)	Also valid for option	Comments
LPD 	015 020	N	1	I	V	B	P		Pumpunit without shaft coupling
ACD 	025	L N	6	N	V T	B	P		Pumpunit without shaft coupling
ACE 	025 032 038	D K L N	3	N	V T	B	P	A101	
LPE 	025 032 038	D K L N	3	N	V T	B Y	P	A101	
ACG/UCG 	045 052 060 070	D K N	7	N	V T	B F	E P	A101 A327 A020 A385	
ACF/UCF 	080 090 100 110 125	K L N	5	I N	T	B F(4)	E(4) P	A020 A084 A087 A101	
LPQ 	100 110 125 140	L N P J	1	I N	R T	Y	P		

(1) See Product description or Service instruction for specified pump model
(2) B = Flange mounting
F = Foot mounting
Y = Vertical foot mounting
(3) E = Without valve
G = Valve with external return
P = Valve with internal return for total pressure range
(4) Valid for UCF

Option

A020 Pump with surface treated casing(s)
A084 Pump with lifetime greased ball bearing
A087 Pump with CCW-rotation and lifetime greased ballbearing
A101 Pump with CCW-rotation, when not standard
A327 Pump with Tuning®
A328 Pump with Tuning®
A385 A101 + A327

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Identification of safety instructions
Non compliance 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: **ATTENTION**

Installation

BEFORE COMMENCING ANY WORK, READ THIS INSTRUCTION CAREFULLY!

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.
Maintenance and service instructions, which are specific for each pump are presented after the installation instructions.

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.

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

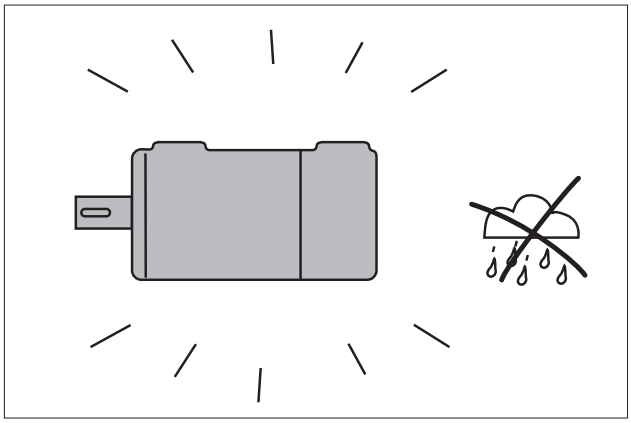


Fig. 1 Clean and dry environment.

Lifting of pump

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.

Use two eye bolts (M 20) securely fastened to the front cover for pump LPQ. Pump and connecting frame are lifted together using two eye bolts securely fastened to the top of the connecting frame. (Thread dimension is M 16, except for frame size 600, where it is M 20).

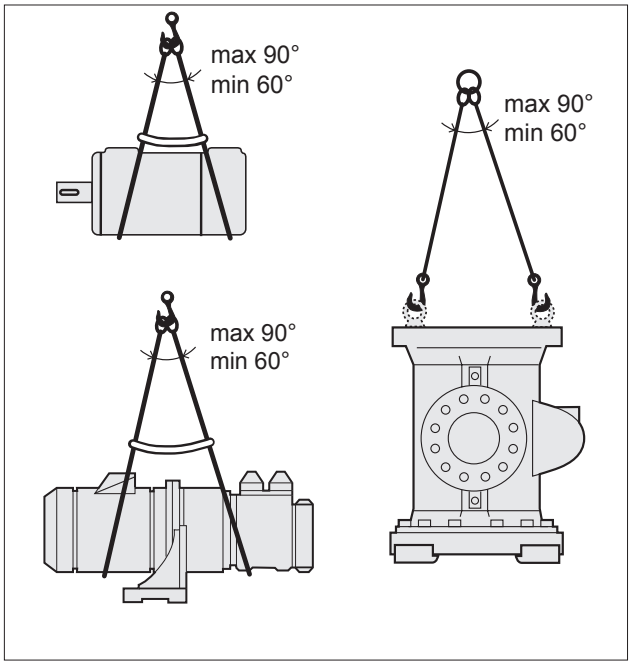


Fig. 2 Lifting of pump

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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.

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 attachments.

Mounting

The pump must be securely mounted on a firm stable foundation and positioned so that it is easily accessible for inspection and servicing.

Provisions for collecting oil spillage when servicing the pump should be considered.

ATTENTION

The installation must always be designed to minimise damage. Should an operational or functional failure occur. E.g. precautions should be considered to collect oil spillage due to a broken pipe or pump housing, to stop pump operation if overheating should occur or if the oil volume is below a minimum tank level.

Alignment and shaft couplings

The pump shall be connected to its driver via a flexible shaft coupling. Pumps of type ACG/UCG and ACF/UCF may also be driven via gears or pulleys as specified in the Product Description, provided the radial forces are kept within the specified range.

An angular misalignment of 0.1° corresponds to approx. 0.2 mm deviation/100 mm.

The coupling and alignment shall be selected not to transmit any axial or radial loads on the shaft ends. IMO AB standard couplings shall have a distance between the coupling halves as per table, fig 4. the coupling halves shall be secured by lock screws.

For other types of couplings, please refer to respective maker's manual.

When fitting the shaft coupling, do not use a hammer or similar as this may damage the ball bearing and shaft seal. Use some kind of press tool.

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

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

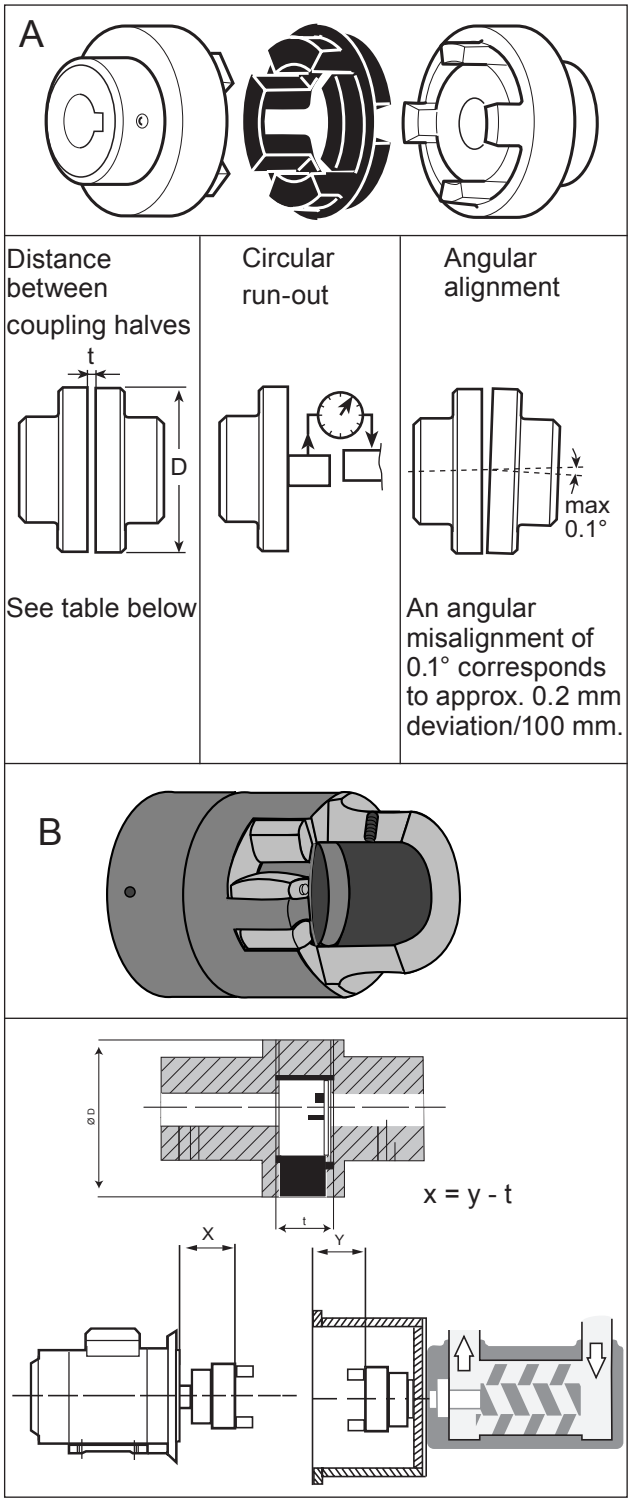


Fig. 3 Alignment of the IMO AB standard coupling

Outer diameter of coupling (D mm)(t mm) A	B	Distance between coupling halves (D mm) A	B	Outer diameter of coupling (t mm)	Distance between coupling halves
50	26	2.0	8	148	3.5
67	40	2.5	16	168	3.5
82	55	3.0	18	194	3.5
97	65	3.0	20	214	4.0
112	80	3.5	24	240	4.0
128	95	3.5	26		

Fig 4. Distance between coupling halves. (IMO AB standard coupling)

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⚠ **Measures shall be provided to avoid accidental contact with the rotating shaft coupling. Any installed coupling guard shall permit easy access to the pump shaft for maintenance and inspection of the pump bearing and seal housing.**

Pipe connections

The pipe work shall be installed and supported so that no pipe stresses are transfered to the pump body.

