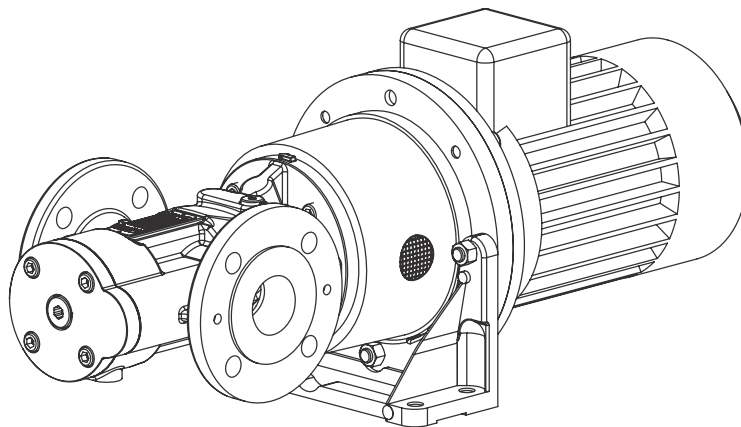
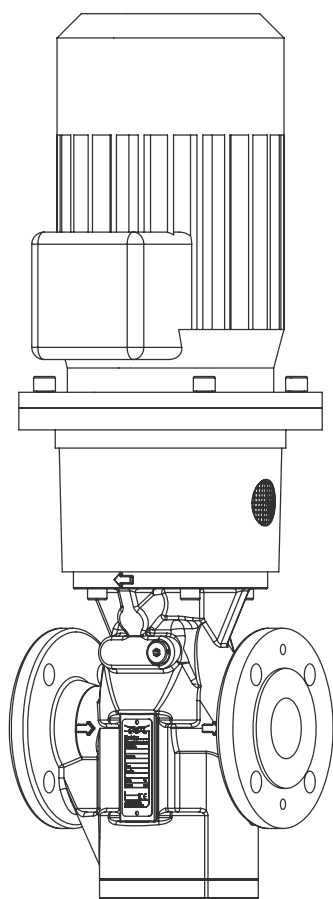


Oil Feed Pumps ALP 100-280



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Original instruction

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Study instruction manuals and observe the warnings before installation, operation, service and maintenance.

Not following the instructions can result in serious accidents.

In order to make the information clear only foreseeable conditions have been considered. No warnings are given, therefore, for situations arising from the unintended usage of the machine and its tools.



1 *EC Declaration of Conformity*

The designating company

Alfa Laval Kolding A/S

Company name

Albuen 31, DK-6000 Kolding, Denmark

Address

+45 79 32 22 00

Phone No.

hereby declares that

Denomination: Three-Screw Pump

Type: ALP

Date: 2019-01-16

Is in conformity with

- Machinery Directive 2006/42/EC

and furthermore declares that if motorised the following applicable directives have been used

- Directive 2014/35/EU on low voltage
- EMC Directive 2014/30/EU

The technical construction file for this machinery has been drawn up. The signer of this declaration is authorized to compile the technical file.

Manager, Product Center Fluid Handling

Title

Bjarne Søndergaard

Name

Alfa Laval Kolding A/S

Company

Signature

2 *Warning signs in text*

2.1 Warning signs

Pay attention to the safety instructions in this manual. Below are definitions of the three grades of warning signs used in the text where there is a risk for injury to personnel.



DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



NOTE indicates a potentially hazardous situation which, if not avoided, may result in property damage.

3 *Function Description*

The operating instructions form part of the pump or of the pump unit and must be kept for future reference. Furthermore please observe the associated documents.

3.1 Application

Use the pump solely for transporting fuel or lubricating oils that are chemically neutral and that contain no gas or solid components.

Use the pump only within the performance limitations specified on the machine plate and in the "Technical data" section. In the case of operating data that does not agree with the specifications on the machine plate, please contact the manufacturer.

The pump is specifically configured for the operating pressure stated in chapter 5.

3.1.1 Safety information

The following general safety instructions must be observed:

- No liability is accepted for damage arising through non-observance of the operating instructions.
- Read the operating instructions carefully and observe them.
- The operator-owner is responsible for the observance of the operating instructions.
- Installation, removal and installation work may only be carried out by authorised personnel.
- In order for the warranty to remain valid, corrective maintenance carried out during the warranty period requires the express permission of the manufacturer.
- Observe the general regulations for the prevention of accidents as well as the local safety and operating instructions.

- Observe the valid national and international standards and specifications of the installation location.
- In case of systems with an increased potential of danger to humans and/or machines the failure of a pump may not lead to injuries or damage to property.
- Always equip systems with an increased potential of danger with alarm equipment.
- Maintain and check the protective/alarm equipment regularly.
- The pumped liquids can be dangerous (e.g. hot, dangerous to health, poisonous, combustible). Observe the safety regulations for handling dangerous materials.
- Pumped liquid can be subject to high pressure and can cause damage and/or personal injury should leaks occur.

3.2 Design

Screw pumps are rotating displacement pumps whose displacement effect results from the meshing of three rotating screws and the enclosing housing. The radial support of the screws is effected by the sliding contact in the housing which requires lubrication by the pumped liquid. Screw pumps are therefore not suitable for dry running and can only be used up to specific pressure and viscosity limits. Due to the narrow tolerances, pumping of suspended solids is not possible. Axial support of the main screw is carried out by a deep-groove ball bearing. An internal pressure relief valve protects against excessive pressure that could cause housing parts to burst.

3.2.1 Mechanical seal

The functionality of a mechanical seal is based on the formation of a hydrodynamic film between rotary seal ring and stationary seal ring of a mechanical seal. The formation of this film avoids solid body friction between both parts, the stability of the film therefore is essential for the functionality of the mechanical seal. However, the formation of a fluid film also means that

the differential pressure on the seal will always move some fluid through the gap which is filled by the film. Therefore a properly designed mechanical seal will always show a certain amount of leakage. The amount of leakage is depending on various factors, dominated by size, rotation speed and differential pressure. In any case, a leakage of less than 10 drops per hour (approx. 0.5 cm³/h) is considered to be normal and gives no reason for a replacement of the seal. The integrated leakage vent hole allows draining of this leakage. The drainage through these hole has to be kept free, see [5.6 Cleaning the leakage vent hole on page 25](#). Dry running must be avoided at all costs, as the seal will overheat and be destroyed in a matter of minutes.

3.2.2 Direction of Rotation

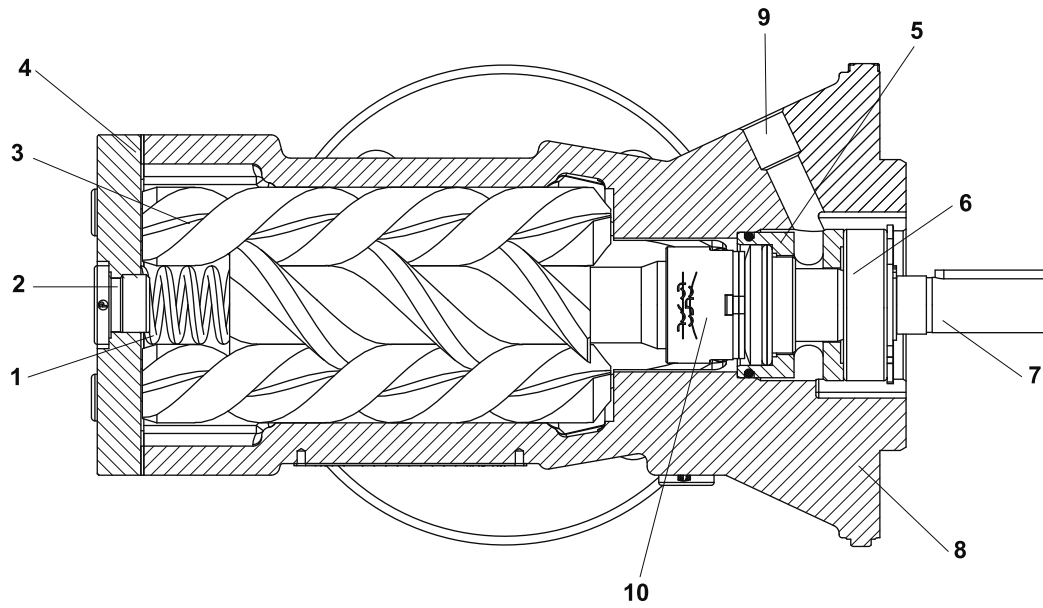
Standard direction of rotation: clockwise, viewed from the drive; marked on the housing by two arrows, see [7.6.3 Checking the direction of rotation on page 48](#). Flow direction: marked on the housing by two arrows, see [7.6.3 Checking the direction of rotation on page 48](#).

3.2.3 Pressure relief valve

The integrated pressure relief valve prevents very high pressures which can result in housing parts bursting. The valve is purely there as a safety element and should not be used for control or regulation such as maintaining pressure. Circulation through the pressure relief valve for too long heats the pump to excess. This reduces viscosity and can ultimately lead to pump failure. Setting: The valve spring is pretensioned to an opening pressure of 6 bar $\pm 10\%$ for separator applications, or delta 10 bar $\pm 10\%$ for fuel conditioning applications.

