ALFA PUMPS

Operating Manual

NKP Series

(With ALFA-KSS-RS & ALFA-KSS-RS/D mechanical seal)

Version: 2021-01 EN

Series no.:

P-0674-001-01

Read this operating manual before installation and start the pump!

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1 About this document

This manual

- Is part of the pump
- Applies to all of the afore-mentioned series
- Describes safe and appropriate operation during all operating phases

1.1 Target groups

Target group	Duty
Operating company	► Keep this manual available where the installation is used, including for later use. ► Make sure the staff read and follow this manual and the other applicable documents, especially the safety instructions and warnings. ► Observe any additional rules and regulations referring to the installation.
Qualified staff, fitter	► Read, observe and follow this manual and the other applicable documents, especially the safety instructions and warnings.

Tab. 1 Target groups and their duties

1.2 Other applicable documents

Document	Purpose
Order data sheet	Technical specifications, operating conditions
Setup drawing	Setup dimensions, connection dimensions etc.
Technical description	Technical specifications, operating limits
Sectional drawing	Sectional drawing, part numbers, component designations
Supplier documentation	Technical documentation for supplier parts
Spare parts list	Ordering spare parts
Document of compliance	Returning the pump to the manufacturer
Manual 0312–... Bearing bracket with labyrinth rings for oil-lubricated roller bearings	Technical documentation for bearing bracket with labyrinth rings
Manual 0107–... Bearing bracket with oil level controller	Technical documentation for bearing bracket with oil level controller

Tab. 2 Other applicable documents and their purpose

1.3 Warnings and symbols

Warning	Risk level	Consequences of non-observance
⚠ DANGER	Immediate acute risk	Fatal or serious injury
⚠ WARNING	Potential acute risk	Fatal or serious injury
⚠ CAUTION	Potentially hazardous situation	Minor bodily harm
NOTE	Potentially hazardous situation	Material damage

Tab. 3 Warnings and consequences of non-observance

Symbol	Meaning
⚠	Safety warning sign ► Observe all information indicated by the safety warning sign to avoid injury or death.
►	Instruction
1. , 2. , ...	Multiple-step instructions
	Requirement
→	Cross reference
ℹ	Information, note

Tab. 4 Symbols and their meaning

1.4 Technical terms

Term	Meaning
Pump unit	Pump with motor
Quenching medium	Medium for quenching shaft seals
Barrier medium	Pressurised barrier medium for shaft seals
Flushing medium	Medium for flushing the sealing faces in the seal space or plain bearing
Auxiliary operating systems	Devices for operating the pump

Tab. 5 Technical terms and their meaning

2 Safety

The manufacturer does not accept any liability for damage resulting from non-observance of the entire documentation.

2.1 Intended use

The intended use of the pump is defined in the technical documents. If the pump is to be used for operating data other than those specified in the order data sheet, the operator should check carefully whether the pump version, the accessories and the materials are suitable for the new operating conditions.

- Adhere to the operating limits (→ order data sheet, technical description).
- Only use the pump to pump the agreed pumped media (→ order data sheet).
- Avoid dry running:
  Initial damage such as destruction of mechanical seal and plastic parts within only a few seconds.
  – Make sure the pump is never put into operation or operated without pumped medium.
- Avoid cavitation:
  – Fully open the suction-side fitting; do not use the fitting to adjust the flow rate.
  – Do not open the pressure-side fitting beyond the agreed operating point.
  – Ensure a sufficient $NPSH_{installation}$.
- Avoid overheating:
  – Do not operate the pump while the pressure-side fitting is closed.
  – Minimum permissible flow rate 0.1 x Q_{opt0} (minimum flow rate → order data sheet)
- Avoid damage to the motor:
  – Do not open the pressure-side fitting beyond the agreed operating point.
  – Observe the number of permitted motor start-ups per hour (→ manufacturer's specifications).
- Consult the manufacturer about any other use of the pump.
- Adhere to the operating limits for pressure and temperature (→ 9.2.9 Operating limits for pressure and temperature, Page 54).

Avoiding common types of misuse (examples)

- The power uptake of the pump increases with increasing density of the pumped medium. To avoid any overloading of the pump, coupling and motor, do not exceed the allowable density (→ order data sheet).
  A lower density is allowed. Adapt the auxiliary systems accordingly.
- Adhere to the limits for solids content and grit size when pumping solids-carrying fluids (→ order data sheet, technical description).
- When using auxiliary operating systems:
  – Make sure the operating medium is compatible with the product medium.
  – Ensure a permanent supply of the respective operating medium.

2.2 General safety instructions

Take note of the following instructions before carrying out any work.

2.2.1 Product safety

The pump has been constructed according to the latest technology and established technical safety rules. Nevertheless, a potential risk to life and limb of the operator or other persons or damage to the pump and other property cannot be completely excluded.

- Only operate the pump ifi t is in perfect technical condition; only use it as intended, staying aware of safety and risks and adhering to the instructions in this manual.
- Keep this manual and all other applicable documents complete, legible and accessible to staff at all times.
- Refrain from any procedures that would endanger staff or third parties.
- If a safety-relevant fault occurs, shut down the pump immediately and have the fault eliminated by appropriate staff.
- In addition to the entire documentation, comply with statutory or other safety and accident-prevention regulations as well as with the applicable standards and guidelines in the country where the pump is operated.

2.2.2 Operator's obligations

Safety-conscious operation

- Only operate the pump ifi t is in perfect technical condition; only use it as intended, staying aware of safety and risks and adhering to the instructions in this manual.
- Ensure the following are observed and monitored:
  – Adherence to 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 protective equipment available.

Staff qualifications

- Make sure all staff assigned with work on the pump have read and understood this manual and all other applicable documents, especially the safety, maintenance and repair information, before beginning with work.
- Organise responsibilities, areas of competence and the supervision of staff.
- Make sure all work is carried out by specialist technicians only:
  – Fitting, repair and maintenance work
  – Work on the electrical system
- Make sure trainee staff only work on the pump under supervision of specialist technicians.

Safety devices

- Provide the following safety devices and verify their integrity:
  – For hot, cold and moving parts, check the contact guards provided by the customer
  – In case of electrostatic charges, provide appropriate earthing

Warranty

- Obtain the manufacturer's approval before carrying out any modifications, repairs or alterations during the warranty period.
- Only use original parts or parts that have been approved by the manufacturer.

2.2.3 Duties of staff

- Observe and keep legible all directions given on the pump, e.g. the arrow indicating the direction of rotation and the markings for flushing 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 de-ice using gas burners or similar tools
- Do not remove the protection against accidental contact with hot, cold and moving parts during operation.
- Use protective equipment if necessary.
- Carry out work on the pump only while the pump is not running.
- Before carrying out any fitting or maintenance work, isolate the motor from its supply voltage and secure it against being switched back on again.
- Reinstall the safety devices according to regulations after any work on the pump.

2.3 Special hazards

2.3.1 Potentially explosive areas

2.3.2 Hazardous pumped media

- Observe the safety regulations for handling hazardous substances when handling hazardous pumped media (e.g. hot, flammable, explosive, poisonous or potentially harmful).
- Use protective equipment when carrying out any work on the pump.

3 Layout and function

3.1 Description

Horizontal centrifugal pump with volute casing and single-entry, single-stage radial impeller; nominal pressure PN 16.

The casing dimensions and connection dimensions correspond to EN 22858/ISO 2858, with the addition of pump sizes 40-25-160 and 40-25-125.

3.2 Labels

3.2.1 Type plate

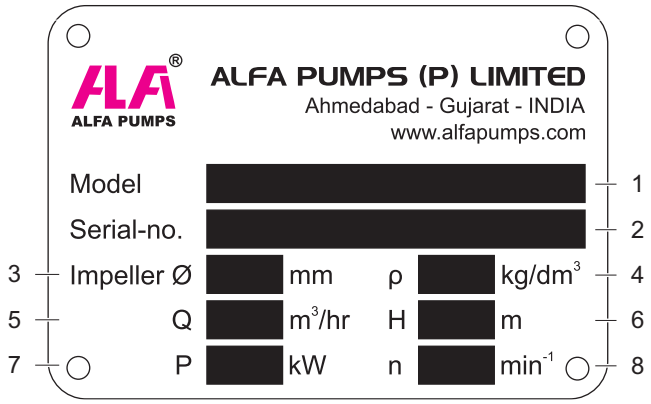

Fig. 1 Type plate (example)

1 Pump Model
2 Serial Number
3 Impeller Diameter
4 Density of Fuild
5 Flow Rate
6 Head
7 Nominal Power
8 Speed

3.2.2 Pump type code

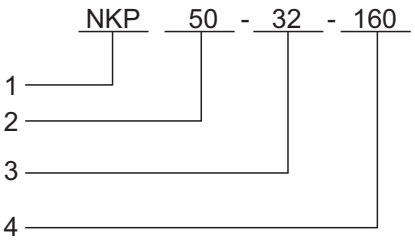

Fig. 3 Pump type code (example)