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 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 an stand-by pump.

For direct driven pumps the alignment between pump and motor shafts must be kept within the following limits:		
	Max run-out (mm)	Max angular misalignment (degrees)
Type LPD and ACD	(n/a short coupled)	
Other types	0.3	0.1

Fig 5.

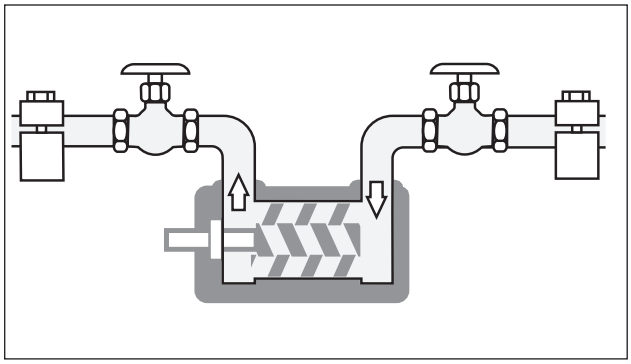


Fig. 6 Pipe connections

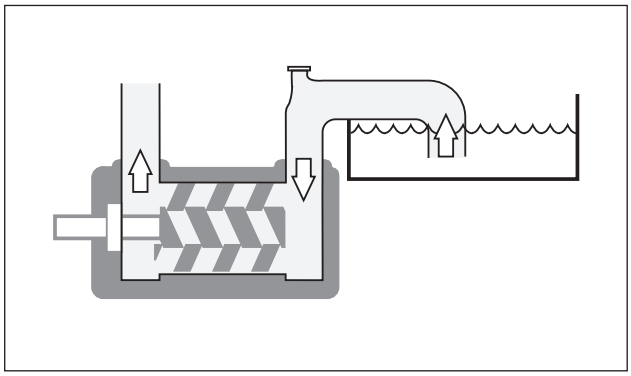


Fig.7 Suction line

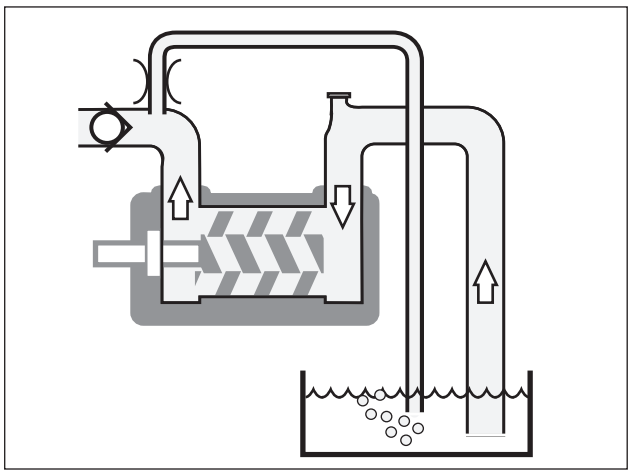


Fig. 8 Deaeration

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Strainer

The pump has to be protected from foreign matter, 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 0.6 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.

Note: The service life of the pump is decisively influenced by the degree of contamination of the fluid being conveyed, that means, by the number, size and hardness of the abrasive components.

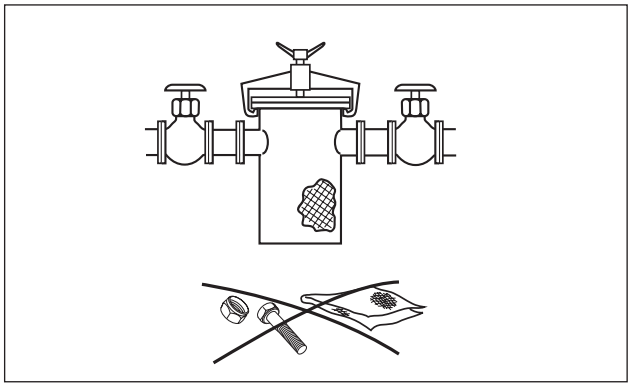


Fig. 9 Strainer

Shaft seal drain

The pump should be installed so that any leakage from the shaft seal does not become a hazard. As the shaft seal has to be lubricated a small amount of oil dripping cannot be avoided.

Provisions to collect the leakage from the shaft seal must be made.

A drain pipe can be connected to the drain connection on the pump, (not applicable to pump series LPD). However, when pumping heavy fuel oil or any other liquid that is likely to become very viscous at ambient temperature, we recommend that the liquid is allowed to drop freely from the drain opening.

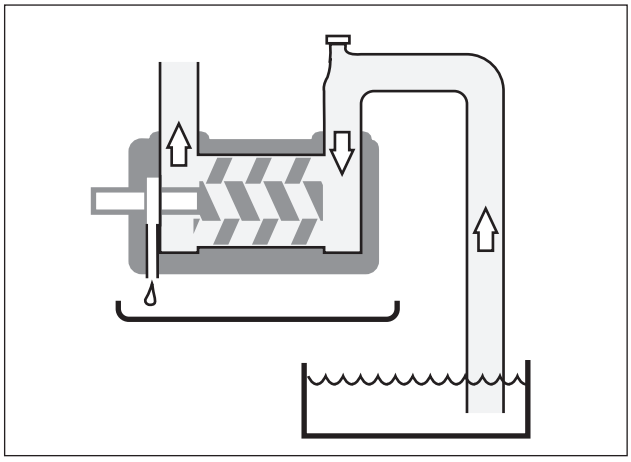


Fig. 10 Shaft seal drain

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. See fig. 11.

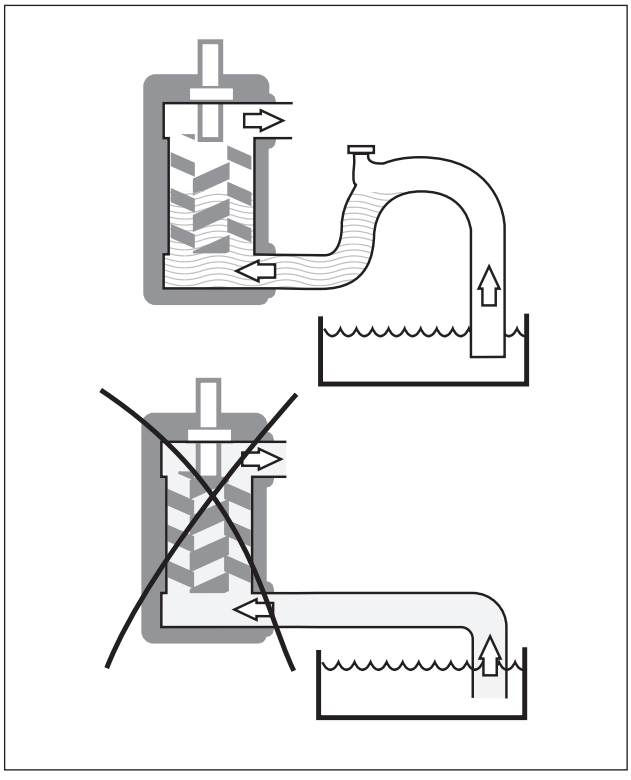


Fig. 11 Liquid trap

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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 pump's in- and outlet flanges as possible. On standard pumps, series ACE, LPE, ACG/UCG, ACF/UCF and LPQ, there are gauge connections for both in- and outlet.

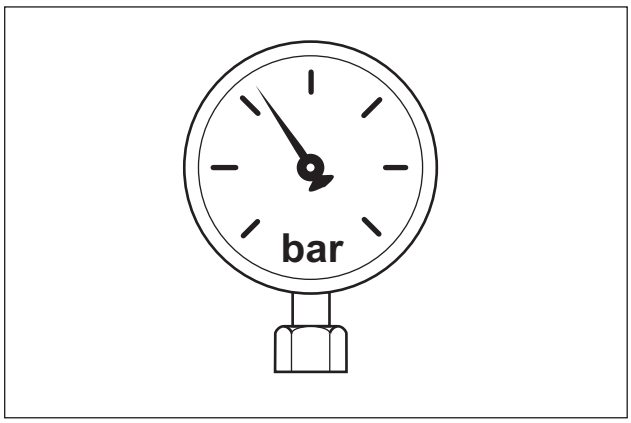


Fig. 12 Gauges

Pressure relief valve

All systems with screw pumps should be equipped with a pressure relief valve installed immediately adjacent to the pump.

In the standard versions of IMO AB low pressure pumps, this pressure relief valve is an integral part of the pump to protect the pump against excess pressure.

This relief valve is intended for momentary protection of the pump against overpressure. It is neither intended to be a system pressure control device, nor used as a flow regulation device.

When liquid is circulated through the valve it is heated up in proportion to the set pressure level and the percentage of by-passed liquid.