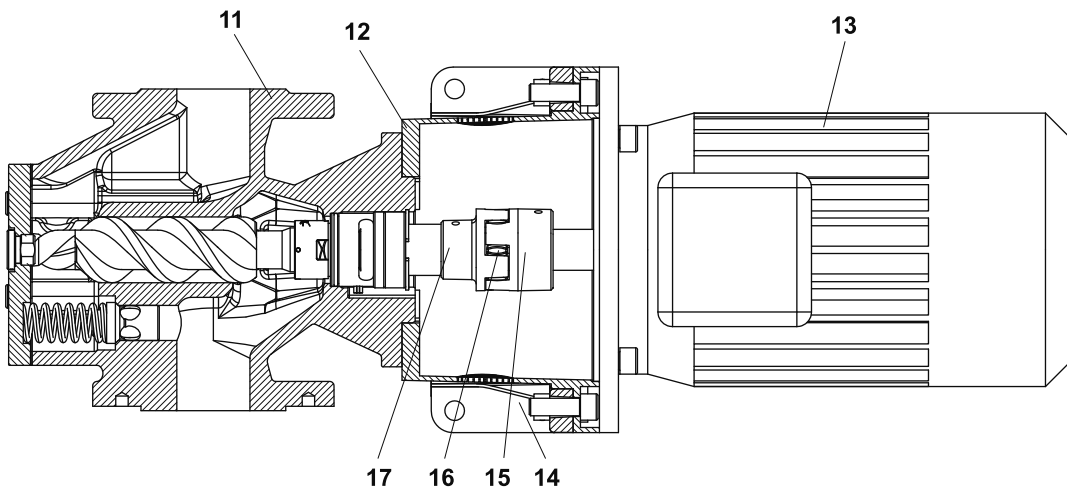
3.3 Parts

1 Pressure relief valve	10 Mechanical seal
2 Screw plug	11 Pump
3 Idle screw	12 Adapter housing
4 End cover	13 Motor
5 Sealing sleeve	14 Bracket
6 Ball bearing	15 Motor-side coupling half
7 Main screw	16 Spider
8 Pump housing	17 Pump-side coupling half
9 Leakage vent hole	



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Fig. 1. Structure of ALP pump

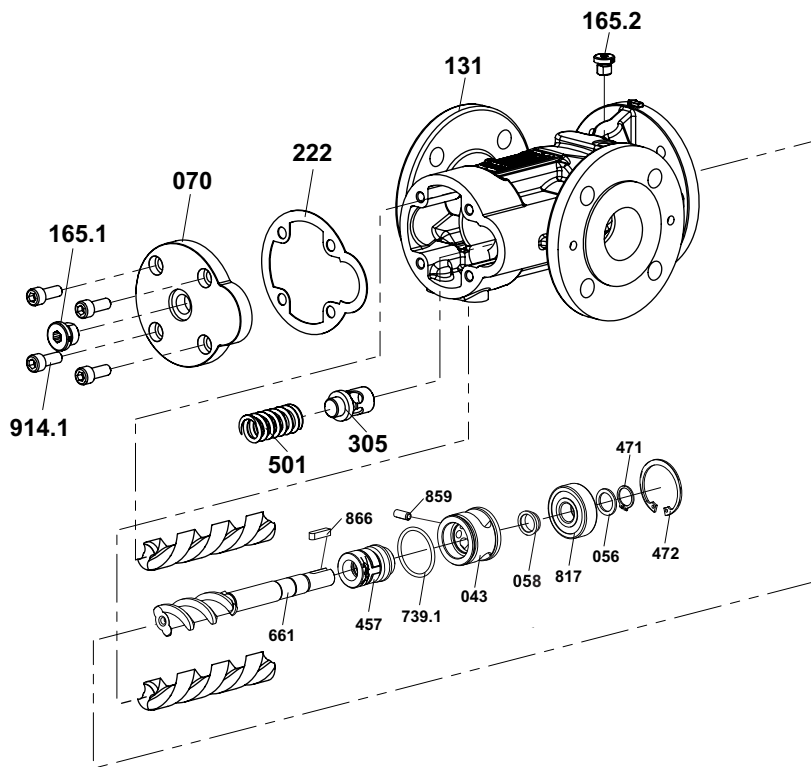


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Fig. 2. Structure of ALP pump with spider coupling and motor

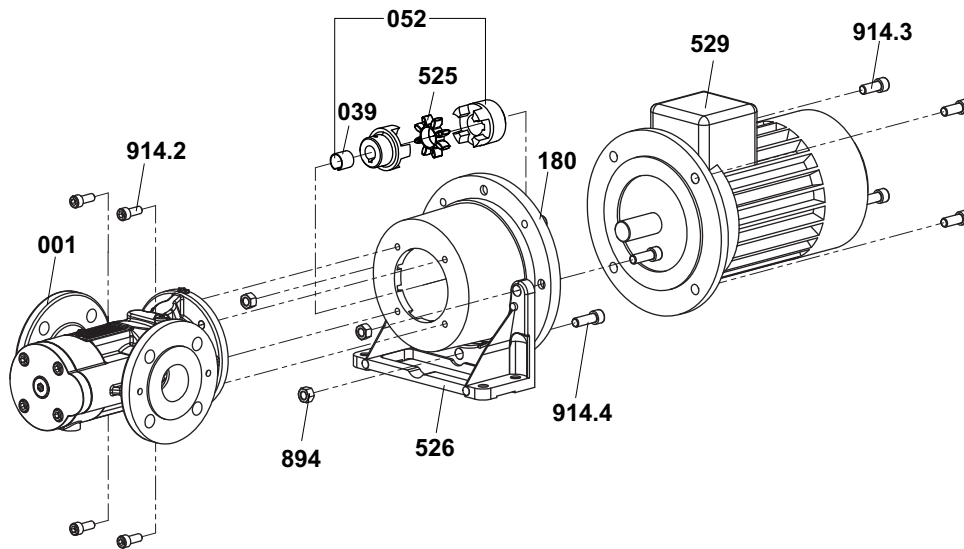
Parts table

Pos. no.	Denomination	Pos. no.	Denomination
001	Pump	472	Circlip
039	Distance sleeve	501	Spring
043	Sealing sleeve	525	Coupling intermediate ring
052	Coupling	526	Pump bracket foot
056	Supporting ring	529	Motor
058	L-ring	661**	Screw set
070	End cover	739.1	O-ring
131	Pump housing	817	Ball bearing
165.1	Screw plug	866	Feather key
165.2	Screw plug	894	Hexagon nut
180	Pump bracket	914.1	Socket screw
222	Flat gasket	914.2	Socket screw
305	Valve body	914.3	Socket screw
457	Mechanical seal	914.4	Socket screw
471	Circlip		
**	In case of wear of the screw set it is recommended to replace the pump.		



X027479A

Fig. 1. ALP 100–280



X027480B

Fig. 2. Completion spider coupling ALP 100 – 280

3 Function Description

4 Fault Finding

4.1 Possible faults

Faults can have different causes. The following tables list the symptoms of a fault, the possible causes and measures for elimination.

Fault	Cause/Remedy
No pump suction	1, 2, 3, 4, 5, 6, 7, 8, 30
Delivery rate too low	2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 16
Pump runs noisily	2, 3, 4, 6, 10, 12, 14, 18, 19, 20, 21
Motor overload	9, 10, 13, 21, 22, 25
Uneven delivery rate	2, 3, 4, 6, 10, 12, 14, 15
Leaking shaft seal	17, 23, 24, 25
Pump has seized up	26, 27, 28, 29

4.2 Troubleshooting

No.	Cause	Remedy
1	Pump suction pipe closed	Check shut-off devices in the suction pipe and open them, if necessary.
2	Suction valve or pipe obstructed	Check the suction valve and pipe for clear passage.
3	Suction pipe or shaft seal leaks	Check suction pipe or shaft seal for leaks. Pay particular attention to leakage at valves and connection points. If necessary, replace parts.
4	Suction head too high	Reinstall the pump at lower suction head level.
		- or -
		Reduce pipe length
		- or -
		Increase pipe diameter
		- or -
		Heat the liquid to reduce viscosity
		- or - Check that the strainer is not clogged, see 7.4 Strainer on page 45 .
5	Level of liquid in the intake container too low	Top up the pumped liquid.
6	Dirty filter/strainer	Clean the filter/strainer.
7	Pump suction capacity reduced by inadequate wetting	Fill pump with liquid.

No.	Cause	Remedy
8	Incorrect pump direction of rotation	Carry out the electrical connection so that the direction of pump rotation matches that of the arrow on the flange cover, see 7.6.3 Checking the direction of rotation on page 48
9	Differential pressure too high	Check the system and reduce the differential pressure.
10	Viscosity of the pumped liquid too high	Increase the temperature of the liquid
		- or - Reduce the rotation speed.
11	Viscosity of the pumped liquid too low	Decrease the temperature of the liquid
		- or -
12	Airlock or gas in the liquid	Increase the rotation speed.
		Test the pipe system for ingress of air and replace parts if necessary.
		Reduce the suction head
		- or - Increase the inlet pressure.
13	Motor running at wrong voltage or frequency	Ensure that the motor voltage and frequency match the operating voltage.
		Compare the speed of the motor with the pump communication plate. If the data does not match, adjust the speed of the motor.
14	Pressure relief valve opens during normal operation	Reduce operating pressure.
15	Pressure relief valve leaks	Clean the pressure relief valve and reseal if necessary.
16	Advanced wear of rotating pump components	Check screw set and housing and replace the pump if necessary.
		Replace the seal and check the pumped liquid for abrasive content.
17	Advanced wear of sealing surfaces	Support the weight of the pipe system.
18	Pump distorted	Loosen pipework connections and mount stress-free, see 7.3 Piping on page 45 .
19	Resonance in the system	Provide a flexible bearing arrangement for the pump unit
		- or - Make the connections with hoses.
20	Speed of flow in suction or pressure pipe too high	Set the flow speed in the suction pipe so that it does not exceed 1 m/s.
		Set the flow speed in the pressure pipe so that it does not exceed 3 m/s.
21	Ball bearing damaged	Replace the ball bearing, see 5.8 Replacing the mechanical seal and ball bearing on page 30 .
22	Lack of lubrication or foreign bodies have caused superficial damage to rotating pump components	Check the screw set and the housing. If necessary replace the pump with free shaft end.
23	Dry running has damaged the shaft seal	Replace the shaft seal, see 5.8 Replacing the mechanical seal and ball bearing on page 30 . When starting up the pump, pay attention to venting.