1 Series
2 Suction nozzle DN [mm]
3 Pressure joint DN [mm]
4 Nominal impeller diameter [mm]

3.3 Layout

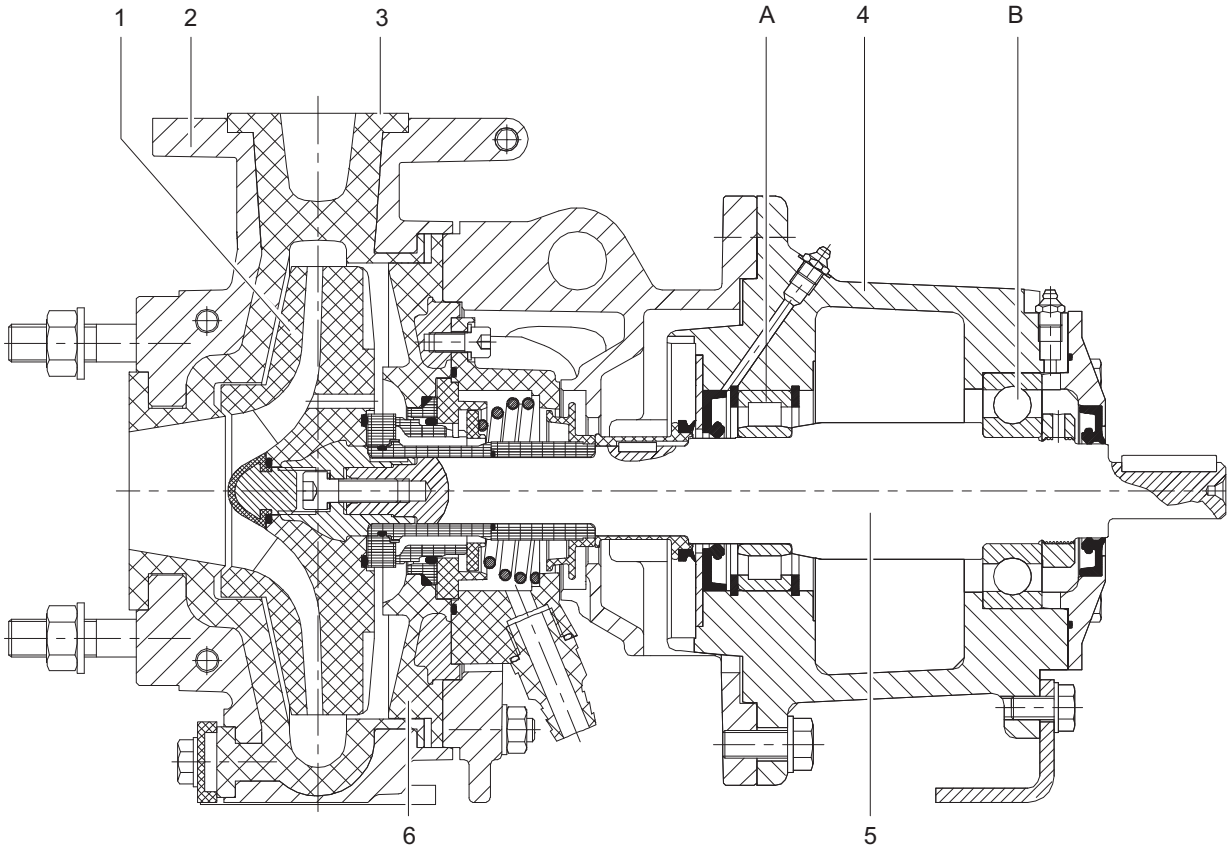

Fig. 4 NKP layout (with ALFA KSS RS mechanical seal)

1 Impeller
2 Casing armour plating
3 Volute casing
4 Bearing bracket
5 Pump shaft
6 Casing cover
A Impeller-side roller bearing
B Motor-side ball bearing

3.4 Shaft seals

Only one of the following shaft seals can be used.

3.4.1 Mechanical seals

Mechanical seals will always show some functional drip leakage.

- Single mechanical seal
- Double mechanical seal with quench
- Double mechanical seal with using a pressurised barrier medium

3.5 Auxiliary operating systems

Specification and connection points of the sealing systems and flushing options
- (→ 9.2.2 Parameters for auxiliary operating systems, Page 50).
- (→ 9.2.10 Flushing options , Page 55).

3.5.1 Sealing systems

Only one of the following sealing systems can be used.

Quenching

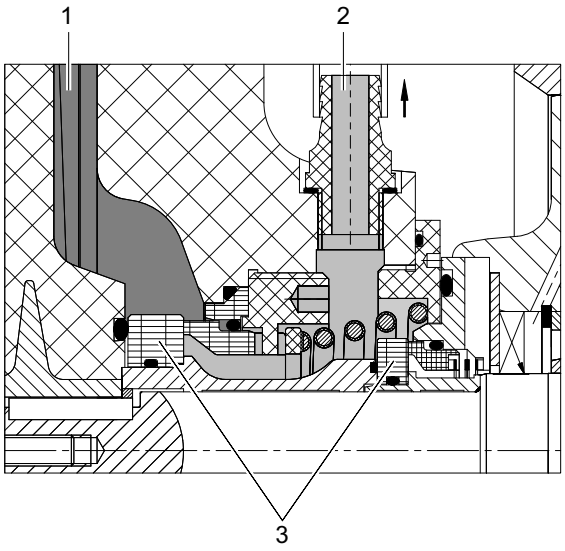

Fig. 5 Double mechanical seal with quench (operating principle)

1 Pumped medium
2 Quenching medium (unpressurised)
3 Double mechanical seal

The pressure of the pumped medium on the product-side mechanical seal is higher than the pressure of the quenching medium during quenching. The sealing friction surfaces of the product-side seal are lubricated by the pumped medium. The sealing friction surfaces of the atmosphere-side seal are lubricated by the quenching medium.

Application examples:
- Pumped media that crystallize in air, causing long-term damage to the seal
- Prevention of odours
- Cooling of seals

Variant	Characteristics of the quenching medium
Open system	• Supplied and drained continuously • Unpressurised • Clean fluid
Closed system	• Circulated in a closed circuit • Unpressurised

Tab. 6 Quenching – variants and characteristics

Using a pressurised barrier medium

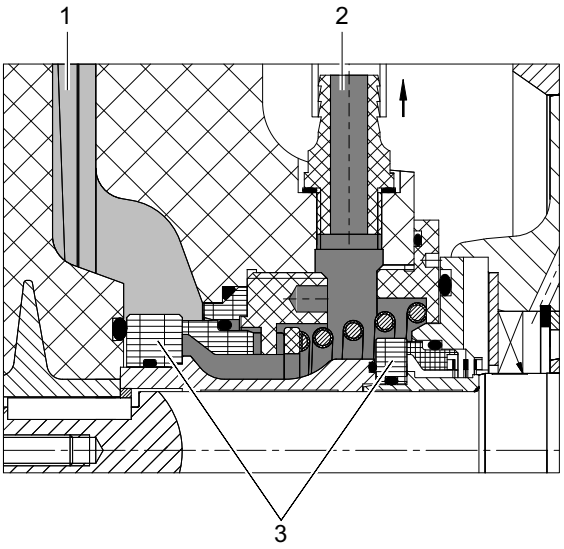

Fig. 6 Double mechanical seal with pressurised barrier medium (operating principle)

1 Pumped medium
2 Barrier medium (pressurised)
3 Double mechanical seal

When using a pressurised barrier medium, the pressure of the barrier medium on the product-side mechanical seal is higher than the pressure of the pumped medium. The sealing friction surfaces are lubricated by the barrier medium.

Application examples:
- Pumped media that crystallize or carry solids, causing long-term damage to the seal
- Toxic pumped media
- Pumped media presenting an environmental hazard

Variant	Characteristics of the barrier medium
Open system	• Supplied and drained continuously • Pressurised • Clean fluid
Closed system	• Circulated in a closed circuit • Pressurised

Tab. 7 Using a pressurised barrier medium – variants and characteristics

3.5.2 Flushing options

Flushing options and parameters for seals, KSS-RS, -RS/D (→ 9.2.10 Flushing options , Page 55).

- Spring chamber flushing
- Stationary flushing
- Permanent flushing

4 Transport, storage and disposal

4.1 Transport

Weight specifications (→ individual order documents)

4.1.1 Unpacking and inspection on delivery

1. Unpack the pump/unit on delivery and check it for transport damage.
2. Report any transport damage to the manufacturer without delay.
3. Dispose of packaging material according to local regulations.

4.1.2 Lifting

⚠ DANGER

Death or crushed limbs caused by falling loads!

- ► Use lifting gear appropriate for the total weight to be transported.
- ► Fasten the lifting gear as shown in the illustrations below.
- ► Do not stand under suspended loads.

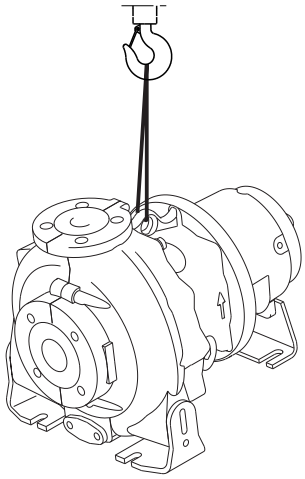

Fig. 8 Fastening the lifting gear to the pump

- ► Lift the pump/unit in an appropriate manner.

4.2 Preservation

No preservation required

► Do not preserve the pump.

4.3 Storage

NOTE

Material damage due to inappropriate storage!

► Store the pump in an appropriate manner.

1. Seal all openings with blank flanges, blind plugs or plastic covers.
2. For models with oil-lubricated bearings and downtimes in excess of one year:
   – Dismount any existing reservoir
   – Dismount any existing oil level controller
   – Seal the threaded hole
   – Fill the bearing bracket with oil, up to the brim
   – Seal the bleeding hole
3. Make sure the storage room meets the following conditions:
   – Dry
   – Frost-free
   – Vibration-free
4. Turn the shaft once a month:
   – Remove any existing transport protection devices first. Keep the transport protection devices for later use.
   – Make sure the shaft and the bearing change their rotational position in the process.