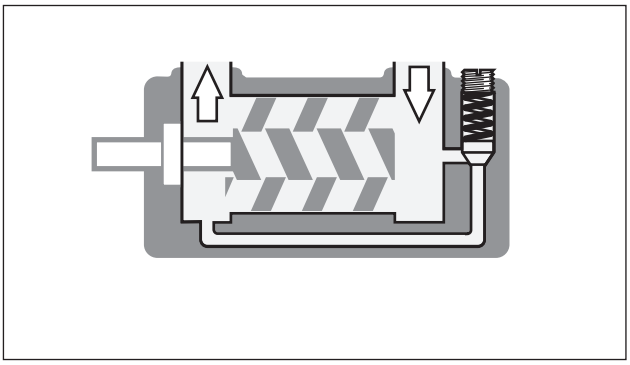


Fig. 13 Pressure relief valve

Up to 50 % by-pass can generally pass for unlimited periods of time without harming the pump except when pumping low viscosity media.

If more than 50% recirculation is anticipated, a value specific to each application should be determined by closely monitoring the pump body temperature.

For flow less than ~50 m^3/h

- 100% by-pass can only be tolerated for less than about 3 minutes, provided the viscosity & temperature is within the limit of the pump type.

For flow higher than ~50 m^3/h

- 100% by-pass is tolerated less than 30 seconds.

Note that an open valve can cause noise.

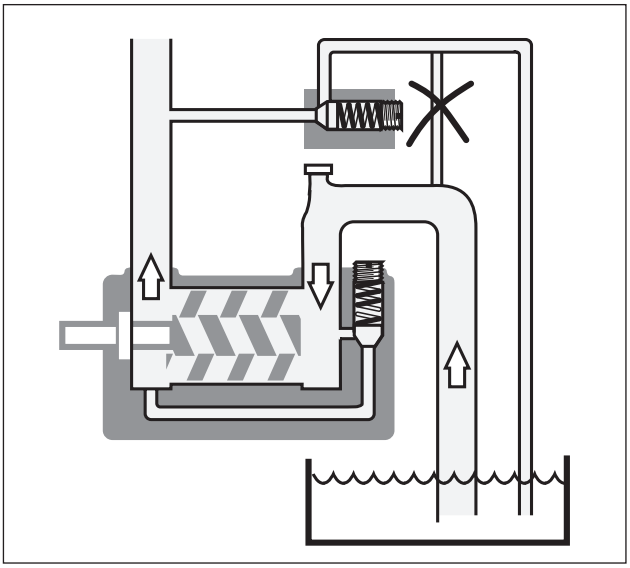


Fig. 14 External control with pressure relief valve

If the pump is operating in line with a separate pressure control valve (see fig. 14), the setting of the relief valve should be high enough to 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.

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.

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

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Start-up

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 15.

For ACE Generation 3, LPE Generation 3, ACG Generation 7 and ACF Generation 4 delivered after 1997, ACF Generation 5 and LPQ the pumps have been fitted with deaeration plugs making venting of the shaft seal compartment easy before start-up.

In installations with positive suction pressure: After opening the inlet and outlet valves, simply open the deaeration plug a few turns until oil sips out. Tighten the plug.

In installation with negative suction pressure: After opening the inlet and outlet valves, remove the deaeration plug and fill the shaft seal compartment with oil. Fit and tighten the plug. See fig. 16.

Note: for LPQ the amount of oil is appr 50 liter.

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

Rotate the shaft by hand while filling the pump, to ensure that the rotor bores and the shaft seal cavity is filled. On the smaller pumps: (LPD, ACD, ACE, LPE, ACG/UCG), this is done by rotating the fan on the electric motor after removing the fan cover.

⚠ **Do not forget to fit the motor fan cover again before making start of motor possible.**

On the ACF/UCF and LPQ pumps, the pump can be turned using the shaft coupling. If the suction pipe cannot be completely filled, it is important to ensure that the trapped air is evacuated without any pressure build up. (See fig. 8 Deaeration).

ATTENTION

Starting a dry pump is likely to cause damage, especially to the shaft seal.

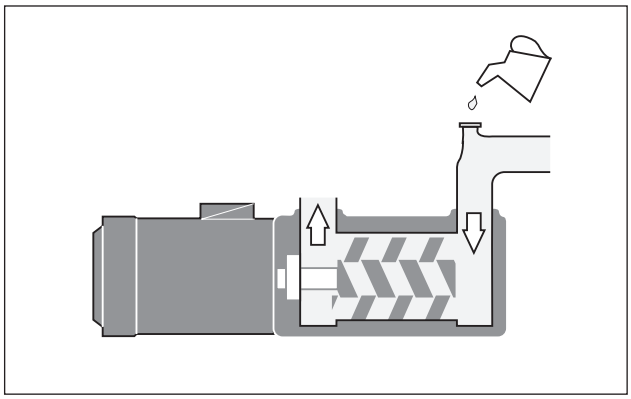


Fig. 15 Filling the pump

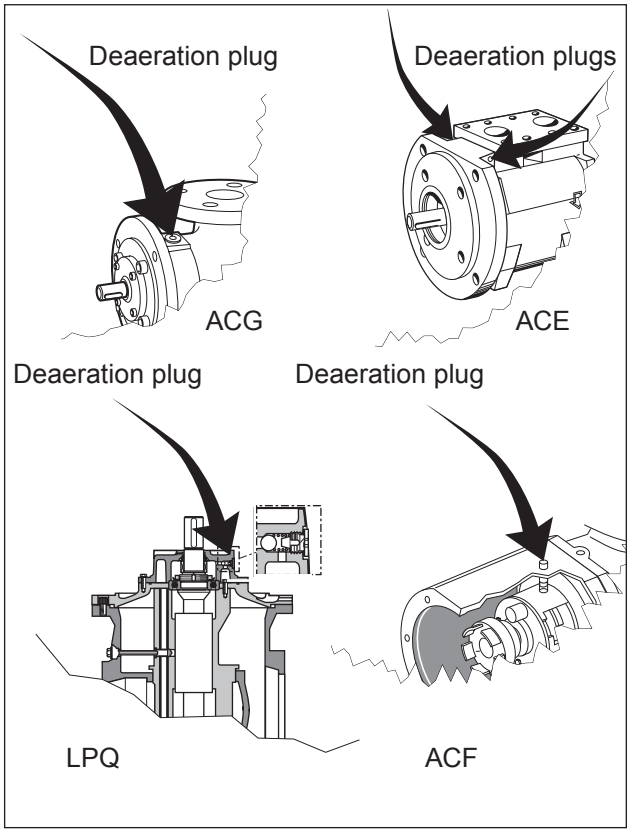


Fig. 16 Deaeration plugs

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 different spots depending on the pump series.

ATTENTION

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

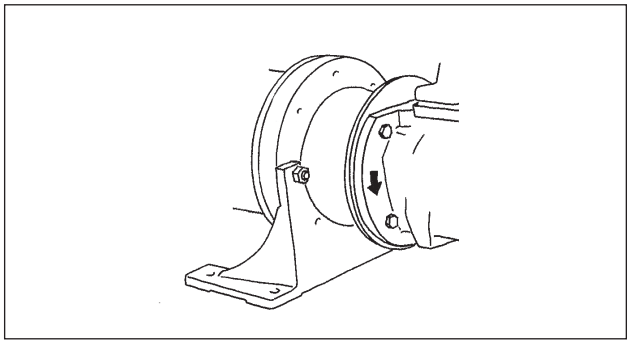


Fig. 17 Direction of rotation

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Starting

Check that all valves necessary for the operation are fully opened in both discharge and suction lines.

The first time, the pump should be started with the adjusting spindle of the pressure relief valve tightened to half of the available turns (the valve setting is increased when the spindle is turned clockwise).

By monitoring the pressure gauge it can be determined when the suction line is primed and the pump begins to work. Should the pump not operate normally soon after start, stop the pump within half a minute. Start again after about 3-5 minutes (the shaft seal must have time to cool off) and run for half a minute. This procedure may need to be repeated a couple of times if the suction line is extremely long. Should the pump still not work, it must be assumed there is a problem in the system that needs to be remedied. Check the suction line calculation on page 5 and/or see ”Trouble shooting”, page 10.

⚠ **Pumps with external ball bearing including grease nipple, must be regreased after one hour of running, while the pump is operating**

Setting the pressure relief valve

To set the opening pressure;

Tighten the valve spindle by rotating clockwise to the maximum extent. The system pressure is regulated by throttling an external valve to required value. The pressure relief valve is eased until the pressure is just beginning to decrease by turning the spindle CCW. The internal relief valve is now preset for desired opening pressure. Open the throttling external valve entirely.

As standard, the recommended valve setting is 1 bar above system pressure.

NOTE: The set screw on LPD is hidden behind a plate.

Adjusting the tuning

The tuning adjustment, which is a standard feature on ACF/UCF and LPQ (option on ACG/UCG pumps, is a device for minimizing the effects of dissolved and free air in lube oil systems. The tuning principle is described in the Product Description.

The tuning should be adjusted while the pump is working under normal operating conditions. This is done by turning the tuning spindle with an Allen key (size 8 mm for ACG/UCG , 12 mm for ACF/UCF and LPQ) to a position where the noise level comes to a minimum. On a double acting pump like the LPQ pump, there are two tuning valves, which must be adjusted individually.