No.	Cause	Remedy
24	Thermal or chemical loading of elastomer seals exceeded	Check the maximum operating temperature. Check the resistance of the elastomers with regard to the pumped liquid.
25	Cold start when delivering high-viscosity liquids	Preheat the pumped liquid.
26	Foreign bodies in the pump	Dismantle the pump and clean it. Smooth the superficial damage to the housing and the rotating parts with an oilstone. If necessary, replace the pump.
27	Differential pressure is too high and has overloaded the screws	Dismantle the pump and clean it. Smooth the superficial damage to the housing and the rotating parts with an oilstone. If necessary, replace the pump. Reduce the differential pressure.
28	Viscosity is too low and has overloaded the screws	Dismantle the pump and clean it. Smooth the superficial damage to the housing and the rotating parts with an oilstone. If necessary, replace the pump. Increase the viscosity, for example by reducing the operating temperature.
29	Dry running has damaged the pump equipment	Dismantle the pump and clean it. Smooth the superficial damage to the housing and the rotating parts with an oilstone. If necessary, replace the pump. When resuming operation, take action to prevent dry running, see 7.6.4 Recommissioning the pump on page 49 .
30	Pump does not vent	Vent the pressure pipe at the highest point.

5 *Maintenance*

5.1 Safety instructions on maintenance and repairs

The following safety instructions must be observed during all the repair work:

All the work may only be carried out by authorized qualified personnel.

Wear protective clothing during all the work.

Switch off the motor and secure it against being switched back on.

Before beginning the work let the pump/the pump unit cool down to the ambient temperature and remove it from the pipe system.

Ensure that the pump is depressurized.

Collect the emitted pumped liquid safely and dispose of it in an environmentally compatible manner.

Also observe the general drawings during all the work, see [Parts on page 14](#).

5.2 Required maintenance

The service life of the pump depends to a great extent on the operating conditions. If the operating limits are observed, see [6 Technical Data on page 35](#), the pump has a service life of many years. Signs of progressive wear of individual pump elements:

Finding	Cause	Elimination
Increased running noises	Incipient damage to bearing	Replace the bearing.
Increased leaking	Incipient damage to seal	Replace the shaft seal.
Deposits on the seal	Non-volatile liquids	Clean the seal.
Increased play in the shaft coupling	Advanced wear of the spider	Replace the spider.
Reduction in the flow rate or pressure under constant operating conditions	Advanced wear of screws and housing	Replace the pump.

Tab. 1 Check table for required maintenance

1. Check the pump visually and acoustically every four weeks.
2. Check for signs of wear as listed in the table above and eliminate the cause.

5.3 Mechanical seal

Mechanical seals are subject to a natural wear that depends strongly on the respective conditions of use. General statements about the durability can therefore not be given. A properly designed mechanical seal will always show a certain amount of leakage. The amount of leakage is depending on various factors, dominated by size, rotation speed and differential pressure. In any case, a leakage of less than 10 drops per hour (approx. 0.5 cm³/h) is considered to be normal and gives no reason for a replacement of the seal. In case of heavy pollution with solidified and/or sticky leakage residues disassemble the mechanical seal completely and carefully clean it, together with the inner surfaces of the sealing sleeve, see [5.8 Replacing the mechanical seal and ball bearing on page 30](#). It is recommended to replace the o-rings when reassembling the mechanical seal.

5.4 Ball bearing

The ball bearings used are lifetime lubricated. Maintenance is therefore not required. We recommend renewing the ball bearings every two years.

5.5 Screw set

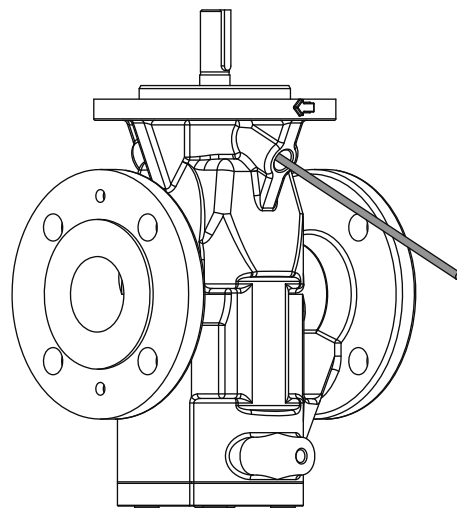
Main and idle screws are precision machine parts made from a high performance steel which is further improved by a nitration treatment. Provided the pump is operating under regular conditions, the screws will have a very long service life. The pump housing is manufactured from nodular cast iron, including also the bores where the screws are rotating. When operating the pump with abrasive liquids, material loss will generally progress faster in the pump housing than on the screws. Screws therefore are not available as spare parts. In case of progressive wear, the complete pump will have to be replaced.

5.6 Cleaning the leakage vent hole

The regular small amounts of leakage can result in deposits that can prevent free draining of further leakage liquids after a longer operating period. The leakage vent hole must therefore be checked monthly and if necessary cleaned.



Bearing damage due to insufficient drainage of shaft seal leakage



X027478A

Fig. 1 Cleaning the leakage vent hole

Check permeability of leakage vent hole regularly.

1. Remove any drainage line that is connected.

5 Maintenance

2. Check the permeability of the drainage line: Observe whether a small amount of added liquid drains, or

Check visually, or

Insert an arbor made of a soft material (wood, plastic, etc.), see Fig. 1.

3. Clean the line or leakage vent hole, if it is not free.
4. Reconnect any drainage line that is connected.

5.7 Replacing the spider coupling

Removing the coupling

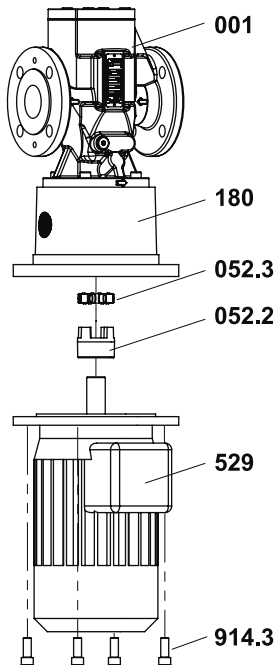


Fig. 2

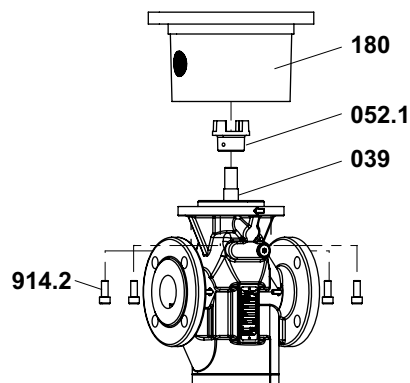


Fig. 3

X027481A

001	Pump	052.2	Motor-side coupling half	529	Motor
039	Distance sleeve	052.3	Spider	914.2	Socket screws
052.1	Pump-side coupling half	180	Adapter housing	914.3	Socket screws



Risk of injury and/or damage to equipment should the pump/pump unit fall

Lift large pumps/pump units using the crane.

Do not stand under raised loads.

1. Before dismantling close the suction and pressure connection of the pump with protective covers.
2. Loosen the connecting screws 914.3 between the motor 529 and adapter housing 180 and lift the pump with adapter housing from the motor, see Fig. 2
3. Loosen the fixing screw on the motor-side coupling half 052.2.

4. Remove the spider 052.3 and pull off the coupling half 052.2 using a suitable device.
5. Loosen the connecting screws 914.2 between the pump 001 and adapter housing 180 and remove the adapter housing, see Fig. 3.
6. Loosen the fixing screw on the pump-side coupling half 052.1 and remove the coupling half using suitable mounting levers.

Installing the coupling

1. Slide the pump-side coupling half 052.1 onto the shaft until it stops. Heating the coupling to 80–100 °C facilitates mounting. Tighten the fixing screw of the coupling half.
2. Place the adapter housing 180 on the pump and tighten the connecting screws 914.2, see Fig. 4.

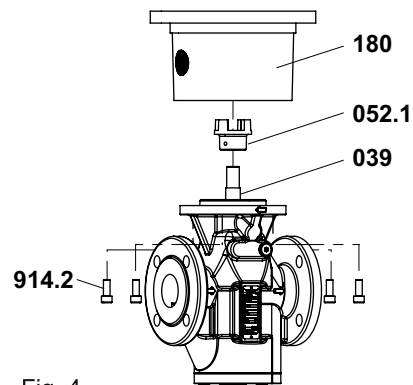


Fig. 4

X027482A

3. Measure and write down the distance X between the face of the coupling and the connecting surface of the adapter housing, see Fig. 5.

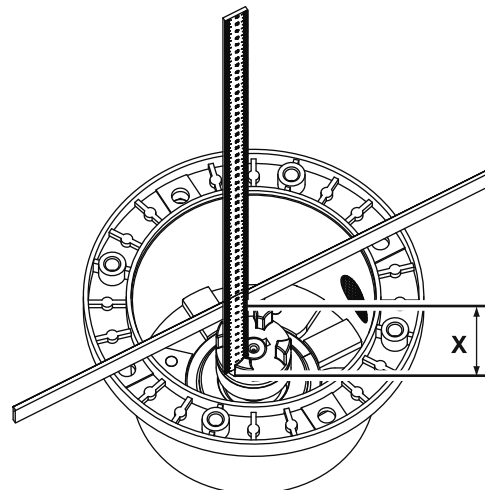
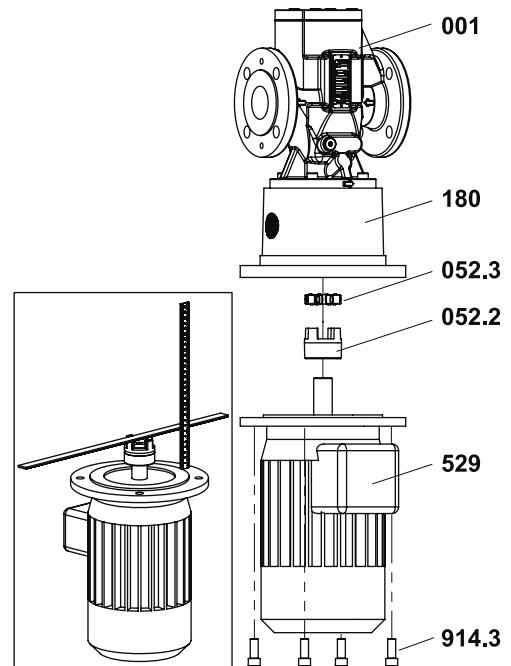


Fig. 5

X027211A

4. Mount the motor-side coupling half 052.2 on the shaft end of the motor, see Fig. 6. Heating the coupling to 80–100 °C facilitates mounting.