4.4 Disposal

Plastic parts can be contaminated by poisonous or radioactive pumped media to such an extent that cleaning is insufficient.

⚠ WARNING

Risk of poisoning and environmental damage due to the pumped medium or oil!

► Use protective equipment when carrying out any work on the pump.

► Prior to the disposal of the pump:
   – Collect any pumped medium and oil or grease which run out and dispose of them separately according to local regulations.
   – Neutralise residues of pumped medium in the pump.

► Remove the plastic parts and dispose of them according to local regulations.

► Dispose of the pump according to local regulations.

5 Setup and connection

For pumps in potentially explosive areas (→ ATEX additional instructions)

NOTE

Material damage caused by dirt!

► Do not remove the covers and sealing covers until immediately before connecting the pipes to the pump.

5.1 Preparing the setup

5.1.1 Checking the ambient conditions

► Make sure the required ambient conditions are met (→ 9.2.1 Ambient conditions, Page 50).

5.1.2 Preparing the setup site

► Make sure the setup site meets the following conditions:
- Pump freely accessible from all sides
- Sufficient space for installation/removal of the pipes and for maintenance and repair work, especially for the removal and installation of the pump and motor
- Pump not exposed to external vibrations (damage to bearings)
- Frost protection
- Sufficient leak protection available according to local regulations

5.1.3 Preparing the foundation and setup surface

Setup options:
- with concrete foundation
- with steel foundation frame
- without foundation

► Make certain that the foundation and setup surface meet the following conditions:
- Level
- Clean (no oil, dust or other impurities)
- Capable of bearing the weight of the pump unit and all operating forces
- Stability of the pump unit ensured
- For concrete foundation: Standard concrete of strength class B 25

5.1.4 Preparing the pump

1. Take the following measures after long storage times / downtimes.

Storage time/ downtime	Measure
> 1 year	► For oil-lubricated bearings: Carry out oil change. ► For variants with roller bearings without lifetime lubrication: Relubricate.
> 2 years	► Replace the motor bearing if necessary (→ operating manual of the motor manufacturer). ► Replace the elastomer seals (O-rings, shaft seal rings). ► Replace the roller bearings.

Tab. 8 Measures after long storage times/downtimes

2. Remove any transport protection devices which are present.
Keep the transport protection devices for later use.

5.1.5 Installing the heat insulation

Only necessary to maintain the temperature of the pumped medium.

NOTE

Material damage caused by overheating!

► Only install the heat insulation on the volute casing.

► Install the heat insulation appropriately.

5.2 Setup with foundation

NOTE

Material damage due to base plate distortion!

► Set and fasten the base plate on the foundation as described in the following.

5.2.1 Placing the pump/unit on the foundation

✓ Aids, tools and materials:
- Foundation bolts (→ Setup drawing)
- Steel washers
- Mortar grout, non-shrinking
- Spirit level

1. Raise the pump/unit (→ 4.1 Transport, Page 14).
2. Working from below, hang the foundation bolts in the fixation holes of the base plate.

Observe the manufacturer's instruction when using chemical anchors.

3. Place the pump/unit on the foundation. When doing this, sink the foundation bolts into the prepared anchoring holes.

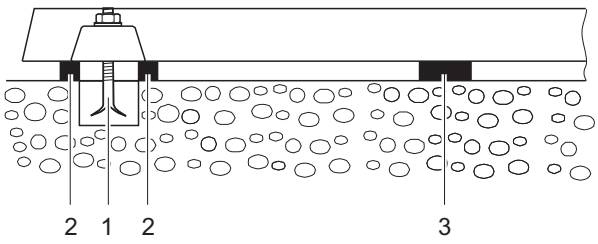

Fig. 9 Setup with foundation

4. Use steel washers to align the pump/unit to the height and system dimensions as described in the following:
   - Position 1 steel washer (2) each left and right of next to each foundation bolt (1).
   - If the distance between anchoring holes is > 750 mm, position additional steel washer (3) centrally at each of the base plate.
5. Make certain that the base plate and the steel washers are in full surface contact.
6. Use a machine spirit level to check the permissible height deviation (1 mm/m) lengthwise and crosswise.
7. Repeat procedure until the base plate is correctly aligned.

5.2.2 Fastening the pump/unit

Filling out the base plate with mortar grout will improve the damping behaviour.

1. Fill the anchoring holes with mortar grout.
2. Once the mortar grout has set:
   - Screw the base plate tight at three points with the specified tightening torque (→ 9.2.4 Tightening torques, Page 51).
3. Before tightening the remaining screws, compensate any unevenness of the fixation surface, using metal shims next to every screw.
4. Fill the base plate with moulding material if applicable. Knock on the base plate to ensure that no cavities are created in the process.

5.3 Setup without foundation

✓ Aids, tools and materials:
- Wrench
- Spirit level

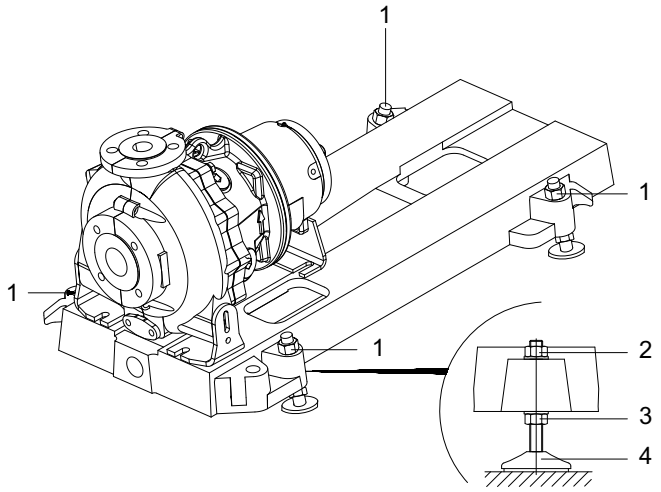

Fig. 10 Setup without foundation

1. Raise the pump/unit (→ 4.1.2 Lifting, Page 14).
2. Mount the four levelling feet (1) as shown in the illustration.
3. Place the pump/unit on the setup surface.
4. Adjust the height of the base plate using levelling feet (1) as shown above:
   - Use wrench to hold the hexagon at levelling foot (4).
   - Slacken hexagon nut (2).
   - Adjust height by turning hexagon nut (3).
   - Tighten the hexagon nut (2) (→ 9.2.4 Tightening torques, Page 51).
   - Use a machine spirit level to check the permissible height deviation (1 mm/m) lengthwise and crosswise.
   - Repeat procedure until the base plate is correctly aligned.

5.4 Installing the motor

ℹ Only necessary if the pump unit is assembled at the setup site.

NOTE

Material damage caused by knocks and blows!

► Do not cant the coupling halves when sliding on.

► Do not knock or hit any components of the pump or motor.

5.4.1 Installing the coupling

1. For detailed information and special couplings, observe the specifications of the manufacturer.
2. Apply a very thin film of molybdenum sulphite (e.g. Molykote) on the pump and motor shaft ends.
3. Insert keys.

⚠ WARNING

Risk ofi njury due to hot pump components!

► Use protective equipment when carrying out any work on the pump.

4. Without a mounting device: Remove rubber buffers and heat coupling halves to approx. 100 °C.

ℹ With flexible couplings which consist of a pocket part and claw part, always install the pocket part on the drive side.

5. Slide on the pump-side and motor-side coupling halves until the shaft end and the coupling centre are flush with each other.
6. Tighten the threaded pins at both coupling halves.
   Observe the tightening torques in the process (→ manufacturer's specifications).

5.4.2 Fitting the motor on the pump

✓ Aids, tools and materials:
- Metal shims

1. Raise the motor (→ specifications of the manufacturer).
2. Place the motor on the basic frame.
3. Connect the coupling halves.
4. Bring the motor shaft end and pump shaft end to the same height with appropriate supports.
5. Position the shafts in line with each other.
6. Connect the coupling halves.
   Observe the prescribed gap width between the coupling halves (→ Gap widths, Page 52).
7. Screw in and tighten the motor screws.

ℹ The pump unit must be aligned prior to operation. (→ 5.8 Aligning the pump unit, Page 21).

5.5 Planning pipes

5.5.1 Laying out supports and flange connections

NOTE

Material damage due to excessive forces and torques of the pipes on the pump!

► Do not exceed the permissible limits (→ 9.2.7 Socket loads acc. to ISO 5199, Page 52).

1. Calculate pipe forces taking into account every possible operating condition:
   – Cold/warm
   – Empty/full
   – Unpressurised/pressurised
   – Position shifts of flanges
2. Ensure the pipe can slide freely in the supports and does not seize up due to corrosion.

5.5.2 Specifying nominal diameters

Keep the flow resistance in the pipes as low as possible.

1. Specify suction pipe nominal width ≥ suction nozzle nominal width.
2. Specify pressure pipe nominal width ≥ pressure joint nominal width.