Setting of tuning of the LPQ:

1. Before starting the setting check that both setting screws (8 mm socket head cap screw on the discharge side) are closed.
2. Turn the lower screw until the noise level obtains a minimum.(If turned too much the noise will increase again).
3. Turn the upper screw and continue to reduce the noise level. (If turned too much the noise will increase again).
4. Repeat item 2. and 3. in order to achieve the lowest possible noise level.

Setting of tuning of the ACG/UCG and ACF/UCF:

1. Before starting the setting, check that the setting screw (8 mm: ACG/UCG, 12 mm: ACF/UCF, socket head cap screw on the discharge side) are closed.
2. Turn the screw CCW until the noise level becomes the lowest (if turned too much the noise will increase again).

Once set, the tuning needs no further adjustment, providing the operating conditions stay the same.

NOTE: It´ s not possible to accidentally turn the tuning spindle too far.

⚠ **If operating temperature exceeds 60°C (149°F), appropriate measures to avoid skin contact shall be provided.**

⚠ **Use hearing protections whenever high noise can be expected from pump, motor and/or environment.**

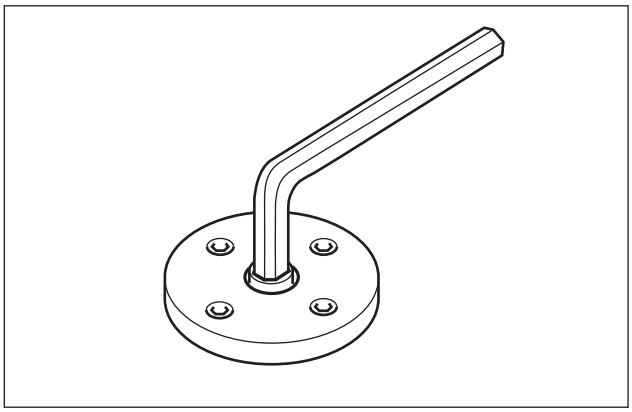


Fig. 18 Adjusting the tuning

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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. **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 5).
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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Disturbance	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 operational 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.	See above: Pressure too high.
	- Liquid too cold	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.
	- Motor is undersized for the prevailing 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 vibrations ⚠ **Monitor the pump function and shut down if any sign of malfunction is noticed.**	- 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 connections. Check that the pipes are sufficiently clamped.
	- Bad alignment	Check alignment, see page 4.
	- Air leakage into the suction line.	Check the suction line for air leakage.
	- Free air in the liquid or gas cavitation.	For pumps with Tuning: Adjust the Tuning. If this does not help or for pumps without Tuning: Contact your IMO representative or IMO service dept.
	- Faulty electrical supply.	Check all three phases of the supply.

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Maintenance and Service

List of components

Valid for all ACD pumps, size 025. Rotor lead and Generation: L6/N6

With version codes:

N	T	B	E
	V	F	P
			G

The version code is composed of the letters in the 4 columns.
Example of pump designations std:
ACD 025L6 IVBP

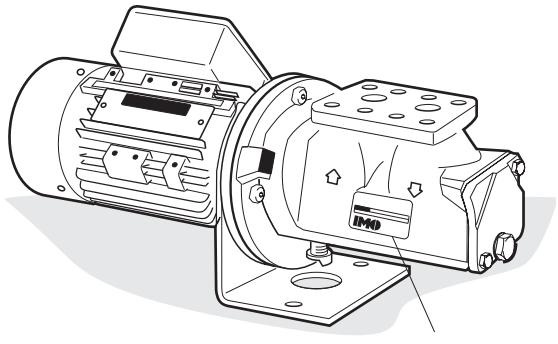
Pos No	Denomination	Quantity	Spare parts set: G012 Rotor set	G050 Shaft seal	G053 Minor kit	G054 Major kit	G057 Joint kit	Remarks
1020	Power rotor	1	x			x		1)
134	Locking screw	1	x		x	x	x	
162	Nylon sleeve socket	1	x		x	x	x	
202	Idler rotor	2	x			x		1)
401	Pump body	1						
416	Inlet flange	1						
417	Screw	8						
417A	Nut	8						
418	Gasket	1			x	x	x	
423	Gasket	1			x	x	x	
427	Outlet flange	1						
443	Drip nipple	1						
451	Screw	8						
501	Front cover	1						
506	O-ring alt. gasket	1			x	x	x	2)
509	Shaft seal	1		x	x	x		
551	Rear cover	1						
556	Gasket	1			x	x	x	
601	Valve cover	1						
602	Sealing washer	1			x	x	x	
605	O-ring	1			x	x	x	
612	Regulating screw	1						
612A	Retaining ring	1						
614	Valve piston	1						
615	Valve spring	1				x		

1) Delivered only as Rotor set G012.
When ordering spare parts, please state the complete pump identification according to its name plate and required spare part set or the required parts position number.

2) The spare part set includes both O-ring and gasket see Fig. 21 and 22 page 9.

ATTENTION

The o-ring is to be used in the version with o-ring. The gasket is to be used in the version with gasket.
Never fit both o-ring and gasket in one pump!



Name plate of the pump

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Exploded view

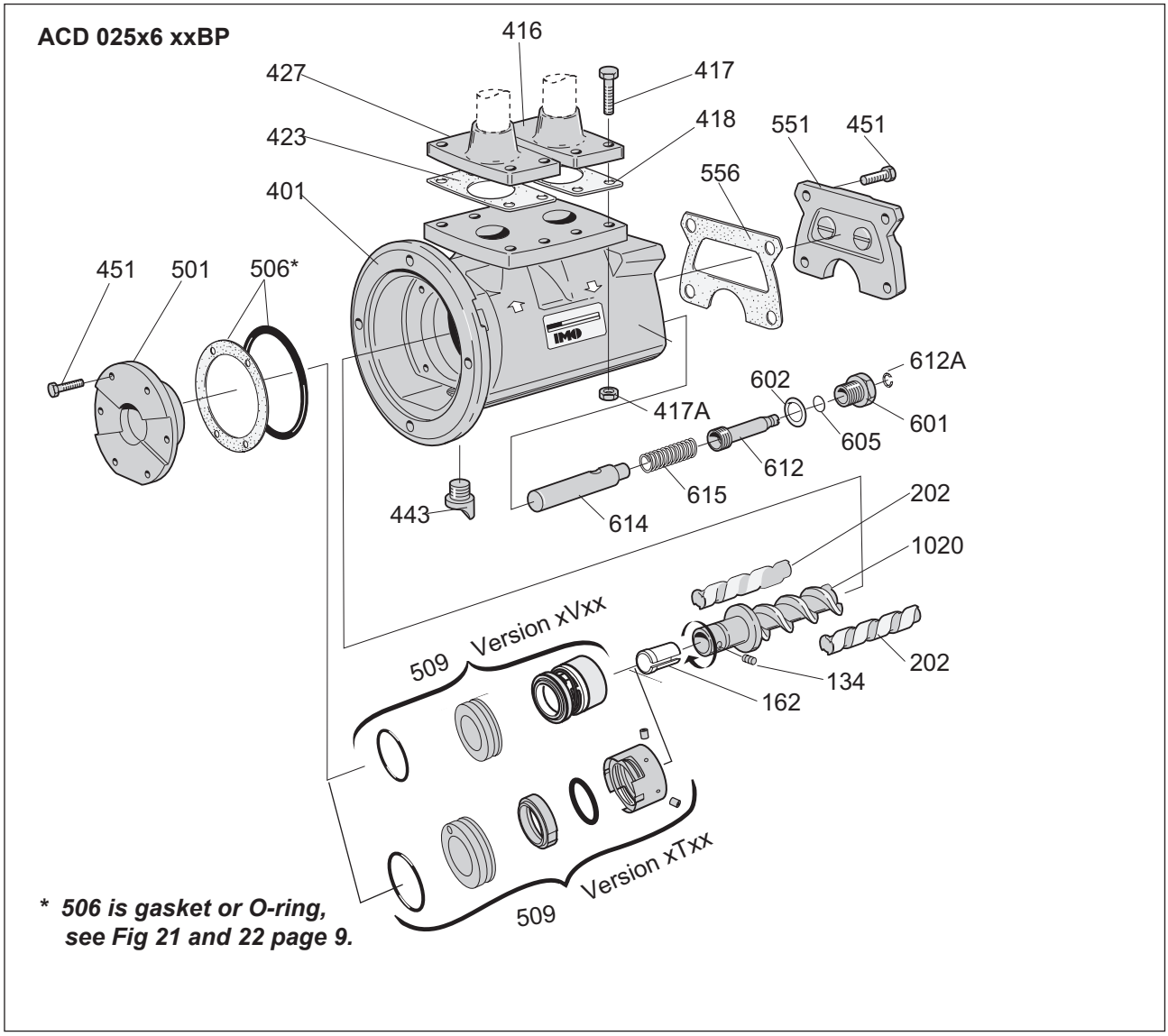


Fig. 1

Ordering code

Pos No	Spare parts sets		Pump size 025 Part no
	Rotor set CW-rotation (std):		
G012	Normal lead Low lead	- pump form N6 - pump form L6	062885 062893
G050	Complete shaft seal	- version code xVxx - version code xTxx	190848 190810
G053	Minor kit	= G050+G057	
G054	Major kit	= G012+G053+615	
G057	Joint kit		183681
615	Valve spring		018523

Fig. 2

Recommendation:
For maintenance the following spare part sets are recommended:
Set: / To be used:

G057 Joint kit
For dismantling of the pump.