X027483A

5. Check the distance between the face of the coupling teeth and the connecting surface of motor flange. The distance has to be adjusted to the value $X - c$, see table below.
6. Insert the spider 052.3 and tighten the fixation screw at the coupling half 052.2.
7. Place the pump with the adapter housing on the motor.
8. Turn the pump slightly until the teeth of the pump-side coupling half 052.1 mesh correctly into the spaces of the spider 052.3.
9. Tighten the connecting screws 914.3 between the motor and adapter housing with torque, see [9.1.1 Tightening torques on page 61](#).

Linear offset	Coupling diameter (mm) c			
	56	66	80	95
min. [mm]	2.0	2.5	3.0	3.0
max. [mm]	3.5	4.0	4.5	5.0

5.8 Replacing the mechanical seal and ball bearing

5.8.1 Dismantling

Aids:

Disassembly tool, see [9.1.2 Required tools for maintenance work on page 61](#).

- Open-end wrench
- Extractor

1. Remove the circlip 472, screw plug 165.1 and feather key 866, see Fig. 7.

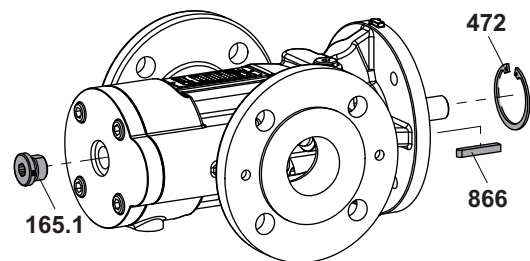


Fig. 7

X027484A

2. Screw in the disassembly tool A by using the open-end wrench B, see Fig. 8. The main screw will be pressed out of the pump housing. Remove the main screw from the pump housing.

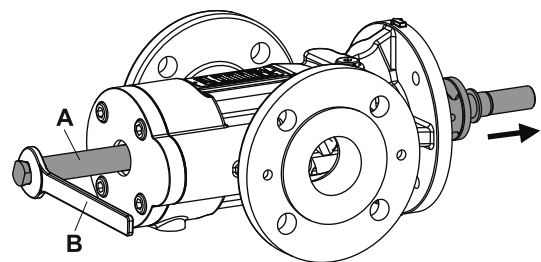


Fig. 7

X027485A

3. Remove the circlip 471 and supporting ring 056, see Fig. 9.

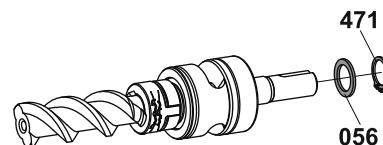


Fig. 9

X027251A

- Pull the ball bearing 817 from the main screw using a suitable extractor C, see Fig. 10.

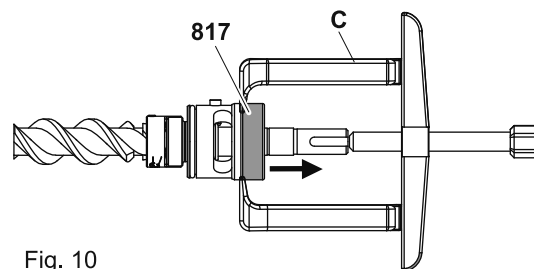


Fig. 10

X027261A

- Remove L-ring 058, sealing sleeve 043 along with o-ring 739.1 and stationary seal ring of the mechanical seal along with o-ring, see Fig. 11.

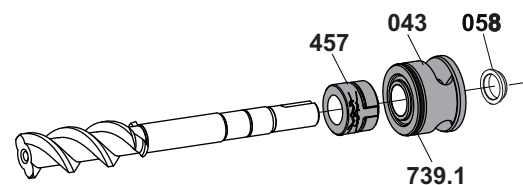


Fig. 11

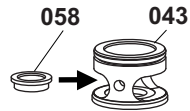
X027517A

- Remove the remaining parts of the mechanical seal 457 from the main screw, see Fig. 11.

5.8.2 Assembly

Aids:

1. Clean the fitting surfaces and the main screw. Grease the main screw and o-rings slightly.
2. Insert the L-ring 058 laterally into the sealing sleeve 043.



X027614A

3. Press the stationary seal ring of the mechanical seal along with o-ring manually into the sealing sleeve 043, see Fig. 12. Take the position of the clearance for the adapter sleeve 859 into account.

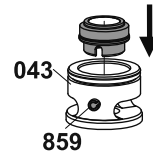


Fig. 12

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4. Slide the remaining parts of the mechanical seal 457 onto the main screw, see Fig. 13.

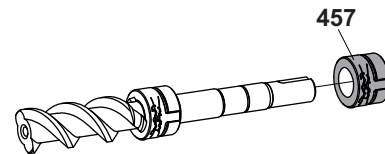


Fig. 13

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5. Slide the new o-ring 739.1 onto the sealing sleeve 043 and slide the sealing sleeve onto the main screw, see Fig. 14.

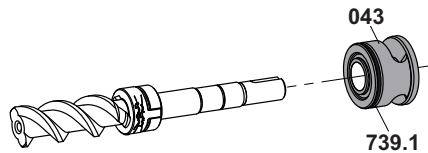


Fig. 14

X027486B

6. Press the ball bearing 817 onto the main screw, see Fig. 15.

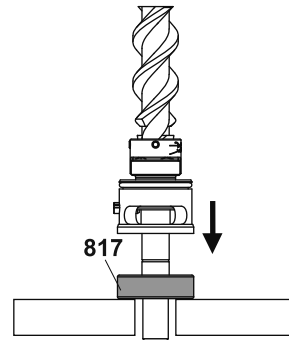


Fig. 15

X027311A

7. Mount the supporting ring 056 and circlip 471. Slide the main screw with pre-mounted sealing sleeve into the pump housing until the main screw engages into the idle screws, see Fig. 16. In doing so turn the main screw and take the position of the clearance for the adapter sleeve into account.

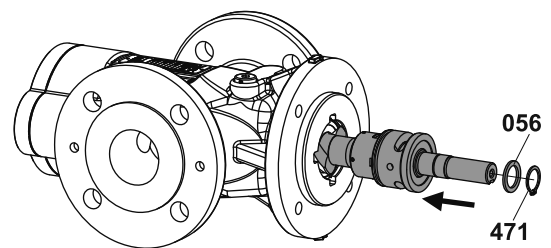


Fig. 16

X027487A

8. Mount the screw plug 165.1, circlip 472 and feather key 866, see Fig. 17.

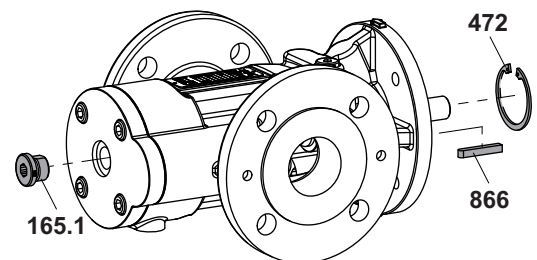


Fig. 17

X027488A

6 Technical Data

6.1 Operating limits

Design pressure max. [bar]	16
Valve opening pressure [bar]	6 bar \pm 10 % for separator systems 10 bar \pm 10 % for fuel conditioning systems
Temperature max. [°C]	180
Temperature min. [°C] for pump materials	-20
Viscosity min. – max. [mm ² /s]	1.4 – 10 000
Rotation speed [min ⁻¹]	
at 50 Hz	2 900
at 60 Hz	3 500

6.2 Required Net Positive Suction Height (NPSH) values

The following table lists the required NPSH values during operation with a low-volatile liquid such as lubricating oil or hydraulic liquid. When liquids have a readily volatile component content, the required NPSH values increase notably when the pumped liquid contains water (e.g. heavy fuel oil), the values in the table have to be increased by the vapor pressure of the water at the specified operating temperature.

The required NPSH values also need to be increased if there are gas contents, regardless of whether it is dissolved or not. In case of any doubt, please contact the manufacturer.