5.5.3 Specify pipe lengths

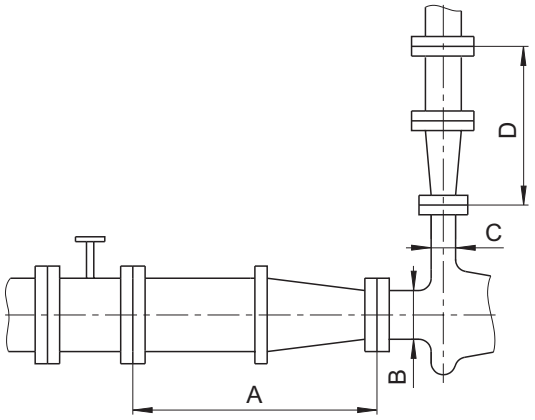

Fig. 11 Straight pipe lengths upstream and downstream of the pump (recommended)

A > 5x DNs
B DNs
C DNd
D > 5x DNd

► Observe recommend minimum values when installing the pump.

Suction side: Shorter pipes are feasible but can restrict hydraulic performance data.

Pressure side: Shorter pipes are feasible but can lead to increased operating noise.

5.5.4 Optimising changes in cross-section and direction

1. Avoid bends with radii smaller than 1.5 times the pipe diameter.
2. Avoid abrupt changes of cross-sections in the pipes.

5.5.5 Providing safety and monitoring devices (recommended)

Avoid impurities

1. Integrate filter into the suction pipe.
2. To monitor the level of dirt, install a differential manometer with contact manometer.

Avoiding reverse operation

1. Install a non return valve between the pressure joint and stop valve to ensure the medium does not flow back after the pump is switched off.
2. To enable bleeding, provide a bleeding connection between the pressure joint and non return valve.

Make provisions for isolating and shutting off the pipes

For maintenance and repair work.

► Provide shut-off devices in the suction and pressure pipes.

Enable measurements of the operating conditions

1. Provide manometers for pressure measurements in suction and pressure pipes.
2. Provide for motor-side torque measurement.
3. Provide for pump temperature measurements.

5.6 Connecting pipes

NOTE

Material damage due to excessive forces and torques of the pipes on the pump!

► Do not exceed the permissible limits (→ 9.2.7 Socket loads acc. to ISO 5199, Page 52).

5.6.1 Avoid impurities in the pipes

NOTE

Material damage due to impurities in the pump!

► Ensure no impurities enter the pump.

1. Clean all pipe sections and fittings prior to assembly.
2. Ensure no flange gaskets protrude inwards.
3. Remove any blank flanges, plugs, protective films and/or protective paint from the flanges.

5.6.2 Installing auxiliary piping

Observe the manufacturer's specifications for any existing auxiliary operating systems.

1. Install the auxiliary pipes at the auxiliary connections without stress and leaks.
2. To avoid air enclosures: install the pipes so that they ascend to the pump.

5.6.3 Installing the suction pipe

1. Remove the transport and sealing covers from the pump.
2. Install the suction pipe without stress and leaks.
   To avoid air enclosures: install the pipes so that they ascend to the pump.
3. Ensure no seals protrude inwards.
4. For suction operation: Install a foot valve in the suction pipe to prevent the pump and suction pipe from running empty during downtimes.

5.6.4 Installing the pressure pipe

1. Remove the transport and sealing covers from the pump.
2. Install the pressure pipe without stress and leaks.
3. Ensure no seals protrude inwards.

5.6.5 Checking that the pipe connection is stress-free

✓ Pipe installed and cooled down

1. Disconnect the connection flange of the pipes from the pump.
2. Check whether the pipe is freely moveable in all directions within the range of expected expansion:
   – Nominal width < 150 mm: by hand
   – Nominal width > 150 mm: with small lever
3. Make sure the flange surfaces are parallel.
4. Reconnect the connection flange of the pipes to the pump.

5.6.6 Inspecting the support foot for distortion

1. Slacken the union of the support foot to the base plate.
2. If the support foot moves, compensate distortion:
   – Lateral displacement: through elongated holes
   – Vertical displacement: through shims
3. Bolt the support foot back onto the base plate. Ensure that the bearing bracket is not distorted in the process.

5.7 Connecting the electrical system

5.7.1 Connecting the motor

Observe the specifications of the motor manufacturer.

DANGER

Risk off atal injury due to electric shock!

- ► Have all electrical work carried out by qualified electricians only.
- ► Isolate the installation from its supply voltage and secure it against being switched back on again prior to any work on the electrical system.

1. Connect the motor according to the circuit diagram.
2. Ensure the electrical power does not pose any risks.
3. Install an EMERGENCY STOP switch.

5.7.2 Checking the direction of rotation

✓ Transport protection devices removed

DANGER

Risk off atal injury due to rotating parts!

- ► Use protective equipment when carrying out any work on the pump.
- ► Secure the key against being thrown off during the rotational direction check.
- ► Keep a sufficient distance to rotating parts.

NOTE

Material damage caused by running dry and wrong direction of rotation!

- ► Decouple the motor from the pump.

1. Switch the motor on and immediately off again.
2. Check whether the motor's direction of rotation corresponds to the arrow indicating the direction of rotation of the pump.
3. If the direction of rotation is different:
   – Swap two phases (→ 5.7.1 Connecting the motor, Page 21).
4. Couple the motor to the pump.

5.8 Aligning the pump unit

5.8.1 Checking the alignment of the coupling

DANGER

Risk off atal injury due to rotating parts!

- ► Before carrying out any fitting or maintenance work, isolate the motor from its supply voltage and secure it against being switched back on again.

NOTE

Material damage due to inappropriate alignment of the coupling!

- ► If there is any height, lateral or angle misalignment, align the motor exactly with the pump.
- ► For detailed information and special couplings, observe the specifications of the manufacturer.

Couplings with a spacer piece (Dismountable coupling) can also be inspected with a dial gage.

With a straight-edge/feeler gauge/slide gauge

✓ Aids, tools and materials:
   – Feeler gauge
   – Hair ruler
   – Slide gauge
   – Other suitable tools, e.g. laser alignment device

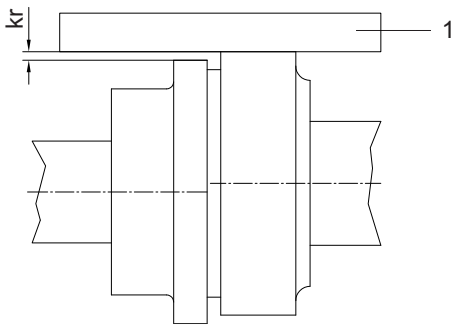

Fig. 12 Checking for radial displacement

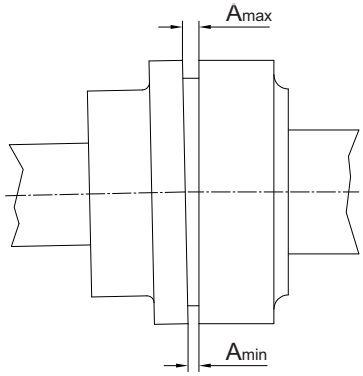

Fig. 13 Checking for angular displacement

1. Check the radial and angular displacement with a straight-edge (1), slide gauge and feeler gauge:
   - Measure in two planes at an angle of 90° to each other on the circumference of the coupling.
   - Measure the angular displacement indirectly through the difference in gap width.
   - Position the straight-edge (1) across both halves of the coupling.
   - If there is a gap at the outer diameter: Measure the radial displacement (kr) and/or difference in gap width (A_{max} - A_{min}).
   - Permissible radial displacement and difference in gap width (→ Permissible deviations, Page 53).
   - Align the coupling if the deviation is not permissible. (→ 5.8.2 Aligning the coupling, Page 23).

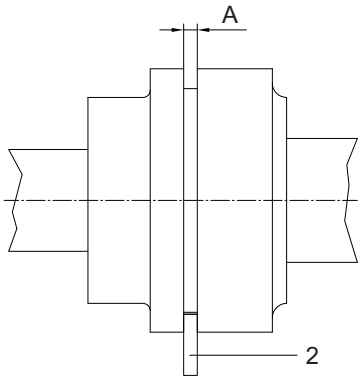

Fig. 14 Checking the gap width

2. Check the gap width with a feeler gauge (2) or slide gauge:
   - Determine the gap width (A) between the coupling halves.
   - Permissible gap width: (→ Gap widths, Page 52).
   - Align the coupling if the deviation is not permissible. (→ 5.8.2 Aligning the coupling, Page 23).

Using a dial gauge

✓ Aids, tools and materials:
   - Dial gage (can be used for coupling with a spacer piece)
   - Other suitable tools, e.g. laser alignment device

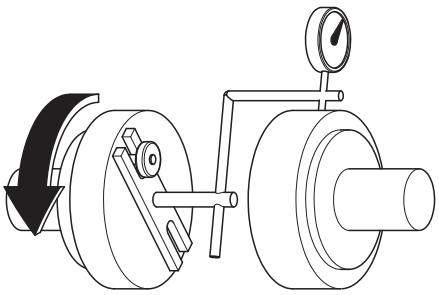

Fig. 15 Checking for radial displacement with a dial gauge

1. Check for radial displacement with a dial gauge:
   - Carry out the measurement as illustrated.
   - Permissible radial displacement (→ Permissible deviations, Page 53).
   - Align the coupling if the deviation is not permissible. (→ 5.8.2 Aligning the coupling, Page 23).