G053 Minor kit
For service

G054 Major kit
For repair after damage or greater wear.

Ordering example:
For IMO-pump ACD 025L6 IVBP, serial number 456789:

Shaft seal pos G050 p/n 190848
Valve spring pos 615 p/n 018523

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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 ACD-pump are lubricated by the pumped liquid. Pumping liquid which contains abrasive materials, or liquid that is corrosive, will significantly reduce service life and call for shorter service intervals.
Wear in the pump may be indicated by:

- Vibration
- Noise
- Loss of capacity
- Reduction in flow/pressure
- Leakage

In installations where unplanned shut downs must be avoided, it is advisable to have a complete pump available for replacement, should any malfunction occur. Furthermore we recommend planned inspection and overhaul at regular intervals, not exceeding 3 years.
It is recommended always to have the spares included in minor spare part kit available.

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 protective clothing.

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

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

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

Inspection of shaft seal

As the seal faces of a mechanical shaft seal are lubricated by the fluid a certain leakage will always be present. Ten drops per hour can be considered as acceptable.
An external visual inspection of the pump is advisable at least every two days to assure that the shaft seal is not leaking too much.
Excessively leaking shaft seals should be replaced without delay, as the leakage normally will grow worse and cause additional damage.
Follow the instructions in the dismantling/reassembly session.
When working with a shaft seal, cleanliness is of utmost importance. Avoid touching the seal faces. If necessary, the seal faces should be cleaned immediately prior to assembly, using a dustfree cloth and clean solvent.
Never use grease on the seal faces.

O-rings

All O-rings found to be hard or damaged shall be replaced.

Inspection of rotors

If an indication of a worn pump is noticed (see service intervals above), a brief inspection of the idler rotors is recommended.
A quick inspection of the idler rotors can be made simply by removing the rear cover. Note that the driver must be deenergized and the pump hydraulically isolated before the rear cover is removed.
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 or bushings: 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 visc./high pressure duties the limit will be lower. Also check if there are major scratches on these parts.

If a more thorough investigation is needed, proceed as under ”Dismantling and reassembly”.

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Sectional view

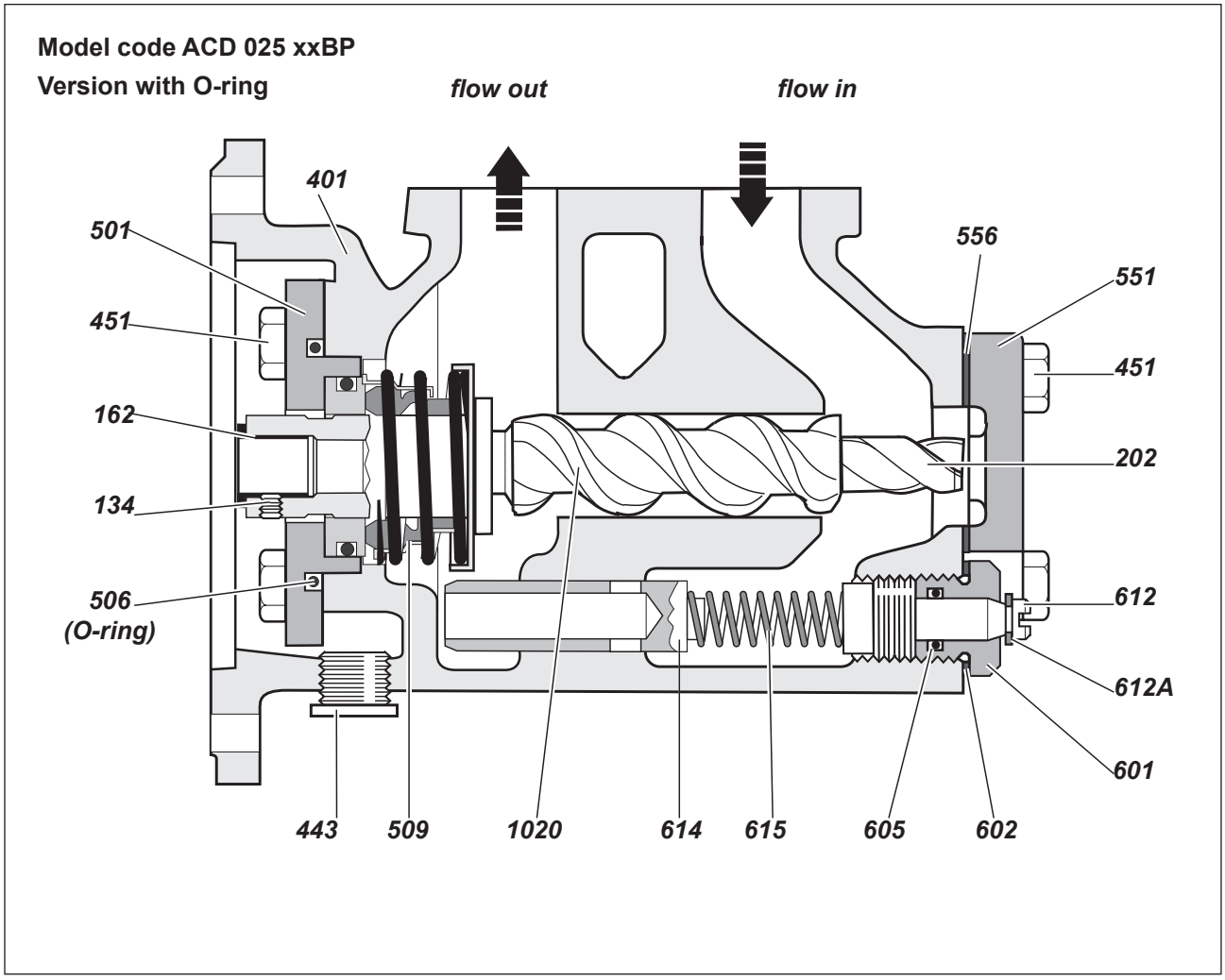


Fig. 3

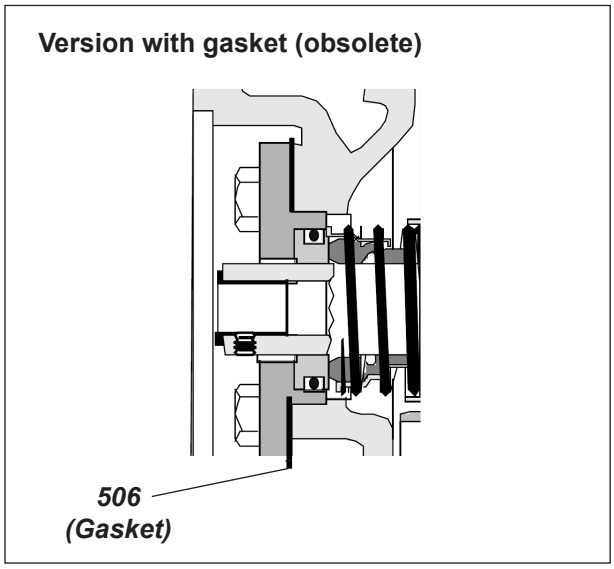


Fig. 4

Useful tools

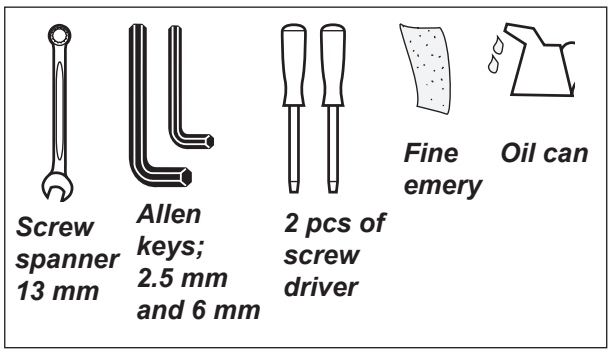


Fig. 5

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

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

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Shaft seal – assembly drawing