Size	Viscosity [mm ² /s]	NPSH value [mWC] at Rotation speed [min ⁻¹]				Size	Viscosity [mm ² /s]	NPSH value [mWC] at Rotation speed [min ⁻¹]			
		1 450	1 750	2 900	3 500			1 450	1 750	2 900	3 500
ALP 100	6	2.0		2.8	3.4	ALP 230	6	2.1	2.4	4.0	5.3
	37	2.0	2.2	3.2	3.8		37	2.4	2.7	4.5	6.0
	152	2.4	2.6	3.8	4.6		152	2.8	3.2	5.5	7.5
	380	2.9	3.1	4.6	5.7		380	3.4	3.9	6.9	9.5
ALP 115	6	2.0		2.7	3.2	ALP 280	6	2.3	2.6	4.5	6.1
	37	2.0	2.2	3.0	3.6		37	2.5	2.9	5.1	7.0
	152	2.4	2.5	3.6	4.4		152	3.0	3.5	6.3	8.8
	380	2.8	3.0	4.4	5.4		380	3.6	4.2	8.0	11.4
ALP 165	6	2.0	2.1	2.9	3.6						
	37	2.1	2.3	3.3	4.1						
	152	2.5	2.7	4.0	5.0						
	380	2.9	3.2	4.9	6.1						
ALP 215	6	2.2	2.4	4.0	5.2						
	37	2.4	2.7	4.5	6.0						
	152	2.8	3.2	5.5	7.5						
	380	3.4	3.9	6.9	9.5						

6.3 Weights

ALP weights with spider coupling

Motor size	Size 100 115	Size 165 215	Size 230 280	Weight of bracket with screws [kg]
	Weight of pump with free shaft end [kg]			
	20.7	33.3	37.1	
	Weight of adapter housing with spider coupling and screws [kg]			
90	1.6	—	—	0.5
100	2.1	2.1	2.4	1.6
112	2.1	2.1	2.4	1.6
132	2.6	2.8	4.8	2.7
160	—	4.1	4.6	1.9
180	—	—	5.8	1.9

6.4 Dimensions

Dimensions ALP pump

Size	Pump [mm]												Shaft end [mm]			
	L1	L2	L3	L4	D1	D2	D3	S1	Z1	g1/g2	B1	B2	d	l	t	u
100 – 115	59	14	129	272.5	160	125	100	11	4	110	20	20	19	43	21.5	6
165 – 215	57	17	140	333.5	230	156	125	14	4	122.5	20	20	28	47	31	8
230 – 280	63.5	18	178.5	363.5	230	146	125	14	4	140	20	20	28	47	31	8

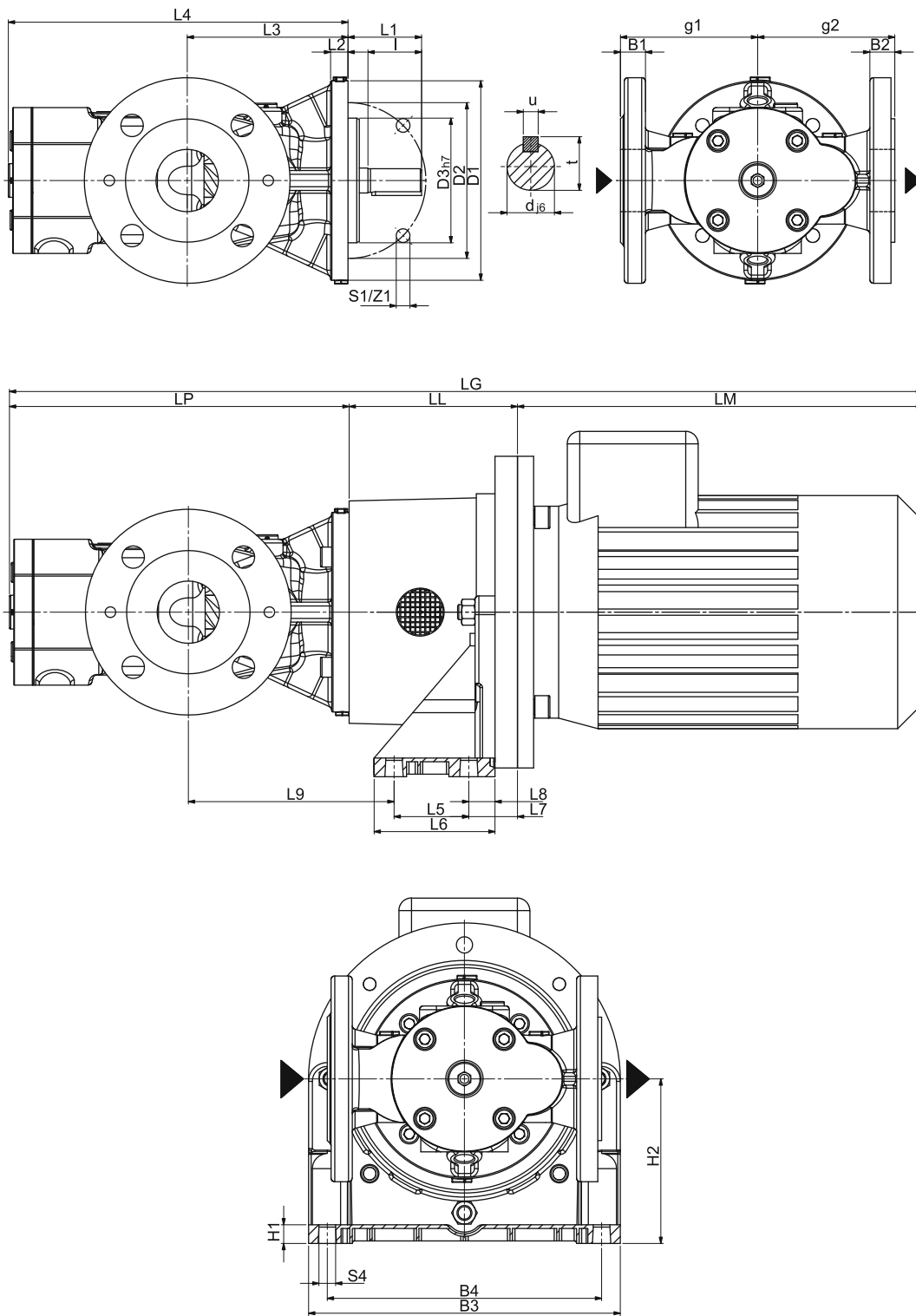
Size	Motor size	Pump unit [mm]													
		LP	LL	LM*	LG**	L5	L6	L7	L8	L9	H1	H2	B3	B4	S4
100 – 115	90	273	124	*	**	60	90	19	15	174	12	112	210	180	Ø11
	100/112	273	135	*	**	60	97	39	21	165	15	132	250	220	Ø13
	132	273	155	*	**	80	116	40	20	164	18	160	290	260	Ø13
165 – 215	100/112	334	135	*	**	60	97	39	21	176	15	132	250	220	Ø13
	132	334	168	*	**	80	116	40	20	188	18	160	290	260	Ø13
	160	334	204	*	**	110	150	45	20	189	22	180	340	300	Ø18
230 – 280	100/112	364	148	*	**	60	97	39	21	227.5	15	132	250	220	Ø13
	132	364	196	*	**	80	116	40	20	254.5	18	160	290	260	Ø13
	160	364	204	*	**	110	150	45	20	227.5	22	180	340	300	Ø18
	180	364	228	*	**	110	150	45	20	251.5	22	180	340	300	Ø18

Dimensions pump unit with spider coupling

* Depends on motor model.

** $LG=LP+LL+LM$

6.4.1 Dimension drawing of ALP pump and pump unit



X027489A

6.5 Capacity tables

6.5.1 Capacity at 50 Hz, delta = 4 bar

Q [l/hour] at viscosity [mm ² /s] 50 Hz										
	Motor kW	13	30	40	60	100	180	380	460**	700**
ALP 100	5,5	10 795	11 054	11 132	11 224	11 317	11 398	11 472	11 486	11 515
	2,2	4 978	5 236	5 314	5 407	5 499	5 580	5 654	5 669	5 697
	1,5	2 900	3 159	3 237	3 329	3 422	3 503	3 577	3 591	3 619
ALP 115	7,5	13 045	13 271	13 339	13 419	13 500	13 571	13 636	13 649	13 673
	2,2	6 156	6 382	6 450	6 530	6 611	6 682	6 746	6 759	6 784
	1,5	3 695	3 921	3 989	4 070	4 151	4 222	4 286	4 299	4 324
ALP 165	7,5	18 214	18 521	18 613	18 723	18 833	-	-	-	-
	4	8 609	8 916	9 008	9 118	9 228	9 324	9 411	9 429	9 462
	2,2	5 179	5 486	5 578	5 687	5 797	5 893	5 981	5 999	6 032
ALP 215	7,5	24 000	-	-	-	-	-	-	-	-
	4	11 422	11 778	11 885	12 012	12 140	12 251	12 353	12 374	12 412
	2,2	6 930	7 286	7 393	7 520	7 648	7 759	7 861	7 882	7 920
ALP 230	5,5	12 463	12 816	12 922	13 048	13 174	13 285	13 385	13 406	13 444
	3	7 603	7 956	8 062	8 188	8 314	8 425	8 525	8 546	8 584
ALP 280	5,5	14 956	15 379	15 507	15 658	15 809	15 942	16 063	16 087	16 188
	4	9 124	9 547	9 675	9 826	9 977	10 110	10 231	10 255	10 301

6.5.2 Capacity at 60 Hz, delta = 4 bar

Q [l/hour] at viscosity [mm ² /s] 60 Hz										
	Motor kW	13	30	40	60	100	180	380	460**	700**
ALP 100	5,5	13 288	13 547	13 625	13 717	13 810	13 891	13 965	13 980	14 034
	2,2	6 224	6 483	6 561	6 653	6 746	6 827	6 901	6 916	6 944
	1,5	3 731	3 990	4 068	4 160	4 253	4 334	4 408	4 422	4 451
ALP 115	7,5	15 997	16 223	16 291	16 372	16 453	16 523	16 590	16 602	16 626
	2,2	7 632	7 858	7 926	8 006	8 087	8 158	8 223	8 236	8 260
	1,5	4 679	4 905	4 973	5 054	5 135	5 206	5 270	5 283	5 308
ALP 165	7,5	22 331	22 637	22 730	22 839	22 949	-	-	-	-
	4	10 667	10 974	11 067	11 176	11 286	11 382	11 470	11 487	11 521
	2,2	6 551	6 858	6 950	7 060	7 169	7 266	7 353	7 371	7 404
ALP 215	7,5	29 390	-	-	-	-	-	-	-	-
	4	14 117	14 473	14 580	14 708	14 835	14 947	15 048	15 069	15 108
	2,2	8 726	9 083	9 190	9 317	9 444	9 556	9 658	9 678	9 717
ALP 230	5,5	15 379	15 732	15 838	15 964	16 090	16 201	16 301	16 322	16 360
	3	9 547	9 900	10 006	10 132	10 258	10 369	10 469	10 490	10 528
ALP 280	5,5	18 455	18 878	19 006	19 157	19 308	19 441	19 562	19 586	19 680
	4	11 457	11 880	12 007	12 158	12 310	12 442	12 563	12 588	12 634

* Max. possible viscosity without cavitation with a suction head of -4 mWC at sea level.