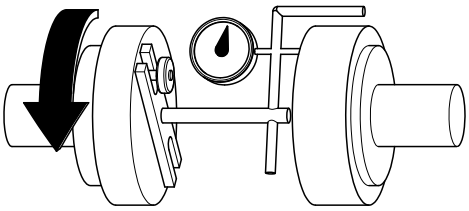

Fig. 16 Checking the angular displacement with a dial gauge

2. Checking the angular displacement with a dial gauge:
   – Measure the angular displacement indirectly through the difference in gap width.
   – Carry out the measurement as illustrated (difference in gap width = A_{max} - A_{min}).
   – Permissible difference in gap width (→ Permissible deviations, Page 53).
   – Align the coupling if the deviation is not permissible.(→ 5.8.2 Aligning the coupling, Page 23).

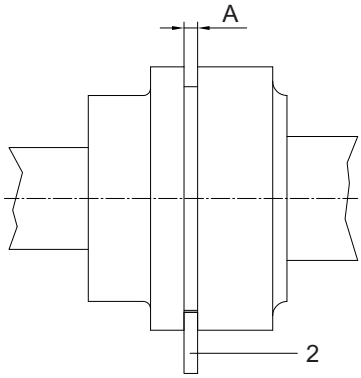

Fig. 17 Checking the gap width

3. Check the gap width with a feeler gauge (2) or slide gauge:
   – Install the spacer piece.
   – Determine the gap width (A) between the coupling halves.
   – Permissible gap width: (→ Gap widths, Page 52).
   – Align the coupling if the deviation is not permissible. (→ 5.8.2 Aligning the coupling, Page 23).

5.8.2 Aligning the coupling

✓ Aids, tools and materials:
   – Metal shims

The pump unit must be aligned prior to operation.

Only necessary if:
   – Impermissible gap width
   – Impermissible radial displacement (height and lateral displacement)
   – Impermissible angular displacement

The coupling halves may only be axially displaced to a certain extent (→ manufacturer's specifications).

1. If the gap width is not permissible:
   – Undo the threaded pins of the coupling halves
   or
   Undo the fixation bolts of the motor.
   – Move the coupling halves or motor axially.
   Observe the prescribed gap width between the coupling halves (→ Gap widths, Page 52).
   – Tighten the threaded pins of the coupling halves
   or
   Tighten the fixation bolts of the motor.
   Observe the tightening torques in the process (→ manufacturer's specifications).
2. In the event of angular/height displacement:
   – Undo the fixation bolts on the motor.
   – Bring the motor to the same height with appropriate supports.
   – Tighten the fixation bolts on the motor.
3. In the event of angular/lateral displacement:
   – Undo the fixation bolts on the motor.
   – Move the motor sideways.
   – Tighten the fixation bolts on the motor.
4. Checking the alignment of the coupling (→ 5.8.1 Checking the alignment of the coupling, Page 21).

5.9 Installing the coupling guard

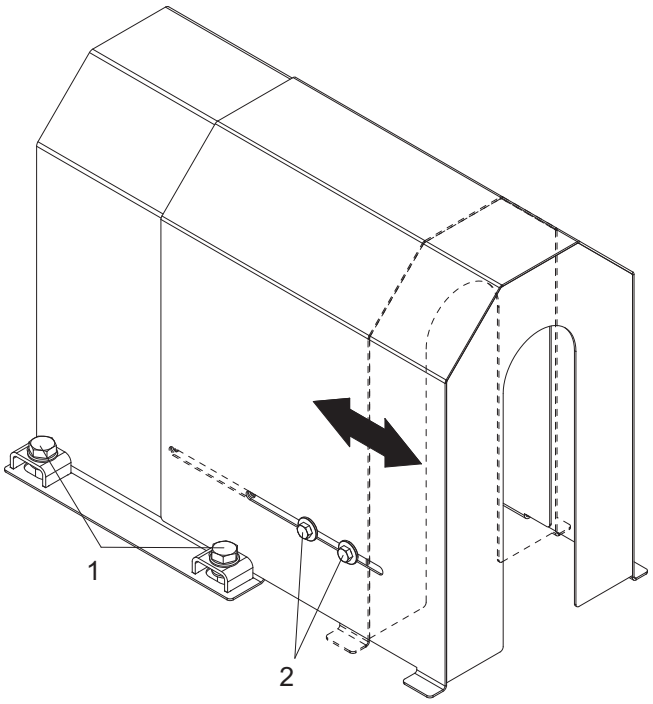

Fig. 18 Load-resistant coupling guard

1. Fasten the coupling guard to the base plate with the hexagon head bolts (1).
2. Adjust the coupling guard to the distance between the pump and motor, then fix with the hexagon head bolts (2).

6 Operation

For pumps in potentially explosive areas (→ ATEX additional instructions)

6.1 Putting the pump into service for the first time

6.1.1 Identifying the pump version

► Identify the pump version (→ order data sheet).

Pump types vary e.g. with regard to bearing lubrication, bearing bracket size, type of shaft sealing and auxiliary operating systems.

6.1.2 Checking the downtime

► Checking the downtime (→ Table 8 Measures after long storage times/downtimes, Page 16).

6.1.3 Lubricating the bearings

Pumps with grease-lubricating roller bearings are ready for operation as delivered.

Fill the bearing bracket with lubrication oil

Only for pumps with oil-lubricated roller bearings.

For bearing brackets with labyrinth rings (→ Manual 0312-... Bearing bracket with labyrinth rings for oil-lubricated roller bearings).

For pumps with oil level controllers (→ Manual 0107-... Bearing bracket with oil level controller).

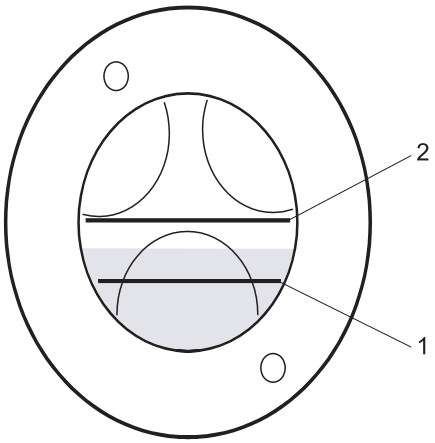

Fig. 19 Oil level in sight glass

1 Minimum oil level ⅓ full
2 Maximum oil level ½ full

1. Be certain to use the correct type and at least the minimum amount ofl ubrication oil for filling the bearing bracket (→ 9.2.5 Lubricants, Page 51).
2. Open the oil filler plug.
3. Fill bearing bracket with lubrication oil until the oil level is within the specified limits in the sight glass.
4. Screw in the oil filler plug with its gasket.
5. Check the oil level in the sight glass and adjust if necessary.

6.1.4 Preparing auxiliary operating systems (if available)

The manufacturer assumes no liability for damage caused by installing or using a third-party or non-approved auxiliary operating system.

Sealing systems

1. Make sure the quenching/barrier medium is suitable for mixing with the pumped medium.
2. Identify the sealing system (→ order data sheet) (→ 3.5.1 Sealing systems, Page 12).
3. Install the sealing system (→ manufacturer's instructions).
4. Ensure the parameters required for the installed sealing system (→ 9.2.2 Parameters for auxiliary operating systems, Page 50).

6.1.5 Filling and bleeding

✓ If available: Auxiliary operating systems are ready for operation

⚠ WARNING

Risk ofi njury and poisoning due to hazardous pumped media!

- ► Use protective equipment when carrying out any work on the pump.
- ► Collect any leaking pumped medium safely and dispose of it according to local regulations.

1. Open the suction-side fitting.
2. Open the pressure-side fitting.
3. Fill the pump and the suction pipe with pumped medium.
4. Open the auxiliary operating systems, if available, and check the flow rate.
5. Make sure all connections are tight.

6.1.6 Switching on the pump

✓ The pump is correctly set up and connected
✓ The motor is correctly set up and connected
✓ The motor is exactly aligned with the pump
✓ All connections stress-free and leak-free
✓ Any existing auxiliary system are ready for operation
✓ All safety devices installed and checked for integrity
✓ The pump has been correctly prepared, filled and bled

⚠ DANGER

Risk ofi njury due to running pump!

- ► Do not touch the running pump.
- ► Do not carry out any work on the running pump.
- ► Allow the pump to cool down completely before starting any work.

⚠ WARNING

Risk ofi njury and poisoning due to hazardous pumped media!

- ► Use protective equipment when carrying out any work on the pump.
- ► Collect any leaking pumped medium safely and dispose of it according to local regulations.

NOTE

Material damage caused by dry running!

- ► Make sure the pump is filled properly.

NOTE

Risk of cavitation when throttling the suction flow rate!

- ► Fully open the suction-side fitting; do not use the fitting to adjust the flow rate.
- ► Do not open the pressure-side fitting beyond the operating point.

NOTE

Material damage caused by overheating!

- ► Do not operate the pump while the pressure-side fitting is closed.
- ► Observe the minimum flow rate (→ order data sheet).

NOTE

Material damage due to partial load operation!

- ► Do not operate below the minimum flow rate (0.1 x Q_{opt}).

1. Open the suction-side fitting.
2. Close the pressure-side fitting.
3. Switch on the motor and check whether it is running smoothly.
4. As soon as the motor is running at nominal speed, open the pressure-side fitting slowly until the operating point is reached.
5. With hot pumped media, make sure any temperature changes do not exceed 50 °C/h.
6. After the initial stress caused by pressure and operating temperature, check whether the pump is not leaking.
7. With hot pumped media, switch off the pump briefly at operating temperature, check the alignment of the coupling and realign the motor if necessary (→ 5.8.1 Checking the alignment of the coupling, Page 21).

6.1.7 Switching off the pump

✓ Pressure-side fitting closed (recommended)

⚠ WARNING

Risk ofi njury due to hot pump components!