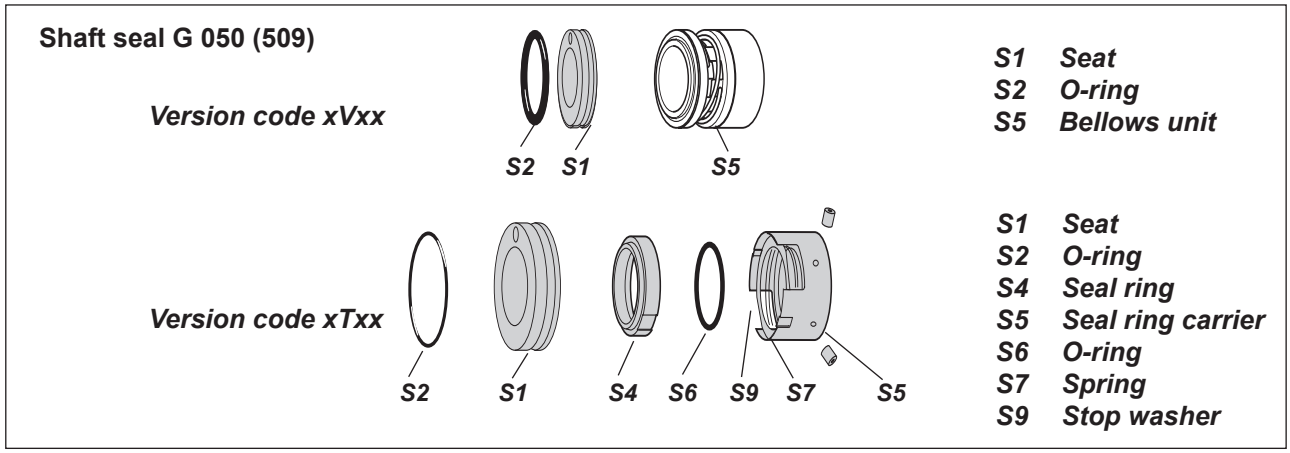


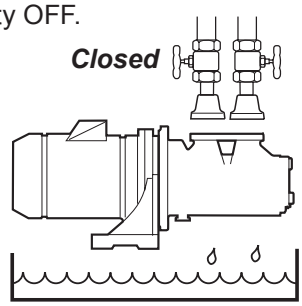
Fig. 6

Dismantling

A.



- Turn the electricity OFF.



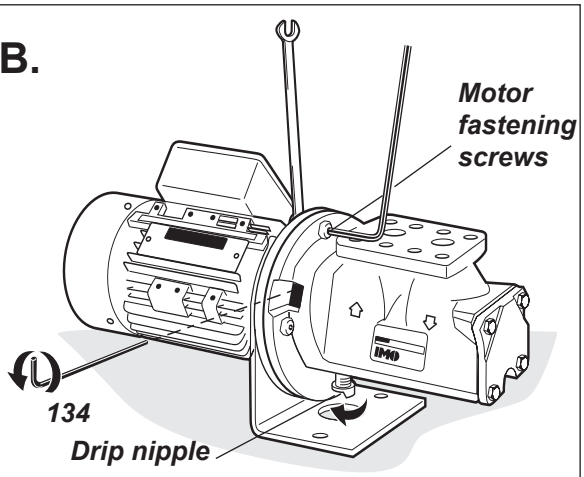
- Close the valves.
- Remove pump from the system.

ATTENTION

Use appropriate vessels to collect oil spillage when removing and opening the pump.

Fig. 7

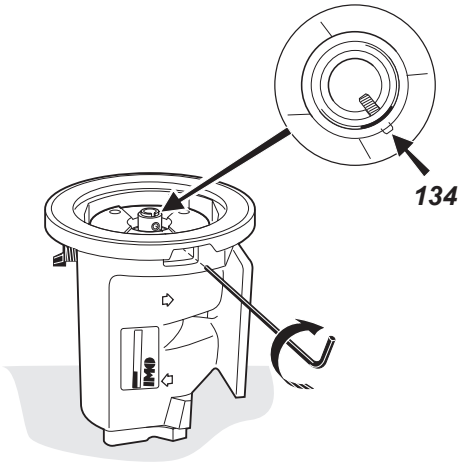
B.



- Remove the drip nipple.
- Untighten the locking screw 134.
- Remove the motor fastening screws.
- Remove the motor and the angle bracket.

Fig. 8

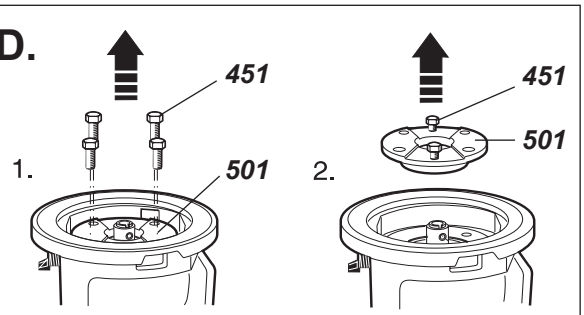
C.



- To ease dismantling hide the locking screw 134 into the shaft by turning it clockwise.

Fig. 9

D.



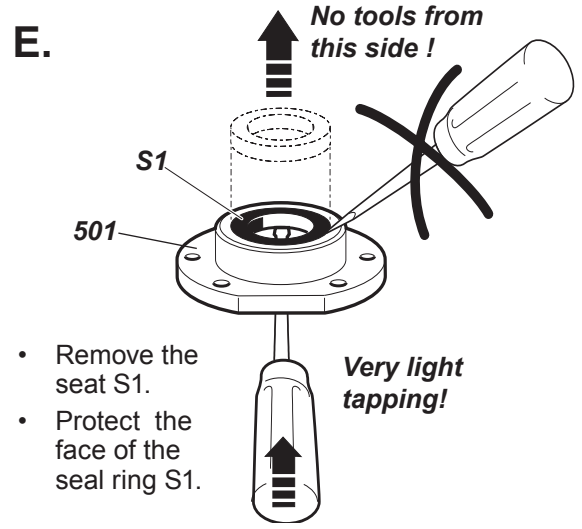
- Untight and remove the screws 451 in the front cover 501.
- Fit two of the screws 451 into the extraction holes in the front cover 501 in order to push it up.
- Remove the front cover 501.

Fig. 10

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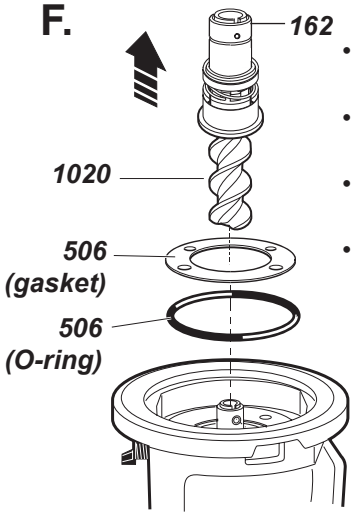
E.



- Remove the seat S1.
- Protect the face of the seal ring S1.

Fig. 11

F.

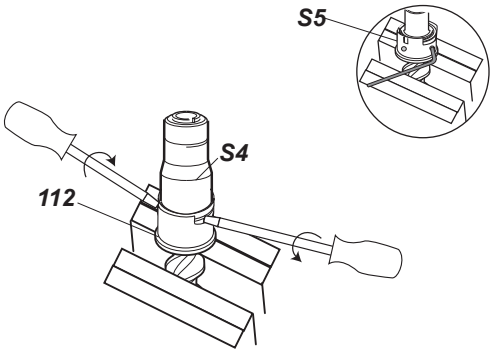


- Pull out the power rotor 1020.
- Remove the gasket 506 if applicable.
- Remove the O-ring 506 if applicable.
- Replace the nylon sleeve socket 162 if damaged.

Fig. 12

G.1

xTxx

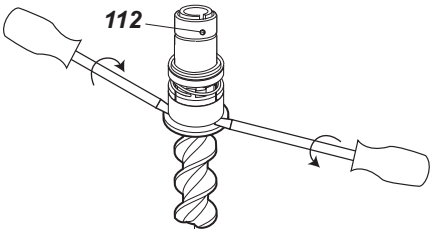


- Place the rotor into the jaw vice with soft jaws.
- Insert gently two screw drivers as shown on the sketch and carefully remove the seal ring S4 and O-ring S6.
- Release the two stop screws and remove the seal ring carrier S5.

Fig. 13 A

G.2

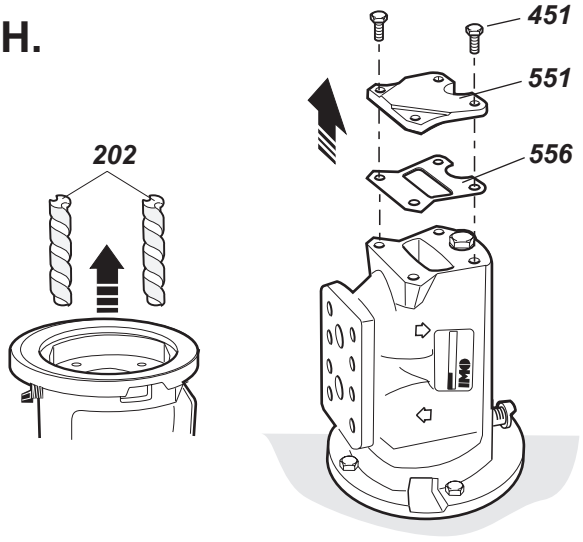
xVxx



- Place the rotor into the jaw vice with soft jaws.
- Pull off the bellows unit as shown.

Fig. 13 B

H.