** Re-sizing of motor required.

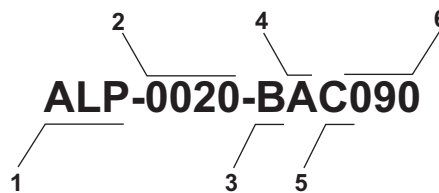
6.5.3 Noise levels

Guide values at 1 m distance, 1450 min⁻¹, 10 bar

Sound pressure level max. ± 3 [dB(A)]			
Size	100 – 115	165 – 215	230 – 280
Pump	60	64	65

6.5.4 Labelling

6.5.4.1 Type code



X027421A

Pos.	Designation	Type
1	Model	ALP
2	Size	Corresponds to flow rate in [l/min] at 1 450 min ⁻¹
3	Shaft seal	B: Mechanical seal of hard material D: Magnetic coupling
4	Pressure stage overflow valve	A: 6 bar B: 10 bar
5	Completion	A: Pump with free shaft end B: With adaptor housing and coupling (flange mounted) C: With adaptor housing, coupling and foot (foot mounted) D: B with motor E: C with Motor
6	Frame size	080
		090
		100
		112
		132
		160
		180

7 Installation

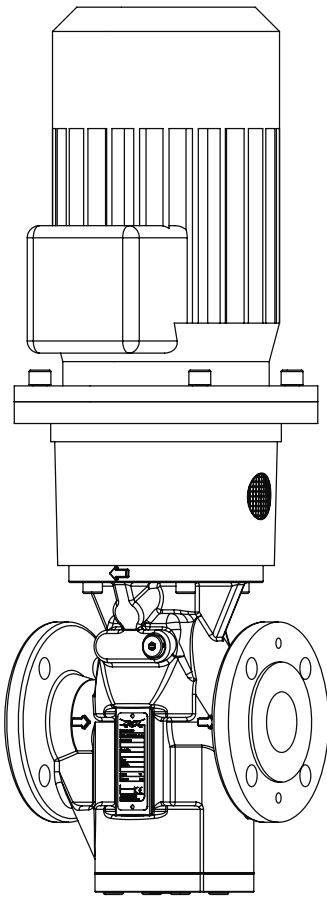
Observe the following instructions:

- When selecting the location take the operating limits, Net Positive Suction Head (NPSH) values and ambient conditions into account, see [6 Technical Data on page 35](#).
- The function, safety and service life may not be impaired by humidity, temperature influences or explosive atmospheres.
- During the installation ensure that all the parts of the pump can be accessed easily and that the maintenance work can be carried out easily.

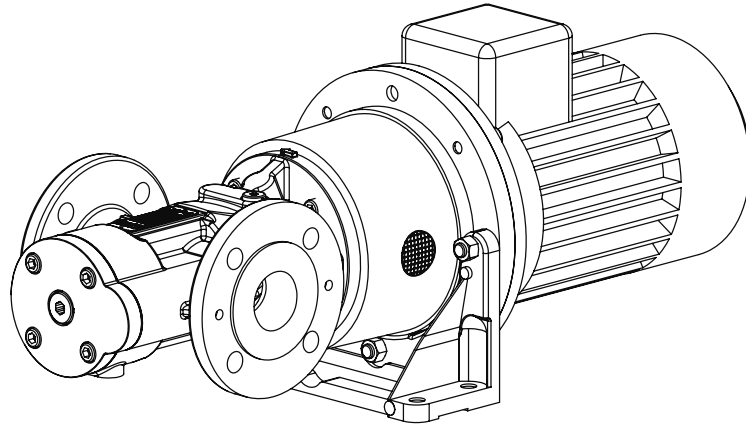
7.1 Installing the pump

The pump must be installed to meet the following demands:

- The pump must be mounted on a solid foundation and on a drip tray or in a cofferdam.
- The pump can be operated vertically or horizontally. However, if vertically mounted the pump should **not** be mounted above the motor since pumped liquid could enter the motor should a leak occur.
- The pump must be easily accessed for inspection and service.
- The pump must be installed so that the oil is kept in the pump casing when the oil flow is stopped.
- The pump must be installed as close as possible to the feed tank in order to avoid suction losses.



Model ALP vertical mounting



X027490A

Model ALP horizontal mounting

7.2 Protect the pump against contamination



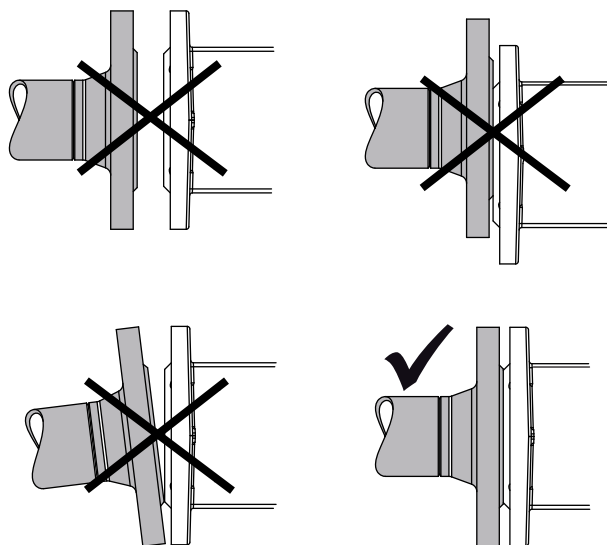
Avoid damage through impurities in the pipe system.

1. During welding work attach protective covers in front of the connecting flanges.
2. Ensure when welding that welding beads and abrasive dust cannot get into the pipe system and the pump.
3. After the connecting work clean the pipe system thoroughly, see [7.6.1 Cleaning the pipe system on page 46](#)

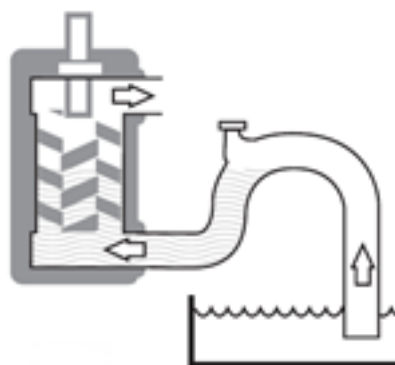
7.3 Piping

The pipe installation must meet the following demands:

- The pipes must be installed and supported with no support from the pump casing.
- The pipe flanges must fit the pump flanges so that they can be connected without using any force. Check the clearance and the angular, vertical and linear offset, adjusting where necessary.
- Before the pipes are connected to the pump they must be cleaned from particles resulting from, for example, welding and cutting.
- Tighten the connecting screws crosswise with torque, see [9.1.1 Tightening torques on page 61](#).
- In installations where the pump does not retain the oil at stand still, the suction pipe should be arranged so it forms a liquid trap together with the pump. The liquid trap should secure that the pump is kept at least half filled with oil at stand still.
- Shut-off valves must be installed on both sides of the pump.
- The suction line should be dimensioned for an oil flow speed between 0.5 and 1.2 m/s, and the pressure line for 1 to 3 m/s.
- The suction line must be equipped with a port near the pump, that allows filling the pump with oil before the initial start.
- The manometric suction head must not exceed the NPSH values in [6.2 Required Net Positive Suction Height \(NPSH\) values on page 35](#)



X027491A



X027513A

7.4 Strainer

An oil strainer of suitable size should be installed to protect the pump against damage and wear from coarse particles.

The pressure drop across the strainer should not exceed 10 kPa (0.1 bar) at maximum flow rate and normal viscosity.

7.5 Gauges

Pressure gauges on both the suction and the pressure side must be connected by 1/2" sockets and ball valves.

7.6 Commissioning

7.6.1 Cleaning the pipe system

To protect the pump against soiling the complete pipe system has to be cleaned carefully before initial commissioning of the pump.

7.6.2 Filling the pump

The filling procedure must be followed when the pump is taken into operation after installation and whenever the pump casing has been emptied of oil, for example, when the pump has been dismantled.



Entrapment hazard

Do not start filling the pump unless the power is switched off.

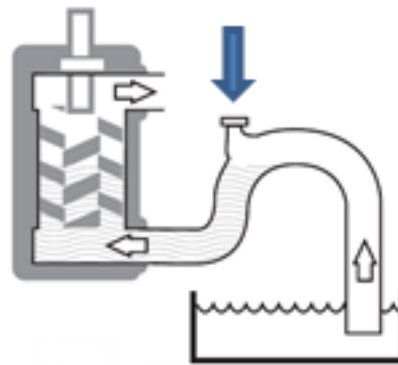
1. Remove the fan cover from the electric motor.
2. Turn the pump shaft or the fan impeller of the motor. This tests that the pump runs smoothly. If the pump cannot be turned by hand, remedy the fault before installing the pump, see [4.2 Troubleshooting on page 19](#).
3. Open the port on the suction pipe near the pump.

4. Open the shut-off valve on the pressure side of the pump.
5. Vent the shaft seal compartment (3).

In installations with positive suction pressure:
After opening the inlet and outlet valves, simply open the deaeration plug (3) 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 (3) and fill the shaft seal compartment with oil. Fit and tighten the plug.

6. Fill the pump with oil while rotating the pump manually. The pump is rotated by turning the motor fan in the direction indicated by the rotation arrow on the motor or connection flange. (There are arrows for inlet and outlet directions on the pump. Do not mix them up with the rotation arrow.)
7. When the pump is filled, close the filling port and refit the fan cover.
8. Check that all valves necessary for operation are open.