► Use protective equipment when carrying out any work on the pump.

1. Switch off the motor. If available, maintain the following functions:
   – With double mechanical seals: Barrier pressure until pump is unpressurised
2. Check all connecting screws and tighten them if necessary.

6.2 Operating

6.2.1 Making preparations for operation

► If necessary, perform the following steps:
   – Prepare the auxiliary operating systems (→ 6.1.4 Preparing auxiliary operating systems (if available), Page 26).
   – Fill and bleed the pump (→ 6.1.5 Filling and bleeding, Page 26).

6.2.2 Switching on the pump

✓ Pump put into service properly
✓ Operation prepared properly

⚠ DANGER

Risk ofi njury due to running pump!

► Do not touch the running pump.
► Do not carry out any work on the running pump.
► Allow the pump to cool down completely before starting any work.

⚠ WARNING

Risk ofi njury and poisoning due to hazardous pumped media!

► Use protective equipment when carrying out any work on the pump.
► Collect any leaking pumped medium safely and dispose of it according to local regulations.

NOTE

Material damage caused by dry running!

► Make sure the pump is filled properly.

NOTE

Risk of cavitation when throttling the suction flow rate!

► Fully open the suction-side fitting; do not use the fitting to adjust the flow rate.
► Do not open the pressure-side fitting beyond the operating point.

NOTE

Material damage caused by overheating!

► Do not operate the pump while the pressure-side fitting is closed.
► Observe the minimum flow rate (→ order data sheet).

NOTE

Material damage due to partial load operation!

► Do not operate below the minimum flow rate (0.1 x Q_{opt}).

1. Open the suction-side fitting.
2. Close the pressure-side fitting.
3. Switch on the motor and check whether it is running smoothly.
4. As soon as the motor is running at nominal speed, open the pressure-side fitting slowly until the operating point is reached.
5. Make sure the temperature changes do not exceed 50 °C/h at pumps with hot pumped media.

6.2.3 Switching off the pump

✓ Pressure-side fitting closed (recommended)

⚠ WARNING

Risk ofi njury due to hot pump components!

► Use protective equipment when carrying out any work on the pump.

► Switch off the motor. If available, maintain the following functions:
  – With double mechanical seals: Barrier pressure until pump is unpressurised

6.3 Shut-down

⚠ WARNING

Risk ofi njury and poisoning due to hazardous pumped media!

► Use protective equipment when carrying out any work on the pump.

► Collect any leaking pumped medium safely and dispose of it according to local regulations.

⚠ DANGER

Risk off atal injury due to electric shock!

► Have all electrical work carried out by qualified electricians only.

► Isolate the installation from its supply voltage and secure it against being switched back on again prior to any work on the electrical system.

⚠ DANGER

Risk ofi njury due to running pump!

► Do not touch the running pump.

► Do not carry out any work on the running pump.

► Before carrying out any fitting or maintenance work, isolate the motor from its supply voltage and secure it against being switched back on again.

► Take the following measures if operation is interrupted:

Pump is	Measure
...shut down for a prolonged period	► Take measures according to the pumped medium (→ Table 10 Measures to be taken, depending on the pumped medium behaviour, Page 28). ► Isolate the motor from its supply voltage and secure it against being switched back on again.
...emptied	► Close the suction-side and pressure-side fittings.
...dismounted	► Disconnect the electrical connections and secure the motor against being switched back on again
...put into storage	► Follow the storage instructions (→ 4.3 Storage, Page 15).

Tab. 9 Measures to be taken if operation is interrupted

Behaviour of the pumped medium	Duration of the interruption to service (depending on process)	
	Short	Long
Solids sedimenting	► Flush the pump.	► Flush the pump.
Solidifying/ freezing, non-corrosive	► Heat up or empty the pump and containers.	► Empty the pump and containers.
Solidifying/ freezing, corrosive	► Heat up or empty the pump and containers.	► Empty the pump and containers. ► Clean and dry the pump. ► Preserve the containers if necessary.
Remains liquid, non-corrosive	–	–
Remains liquid, corrosive	–	► Empty the pump and containers. ► Clean and dry the pump. ► Preserve the containers if necessary.

Tab. 10 Measures to be taken, depending on the pumped medium behaviour

6.4 Restoring the pump to service

1. Checking the downtime (→ Table 8 Measures after long storage times/downtimes, Page 16).
2. Carry out all steps as for the initial start-up (→ 6.1 Putting the pump into service for the first time, Page 25).

6.5 Operating the stand-by pump

✓ Stand-by pump filled and bled

Operate the stand-by pump at least once a week.

1. Fully open the suction-side fitting.
2. Open the pressure-side fitting until the stand-by pump reaches operating temperature and is evenly heated (→ 6.1.6 Switching on the pump, Page 26).

7 Maintenance

For pumps in potentially explosive areas (→ ATEX additional instructions)

Trained service technicians are available for fitting and repair work. Present a pumped material certificate (DIN safety data sheet or document of compliance) upon request.

7.1 Monitoring

The inspection intervals depend on the load placed on the pump.

⚠ DANGER

Risk ofi njury due to running pump!

- ► Do not touch the running pump.
- ► Do not carry out any work on the running pump.

⚠ WARNING

Risk ofi njury and poisoning due to hazardous pumped media!

- ► Use protective equipment when carrying out any work on the pump.

1. Check at appropriate intervals:
   - Compliance with minimum flow rate
   - Roller bearing temperature < 70 °C
   - Normal operating conditions unchanged
   - Top up oil if necessary
   - Alignment of the coupling and condition of the flexible elements
   - Concentration of the quenching/barrier medium in the closed system
2. For trouble-free operation, ensure the following:
   - No dry running
   - No leaks
   - No cavitation
   - Suction-side gate valves open
   - Unobstructed and clean filters
   - Sufficient supply pressure
   - No unusual running noises and vibrations
   - No impermissible leaks at the shaft seal
   - Proper functioning of auxiliary operating systems

7.2 Maintenance

Service life of the roller bearings for operation within the permissible operating range: > 2 years

Intermittent operation, high temperatures, low viscosities and aggressive ambient and process conditions reduce the service life of roller bearings.

Mechanical seals and plain bearings are subject to natural wear, which strongly depends on the actual operating conditions. Therefore, general statements regarding their service life cannot be made.

⚠ DANGER

Risk off atal injury due to electric shock!

- ► Have all electrical work carried out by qualified electricians only.
- ► Isolate the installation from its supply voltage and secure it against being switched back on again prior to any work on the electrical system.

⚠ DANGER

Risk ofi njury due to running pump!

- ► Do not touch the running pump.
- ► Do not carry out any work on the running pump.
- ► Before carrying out any fitting or maintenance work, isolate the motor from its supply voltage and secure it against being switched back on again.

⚠ DANGER

Risk off atal injury due to rotating parts!

- ► Make sure the coupling guard is installed after carrying out any work on the pump.

⚠ WARNING

Risk ofi njury and poisoning due to hazardous or hot pumped media!

- ► Use protective equipment when carrying out any work on the pump.
- ► Allow the pump to cool down completely before performing any work.
- ► Make sure the pump is unpressurised.
- ► Empty the pump, safely collect the pumped medium and dispose ofi t in accordance with environmental rules and requirements.

7.2.1 Roller bearings with grease lubrication

1. As a precaution, replace roller bearings with lifetime lubrication every 2 years (recommended).
2. Relubricate any roller bearings that can be relubricated:
   - Every 3000 operating hours
   - (→ 9.2.5 Lubricants, Page 51).

7.2.2 Roller bearings with oil lubrication

For pumps with oil level controllers (→ Manual 0107-... Bearing bracket with oil level controller).

1. Carry out lubricating oil change:
   – after the first 300 hours of operation
   – after every 5000 hours of operation or at least once a year
2. For oil changes, remove the screwed plug at the bearing bracket and drain the lubrication oil at operating temperature into a suitable container.
3. Reinsert the screwed plug and refill lubricating oil (→ 6.1.3 Lubricating the bearings, Page 25).

7.2.3 Mechanical seals

Mechanical seals will always show some functional drip-leakage (→ manufacturer's instructions).

Double mechanical seals with quench: Any dramatic rise of the quench system level indicates a major leak at the product-side mechanical seal.

Double mechanical seals with pressurised barrier medium: A dramatic pressure drop in the barrier system (loss ofl ubricating fluid) indicates a major leak at one of the mechanical seals.

► If there is a major leak: Replace the mechanical seal with its auxiliary seals and check the functionality of auxiliary operating systems.

7.3 Dismounting the pump

⚠ DANGER

Risk ofi njury due to running pump!

► Do not touch the running pump.
► Do not carry out any work on the running pump.
► Before carrying out any fitting or maintenance work, isolate the motor from its supply voltage and secure it against being switched back on again.

⚠ DANGER

Risk off atal injury due to rotating parts!

► Make sure the coupling guard is installed after carrying out any work on the pump.

⚠ DANGER

Risk off atal injury due to electric shock!

► Have all electrical work carried out by qualified electricians only.
► Isolate the installation from its supply voltage and secure it against being switched back on again prior to any work on the electrical system.

⚠ WARNING

Risk ofi njury and poisoning due to hazardous or hot pumped media!

► Use protective equipment when carrying out any work on the pump.
► Allow the pump to cool down completely before performing any work.
► Make sure the pump is unpressurised.
► Empty the pump, safely collect the pumped medium and dispose ofi t in accordance with environmental rules and requirements.