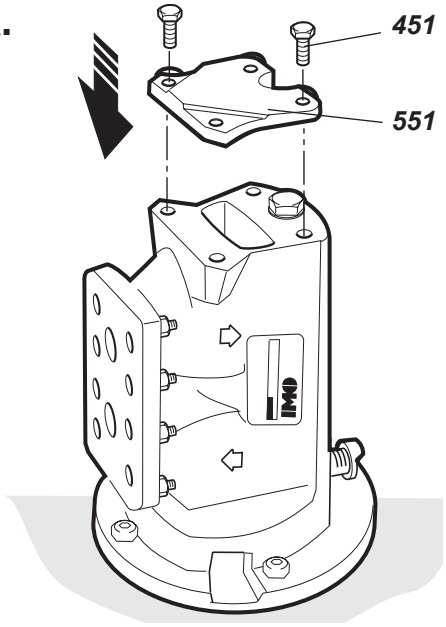
- Pull out the idler rotors 202 for inspection.
- Turn the pump upside down.
- Remove the screws 451.
- Remove rear cover 551.
- Remove the gasket 556.

Fig. 14

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Reassembly

A.

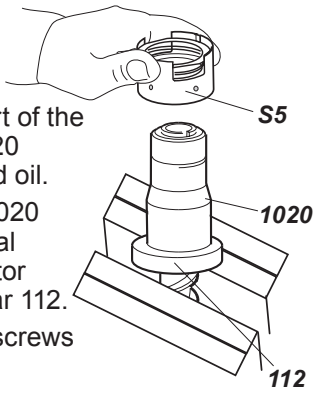


- Fit the rear cover 551. No gasket yet! (This way of reassembling will result in a good adjustment for the shaft seal mounting!)
- Fit two of the screws 451.

Fig. 15

B.

xTxx

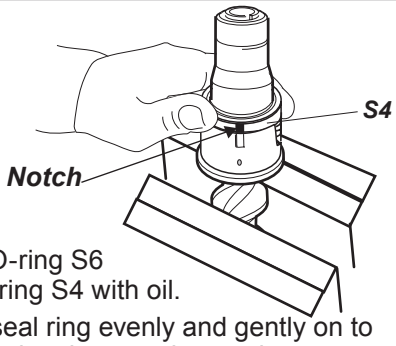


- Polish the thicker part of the power rotor shaft 1020 with a fine emery and oil.
- Lubricate the shaft 1020 with oil and fit the seal ring carrier on the rotor tight against the collar 112.
- Tight firmly the lock screws (3 mm Allen key).

Fig. 16

C.

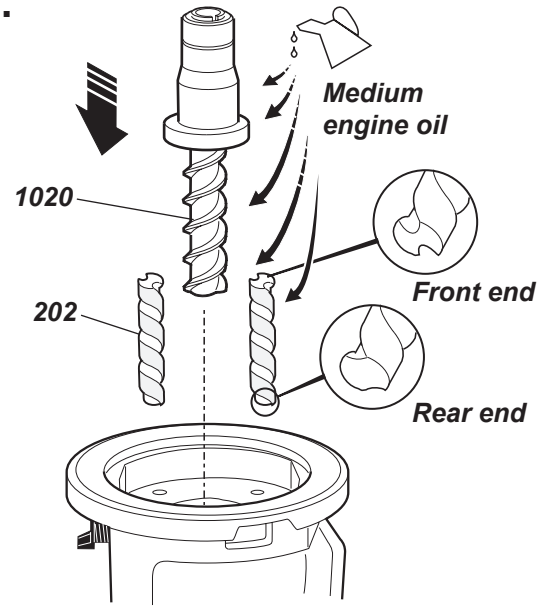
xTxx



- Lubricate O-ring S6 in the seal ring S4 with oil.
- Press the seal ring evenly and gently on to the shaft and make sure the notches enters the carrier.

Fig. 17

D.

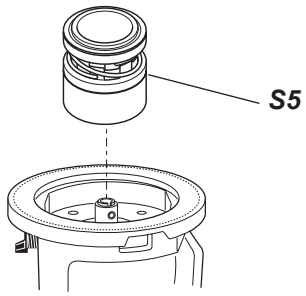


- Lubricate the idler rotors 202.
- Place the idler rotors 202 back into the pump. Rear end first.
- Lubricate the power rotor 1020.
- Place the power rotor 1020 back into the pump.

Fig. 18

E.

xVxx



- Unpack the mechanical seal.

ATTENTION

Protect the seal faces and keep them clean.

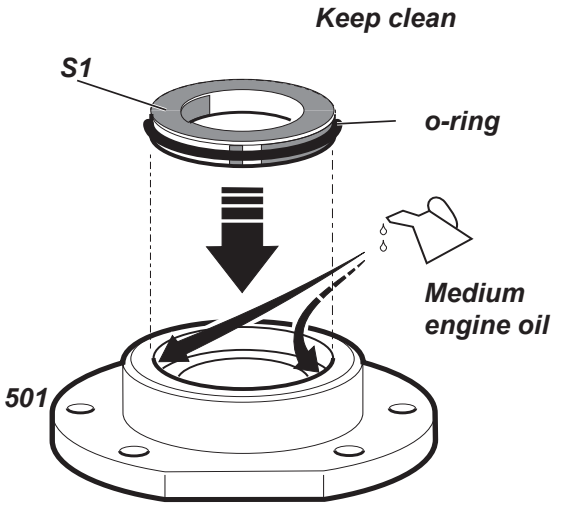
- Lubricate the inner diameter of the bellows unit S5 and the shaft 1020.
- Place the bellows unit S5 on the shaft 1020. Do not push yet.

Fig. 19

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F.

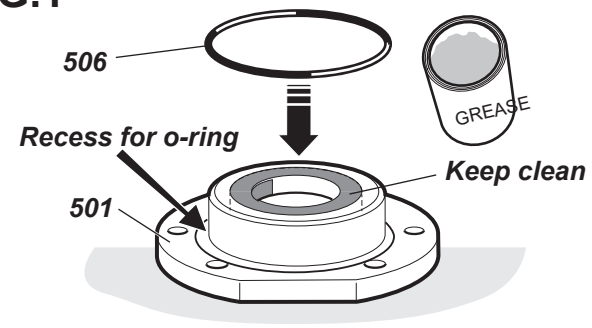


- Lubricate the front covers 501 seat recess.
- Fit the seat into the front cover 501.

Fig. 20

G.1

Version with o-ring.

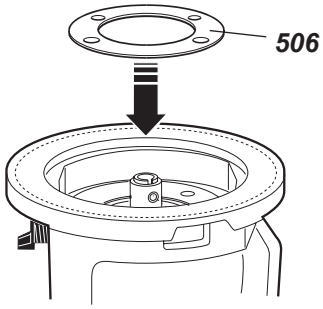


- Fit a new o-ring 506 in replacement for the old o-ring (see fig. 3A). Lubricate the o-ring with grease in order that it is remaining in the front cover when turning it upside down.

Fig. 21

G.2

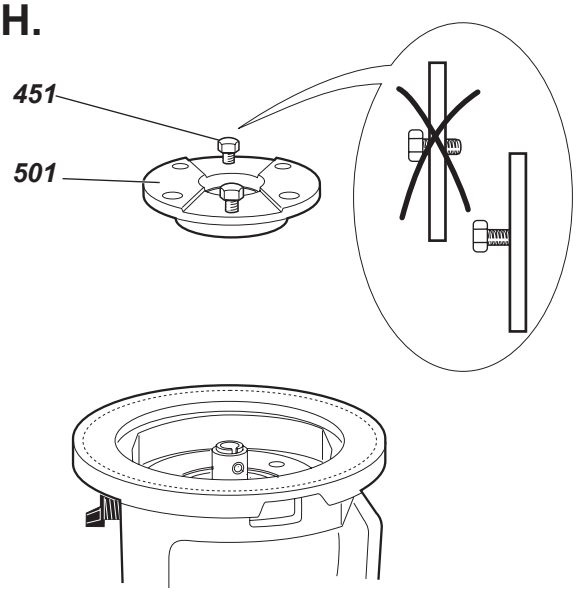
Version with gasket.



- Fit a new gasket 506 into place in replacement for the old gasket.

Fig. 22

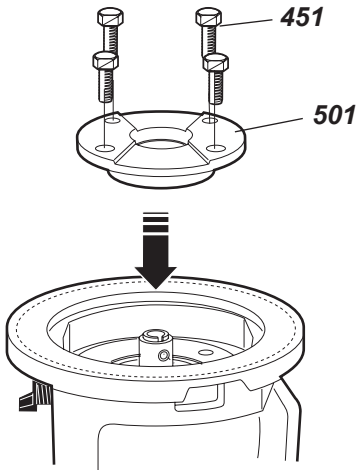
H.



- Untight the screws 451 until the end is inside the front cover 501 in order to not to damage the gasket 506 if applicable.

Fig. 23

I.