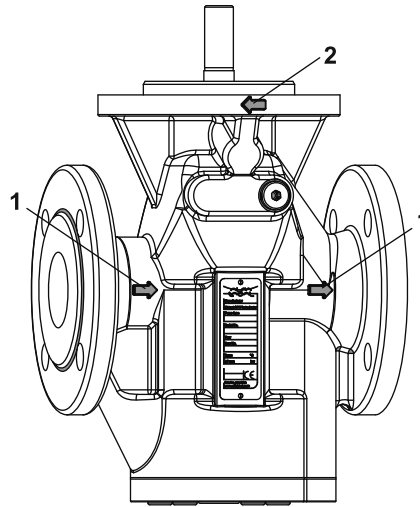


X027514A

7.6.3 Checking the direction of rotation

The direction of rotation and the flow direction are indicated by arrows on the pump. The direction of rotation of the motor gives the direction of rotation of the pump. That is to say, the fan impeller of the motor must rotate in the direction in which the arrows on the pump are pointing to indicate direction of rotation.

Standard direction of rotation: clockwise (viewed from the drive)



X027493A

1. Arrow for flow direction
2. Arrow for direction of rotation



Dry running can damage pump equipment.
Ensure that the pump is filled properly.

Switch the pump on for a maximum of 1 second and then off again immediately.

1. Switch on the power supply and then turn it off again immediately.
2. Compare the direction of rotation of the fan impeller with the arrow indicating direction of rotation on the pump flange (2).
3. If the directions do not match, swap over two electrical connection phases. Repeat Steps 1 and 2.



Dry running can damage pump equipment.
Ensure that the pump is filled properly.

If the pump does not deliver after 10–15 seconds, abort commissioning.

1. Ensure that the pump is filled. In case of doubt prelubricate the pump and mechanical seal by pouring in liquid via the vent hole, see [5.6 Cleaning the leakage vent hole on page 25](#).
2. Switch on the pump.
The pump will deliver when the pressure on the pressure side of the pump rises or a system-side flow indicator triggers.
3. If the pump does not deliver after 10–15 seconds of operation, abort initial commissioning, establish the cause of the fault and only then continue the commissioning procedure. Follow the instructions in the fault table, see [4.2 Troubleshooting on page 19](#).
4. Run the pump for a few minutes to allow the pipe system to vent fully. The pipe system is fully vented when there is a smooth operating noise and a pressure gauge on the pressure side of the pump shows no more fluctuations.

7.6.4 Recommissioning the pump

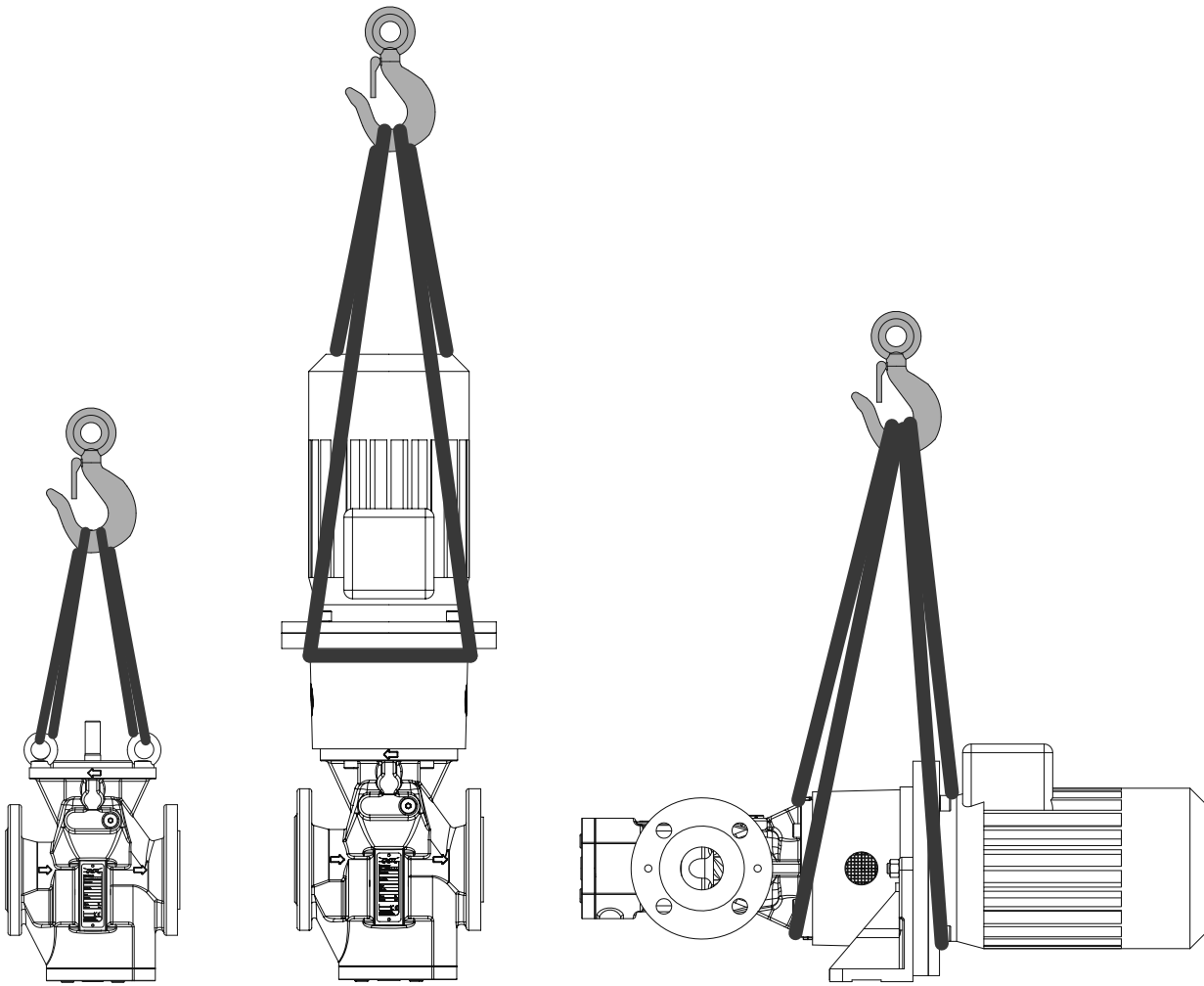
Carry out all the steps as for the commissioning process, see [7.6 Commissioning on page 46](#).

8 *Transportation, storage and disposal*

8.1 Unpacking and checking the state of delivery

1. Upon delivery unpack the pump/pump unit and check for transport damage.
2. Report any transport damage immediately to the manufacturer.
3. Dispose of packing materials in accordance with the locally applicable regulations.

8.2 Lifting the pump/pump unit



X027494A

Prerequisites:

- Sufficiently dimensioned hoisting equipment
- The used hoisting equipment conforms to the local regulations and health and safety regulations



Risk of injury and/or damage to equipment should the pump/pump unit fall.

Use intact and correctly dimensioned hoisting equipment suitable for the weight to be lifted.

Choose the attachment points of the hoisting equipment according to the center of gravity and weight distribution.

Always use at least two slings.

Fasten the hoisting equipment in one of the three ways shown above.

Do not stand under raised loads.

Attach the hoisting equipment to the pump/pump unit, see Fig., and lift the pump/pump unit with a crane.

8.3 Storage

During the test run, the internal components of the pump are wetted with test oil, which has a preservative effect. The pipe connections are fitted with protective covers. The external components of the pump are preserved with a single-coat PU-based two-component paint. The preservative applied at the factory will protect the pump for about six weeks, if it is stored in a dry and clean location. The manufacturer offers a long-term preservation for storage times of up to 60 months. With longterm conservation the pump is additionally packed in hermetically sealing anti-corrosion paper.

8.3.1 Preservation

Preservation has to be carried out in the following cases:

- For standard delivery: For storage periods exceeding six weeks and in case of adverse storage conditions such as high humidity, salty air, etc.
- For delivery with long-term preservation: If the packaging has been opened or damaged.

8.3.2 Preserving the internal surfaces of the pump

1. Close the suction connection of the pump with a blind flange.

2. Pour non-corrosive, resin-free oil into the pressure connection until it reaches approx. 2 cm under the pressure flange, while slowly turning the main screw against the direction of rotation.
3. Close the pressure connection of the pump with a blind flange.

After about 6 months storage check the oil level in the pump and top up if necessary.

8.3.3 Preserving the external surfaces of the pump

Aids:

- Preservative (e.g. Castrol Rustilo DWX 33)

Paint or spray the preservative onto all plain and unpainted parts.

At intervals of about six months, check the preservative effect and if necessary repeat preservation.

**NOTE**

Store the preserved pump in a cool and dry place and do not expose it to direct sunlight.

8.3.4 Removing the preservation

Aids:

- Solvent
- Steam-jet cleaning device with wax-dissolving additives

**WARNING**

Risk of injury through emitted preservative oil.

Wear protective clothing during all the work.

Remove the blind flange with caution to relieve any pressure inside the pump.

Collect the emitted oil safely and dispose of it in an environmentally compatible manner.

1. Clean the outside of the pump with solvents, if necessary using a steam-jet cleaning device.
2. Remove the blind flange on the pressure side.
3. Drain the pump, collecting the preservative oil in a suitable vessel.
4. Remove the blind flange on the suction side.
5. To remove the residual oil, rinse the pump with the pumped liquid.

8.4 Disposing of the pump

Aids:

- Solvents or industrial cleaners suitable for the pumped liquid



Danger of poisoning and damage to the environment from the pumped liquid.