⚠ WARNING

Risk ofi njury due to heavy components!

► Pay attention to the component weight. Lift and transport heavy components with suitable lifting gear.
► Set down components safely and secure them against overturning or rolling away.

Pay attention to the sectional drawings.

7.3.1 Returning the pump to the manufacturer

✓ Pump depressurised
✓ Pump completely empty
✓ Electrical connections disconnected and motor secured against being switched back on again
✓ Pump cooled down
✓ Coupling guard dismounted
✓ For couplings with a spacer piece: Spacer piece removed
✓ Auxiliary systems shut down, unpressurised and emptied
✓ Manometer lines, manometer and fixtures dismounted

1. Enclose a truthfully completed declaration of compliance when returning pumps or components to the manufacturer. Order a form for the document of compliance from the manufacturer if necessary.
2. Take the measures required to return the pump to the manufacturer as specified in the following table, depending on the repair work required.

Repairs	Measure for return
At the customer's premises	► Return the defective component to the manufacturer.
At the manufacturer's premises	► Flush the pump and decontaminate it ifi t has been used with hazardous pumped media. ► Return the entire pump (not disassembled) to the manufacturer.
At the manufacturer's premises for warranty repairs	► Only in the event of hazardous pumped media: – Flush and decontaminate the pump. ► Return the entire pump (not disassembled) to the manufacturer.

Tab. 11 Measures for return

7.3.2 Preparations for dismounting the pump

✓ Pump depressurised
✓ Pump completely empty, flushed and decontaminated
✓ Electrical connections disconnected and motor secured against being switched back on again
✓ Pump cooled down
✓ Coupling guard dismounted
✓ For couplings with a spacer piece: Spacer piece removed
✓ Auxiliary systems shut down, unpressurised and emptied
✓ Manometer lines, manometer and fixtures dismounted

The pumps are constructed in process architecture as standard. The slide-in unit can be dismounted without removing the volute casing and piping.

If a coupling with a spacer piece is used, the motor can remain mounted on the base plate.

1. Observe the following when dismounting the pump:
   – Mark the precise installation orientation and position of all components prior to the disassembly.
   – Dismount the components concentrically without canting.
   – Dismount the pump (→ sectional drawing).
2. Unscrew the fixation bolts between the pump/plug-in unit and base plate.
3. If necessary, undo the pipes.
4. Lift the pump/plug-in unit out of the installation (→ 4.1.2 Lifting, Page 14).

7.3.3 Loosen connectors (if applicable)

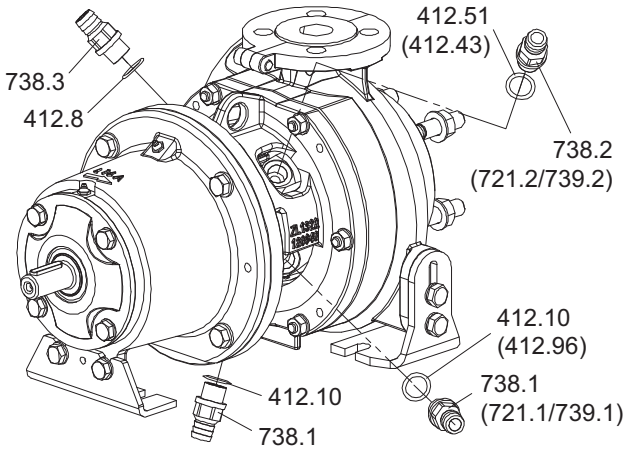

Fig. 20 Undo flushing connection or supply connections (optional, depending on the version)

1. Remove fitting(s) **738.xx** or taper piece **721.xx** from the seal cover **471**.
2. Unscrew the hose fittings **739.xx**.
3. Remove the O-rings **412.xx**.

Connection for spring chamber flushing

1. Loosen and unscrew fittings **738.xxx**.
2. Remove the O-ring **412.xxx**.

7.3.4 Pulling off the volute casing

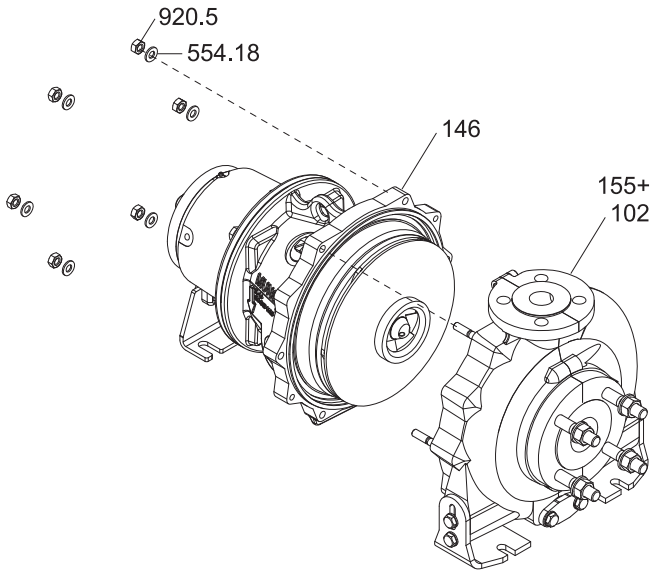

Fig. 21 Pulling off the volute casing

1. Undo the nuts **920.5** and remove them together with the washers **554.18**.
2. Pull off the casing armour **155** with volute casing **102** from the plug-in unit.
   If necessary, screw the ejector screws into the thread of the intermediate lantern **146**.

7.3.5 Dismounting the impeller and product-side shaft sleeve

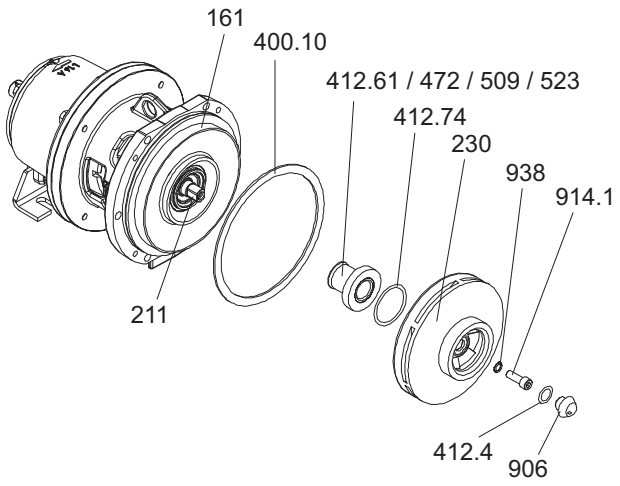

Fig. 22 Dismounting the impeller and product-side shaft sleeve

1. Loosen the impeller screw **906** with circlip pliers and unscrew it.
2. Undo the socket head cap screw **914.1** and remove with the SCHNORR spring washer **938**.
3. Extract impeller **230**.
4. Remove the O-rings **412.4**, **412.74** and replace them.
5. Remove the „product-side shaft sleeve“ sub-assembly from the pump shaft **211**. (→ Product-side shaft sleeve sub-assembly, Page 44).
6. Remove the gasket **400.10** from the casing 161 cover replace if necessary.

7.3.6 Undoing the casing cover

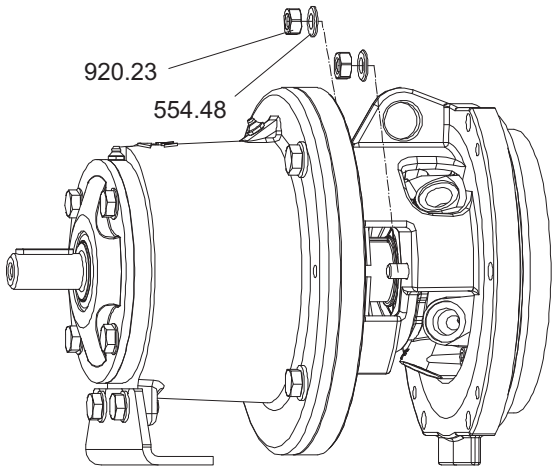

Fig. 23 Undoing the casing cover

► Undo the hexagon head nuts **920.23** and remove them together with the washers **554.48**.

7.3.7 Dismounting the ALFA KSS RS single mechanical seal

Removing the ALFA-KSS-FS cover casing sub-assembly and atmosphere-side shaft sleeves

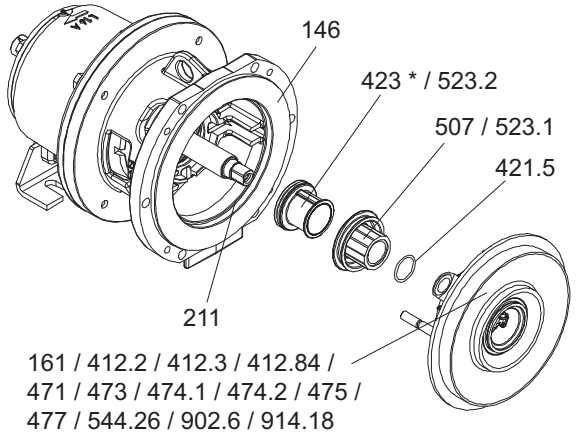

Fig. 24 Removing the ALFA-KSS-RS cover casing sub-assembly and atmosphere-side shaft sleeves

* optional, depending on the version

1. Remove the „ALFA-KSS-RS cover casing“ sub-assembly from the intermediate lantern **146** (→ ALFA KSS RS cover casing sub-assembly, Page 44).
2. Remove the O-ring **412.5** from the pump shaft **211**.