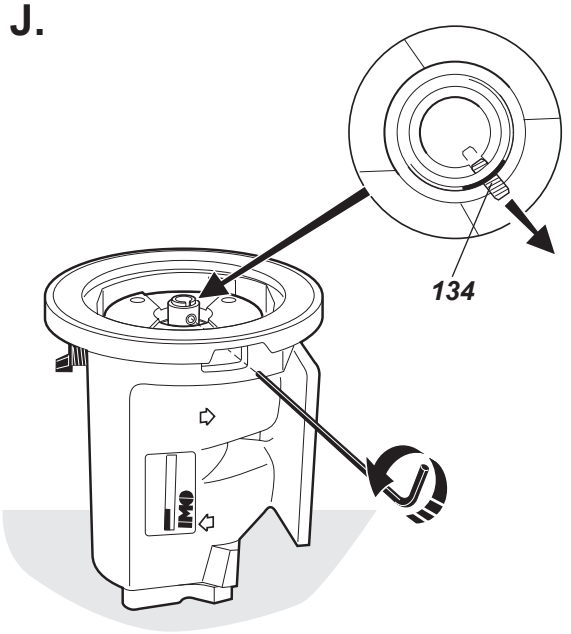


- Place the front cover 501 on top of the bellow unit S5 and push the cover tight against the pump body.
- Fit the screws 451 and tighten them crosswise.

Fig. 24

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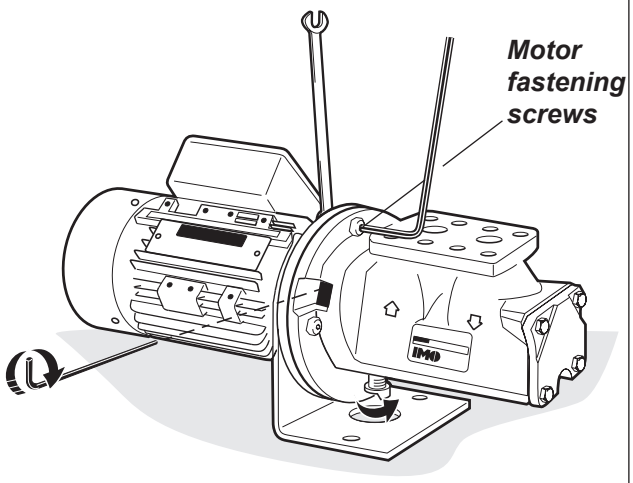
J.



- Adjust location of the locking screw 134 to the opening in the pump body 401.
- Turn the locking screw 134 so it fits into the motor shaft key slot.

Fig. 25

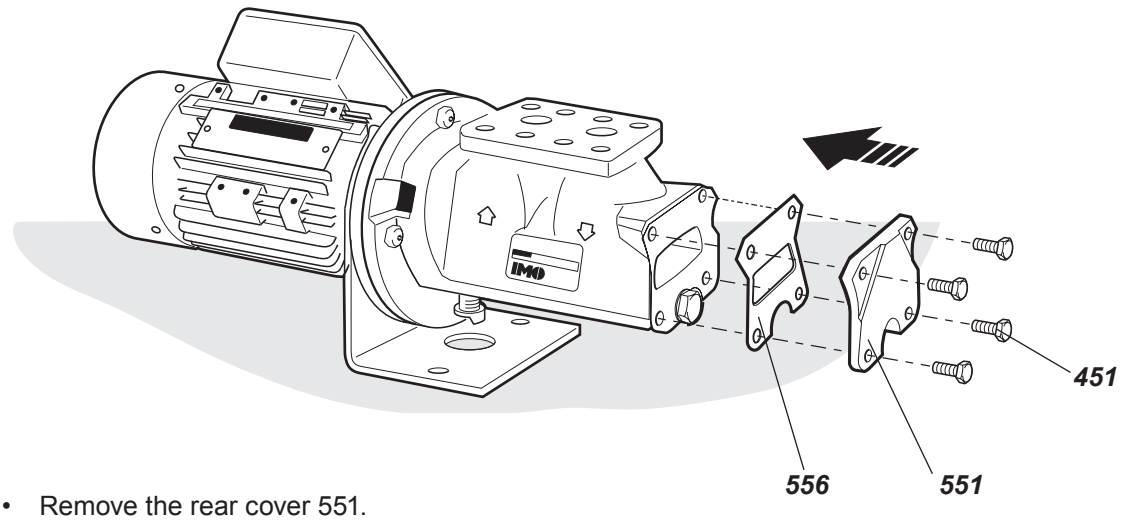
K.



- Fit the electric motor and the angle bracket and make sure that the locking screw 134 has entered the motor shaft key slot.
- Tighten the motor fastening screws.
- Tighten the locking screw 134.
- Reinsert and tighten the drip nipple.

Fig. 26

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- Remove the rear cover 551.
- Fit the gasket 556 and put the rear cover 551 back in place.
- Tighten the screws 451 crosswise (24 Nm).
- Put the pump back into the system. Proceed according to the instructions in the IMO AB Installation and Start up instruction for low pressure pumps.

Fig. 27

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Pressure relief valve

- The valve piston 614 and valve spring 615 can be pulled out by unscrewing the plug 601.
  Should the set screw 612 need to be removed, (for instance to change o-ring 605) the retaining ring 612A must be removed first.
- Readjust the valve pressure according to the installation and Start-up Instruction for IMO Low pressure pumps.

⚠ **Spring tension.**

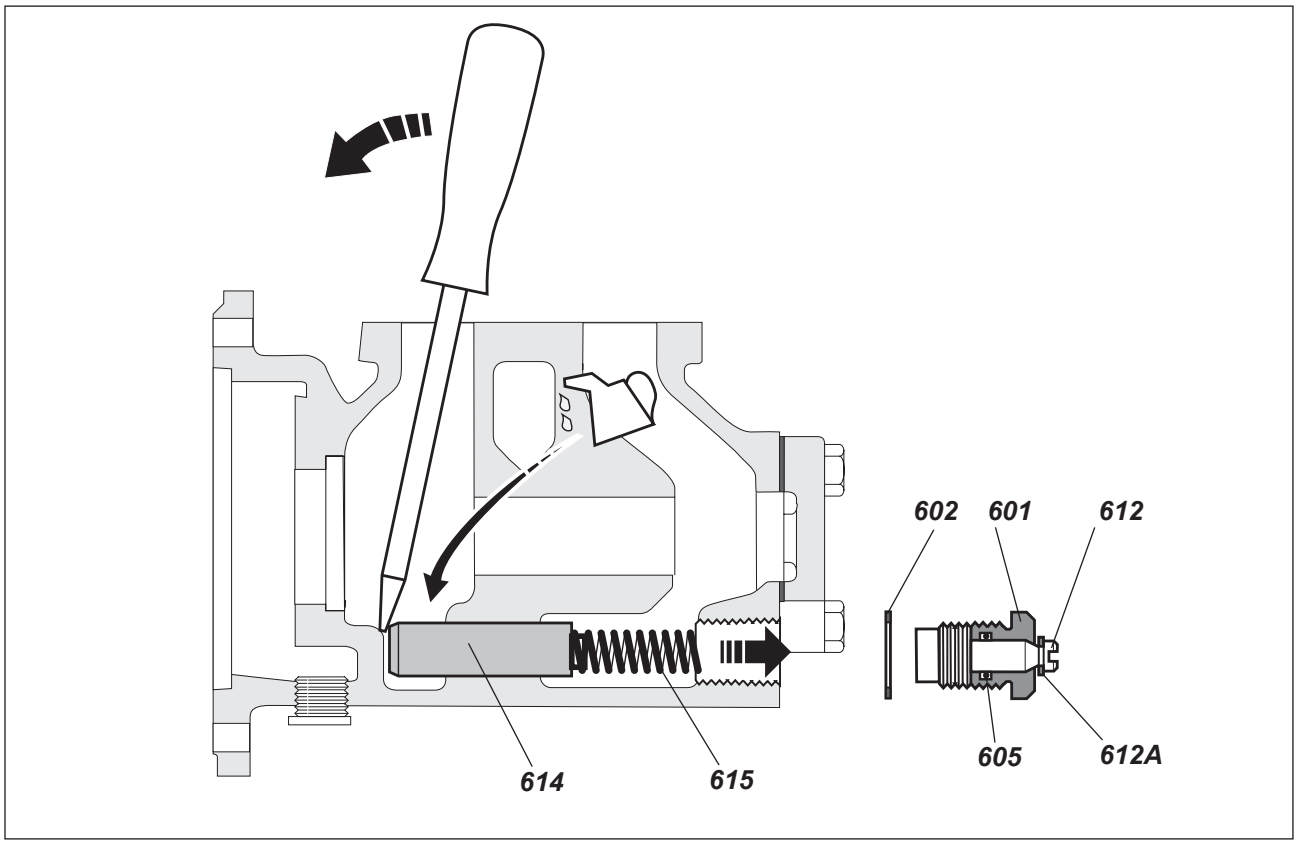


Fig. 28

- If the valve piston 614 does not come out by its own weight push it with a screw driver as far as possible and pull it out together with the valve spring 615.

  If it is not possible to pull out the valve piston with the spring push it back again, lubricate and push it back and forwards until it moves freely and can be pulled out with the spring.

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