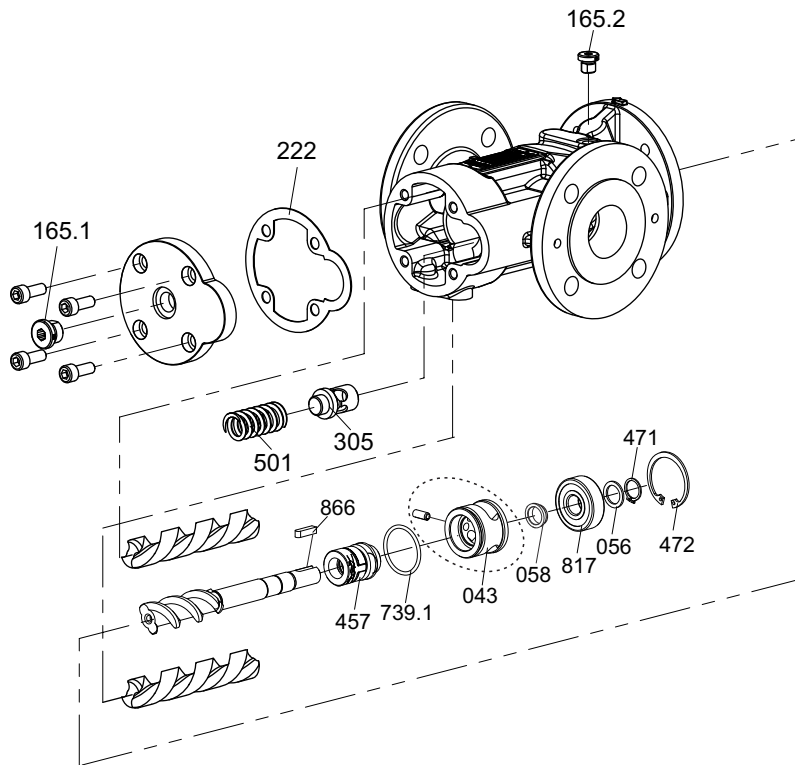
Wear protective clothing during all the work.

Collect the discharging pumped liquid and oil and dispose of it in accordance with the locally applicable regulations.

Neutralize any residues of the pumped liquid.

1. Disassemble the pump.
2. Clean residues of the pumped liquid from the individual parts.
3. Separate sealing elements made of elastomers and ceramics (SiC) from the pump and dispose of them in the residual waste.
4. Recycle metal parts.

9 Spare parts



X027479B

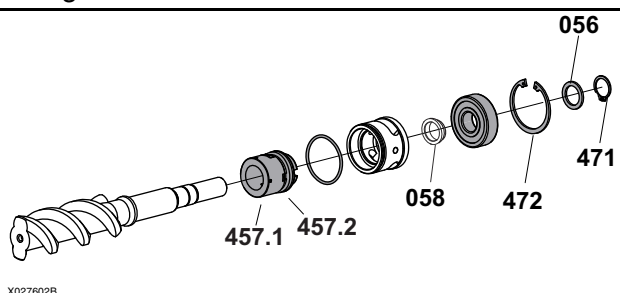
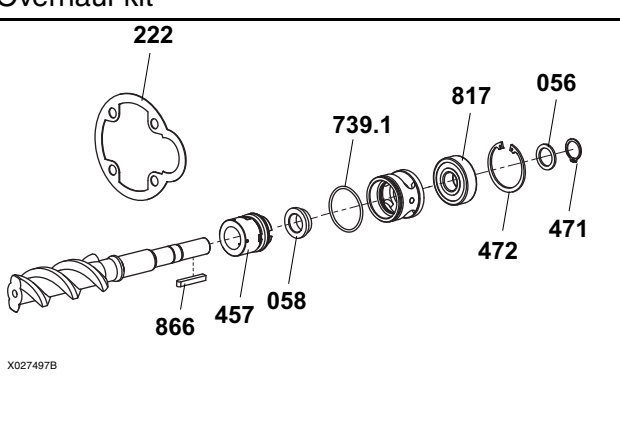
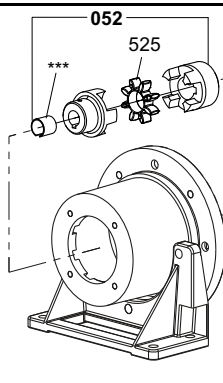
Image show available spare parts (ALP 100-280)

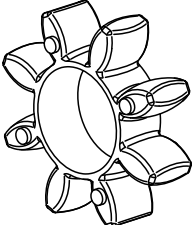
9.1 Spare part kits

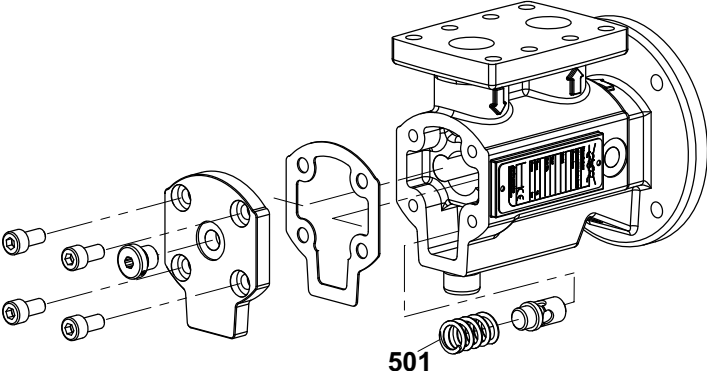
Pump size	Kit type	Part. no
ALP 100-115	O-ring Kit	9007240-84
	Overhaul Kit	9007240-81
ALP 165-280	O-ring Kit	9007240-85
	Overhaul Kit	9007240-83

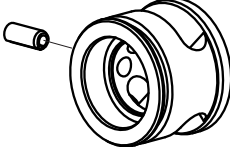
Coupling kits

Pump size	Motor size	Part. no
ALP 100-115	80	9024734-07
	90	9024734-08
	100/112	9024734-09
	132	9024734-10
ALP 165-215	100/112	9024734-11
	132	9024734-12
	160	9024734-13
ALP 230-280	100/112	9024734-14
	132	9024734-15
	160	9024734-16
	180	9024734-17

Spare part kit	Qty.	Pos.no.	Denomination
A: O-ring kit			
	1	056	Supporting ring
	1	058	L-ring
	1	457.1	O-ring stationary seal ring
	1	457.2	O-ring rotary seal ring
	1	471	Circlip
	1	472	Circlip
	1		Disassembly tool
B: Overhaul kit			
	1	056	Supporting ring
	1	058	L-ring
	1	222	Flat gasket
	1	457	Mechanical seal
	1	471	Circlip
	1	472	Circlip
	1	739.1	O-ring
	1	817	Ball bearing
	1	866	Feather key
	1		Disassembly tool
C: Coupling kit			
	1	052	Coupling
	<p>*** Only for sizes 55-85 (motor sizes IEC 90-112)</p>		

Coupling intermediate ring, [525]			
 X027151C	Pump type	Motor size	Part. no
	0100, 0115	80	9029429-01
		90	9029429-01
		100/112	9029429-01
		132	9029429-02
	0165, 0215	100/112	9029429-01
		132	9029429-02
		160	9029429-03
	0230, 0280	100/112	9029429-01
		132	9029429-02
		160	9029429-03
		180	9029429-04

Cylindrical spring, [501]		Part. no
 X027151D		9014370-05 (ALP100-ALP115) 6 bar
		9014370-06 (ALP100-ALP115) 10 bar
		9014370-07 (ALP165-ALP280) 6 bar
		9014370-08 (ALP165-ALP280) 10 bar

Sealing sleeve, [043]		Part. no
 X027151E	ALP100, ALP115	9029771-04
	ALP165, ALP215, ALP230, ALP280	9029771-05

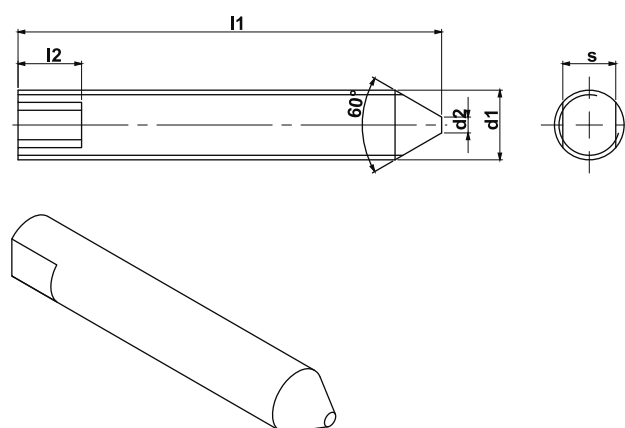
Drain pipe, [155]			
Part	Qty.	Dimensions	Part # Alfa Laval
HHR1201	1	20x1,5x60 mm -0/+2 mm	902447901

9.1.1 Tightening torques

Tightening torque [Nm] for screws with metric threads + head contact surfaces								With thread measured in inches	
				+ wedge lock washers		Stainless steel screws A2 and A4		Screw plugs with elastomer seal	
Thread	8.8	10.9	8.8 + Alu*	8.8	Rust-proof A4-70	Property class 70	Property class 80	Thread	Galvanized + stainless steel
M3	1.5	—	1.2	1.5	1.1	—	—	G1/8"	13
M4	2.9	4.1	2.3	3	2	—	—	G1/4"	30
M5	6.0	8.0	4.8	6.0	3.9	3.5	4.7	G3/8"	60
M6	9.5	14	7.6	10.3	6.9	6	8	G1/2"	80
M8	23.1	34	18.4	25	17	16	22	G3/4"	120
M10	46	68	36.8	47	33	32	43	G1"	200
M12	80	117	64	84	56	56	75	G1 1/4"	400
M14	127	186	101	133	89	—	—	G1 1/2"	450
M16	194	285	155	204	136	135	180	* reduced tightening torque when screwing into aluminum	
M18	280	390	224	284	191	—	—		
M20	392	558	313	399	267	280	370		
M24	675	960	540	687	460	455	605		

9.1.2 Required tools for maintenance work

Disassembly tool



X027391A

Dimensions disassembly tool [mm]					
Size	d1	d2	l1	l2	s
100 – 280	G 1/2"	Ø 40	130	15	17