3. Remove the shaft sleeve **523.1** with splash ring **507** from the pump shaft **211**.
4. Remove the shaft sleeve **523.2** with axial shaft ring **423*** from the pump shaft **211**.

Dismounting the ALFA KSS RS cover casing sub-assembly

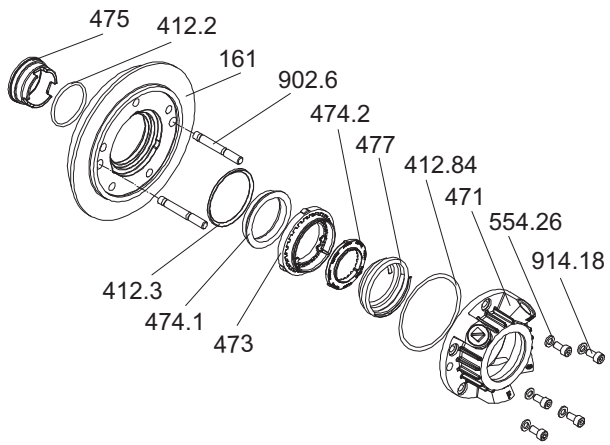

Fig. 25 Dismounting the ALFA KSS RS cover casing sub-assembly

1. Extract stationary seal ring **475**.
2. Unscrew the studs **902.6** from the cover casing **161**.
3. Undo the socket head cap screws **914.18**and remove the washers **554.26**.
4. Remove the seal cover **471**.
5. Remove spring **477** and thrust ring **474.2**.
6. Remove stationary seal ring holder **473**.
7. Remove thrust ring **474.1**.
8. Remove and replace the O-rings **412.2**, **412.3** and **412.84**.

7.3.8 Dismounting the ALFA KSS RS/D double mechanical seal

ALFA-KSS-RS/D cover casing sub-assembly, removing the atmosphere-side shaft sleeves and atmosphere-side mechanical seal

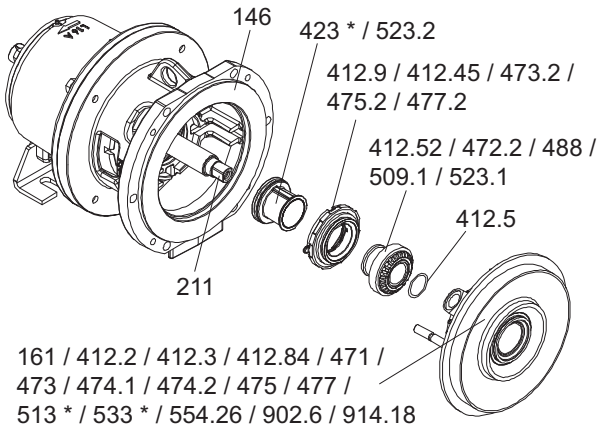

Fig. 26 ALFA-KSS-RS/D cover casing sub-assembly, removing the atmosphere-side shaft sleeves and atmosphere-side mechanical seal

* optional, depending on the version

1. Remove the „ALFA-KSS-RS/D cover casing“ sub-assembly from the intermediate lantern **146** (→ ALFA KSS RS/D cover casing sub-assembly, Page 44).
2. Remove the O-ring **412.5** from the pump shaft **211**.
3. Remove the „atmosphere-side shaft sleeve“ sub-assembly from the pump shaft **211**. (→ ALFA KSS RS/D atmosphere-side shaft sleeve sub-assembly, Page 44).
4. Remove the „atmosphere-side mechanical seal“ sub-assembly from the intermediate lantern **146** (→ ALFA KSS RS/D atmosphere-side mechanical seal sub-assembly, Page 44).
5. Remove the shaft sleeve **523.2** with axial shaft ring **423*** from the pump shaft.

Dismounting the ALFA KSS RS/D cover casing sub-assembly

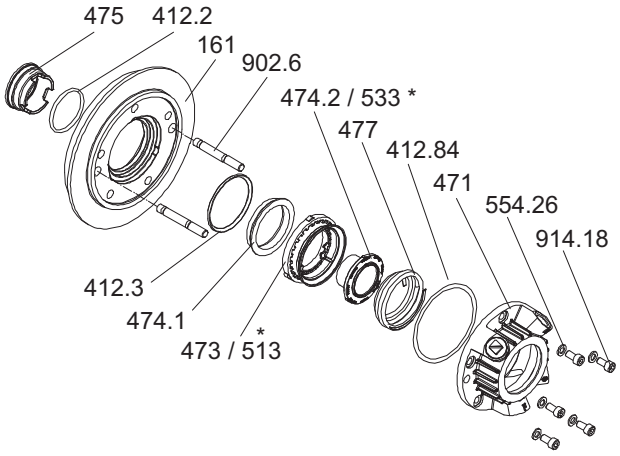

Fig. 27 Dismounting the ALFA KSS RS/D cover casing sub-assembly

* optional, depending on the version

1. Extract stationary seal ring **475**.
2. Unscrew the studs **902.6** from the cover casing **161**.
3. Undo the socket head cap screws **914.18** and remove the washers **554.26**.
4. Remove the seal cover **471**.
5. Remove the spring **477** and thrust ring **474.2** with guide sleeve **533**.
6. Remove the stationary seal ring holder **473** with insert ring **513**.
7. Remove thrust ring **474.1**.
8. Remove and replace the O-rings **412.2**, **412.3** and**412.84** .

Disassembling the atmosphere-side mechanical seal

Only with ALFA-KSS-RS/D double mechanical seal

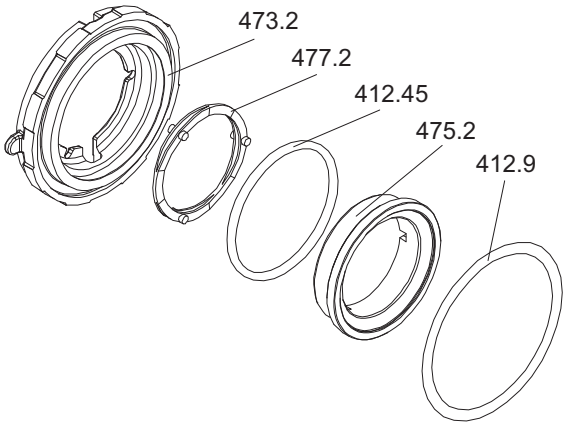

Fig. 28 Dismounting the ALFA-KSS-RS/D mechanical seal

1. Pull the stationary seal ring **475.2** out of the stationary seal ring holder **473.2**.
2. Remove spring **477.2**.
3. Remove O-rings **412.45**, **412.9**and replace them.

7.3.9 Dismounting the shaft sleeves

Dismounting the product-side shaft sleeve

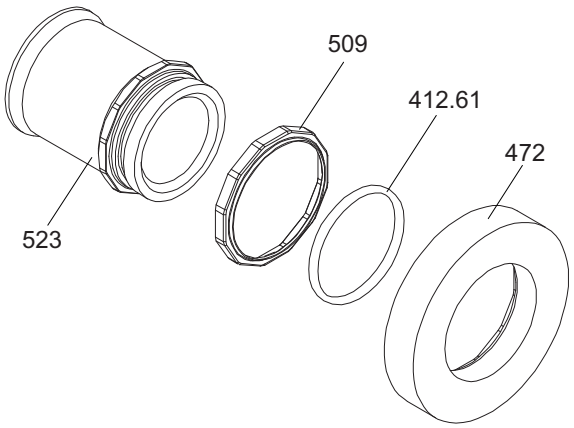

Fig. 29 Dismounting the product-side shaft sleeve

1. Pull the rotating seal ring **472** off the shaft sleeve **523**.
2. Take out the O-ring **412.61** from the shaft sleeve **523**.
3. Pull the intermediate ring **509** off the shaft sleeve **523**.

Dismounting the KSS-RS/D atmosphere-side shaft sleeve

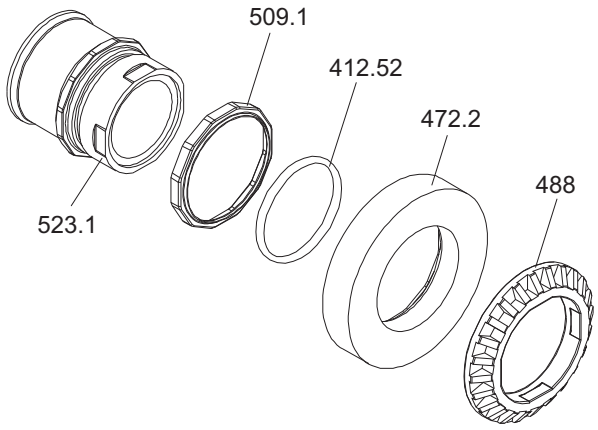

Fig. 30 Dismounting the KSS-RS/D atmosphere-side shaft sleeve

1. Pull the conveying ring **488** off the shaft sleeve **523.1**.
2. Pull the rotating seal ring **472.2** off the shaft sleeve **523.1**.
3. Take out the O-ring **412.52** from the shaft sleeve **523.1**.
4. Pull the intermediate ring **509.1** off the shaft sleeve **523.1**.

7.3.10 Dismounting the bearing bracket

✓ Intermediate lantern **146** dismounted.

ⓘ For bearing brackets with labyrinth rings (→ Manual 0312-... Bearing bracket with labyrinth rings for oil-lubricated roller bearings).

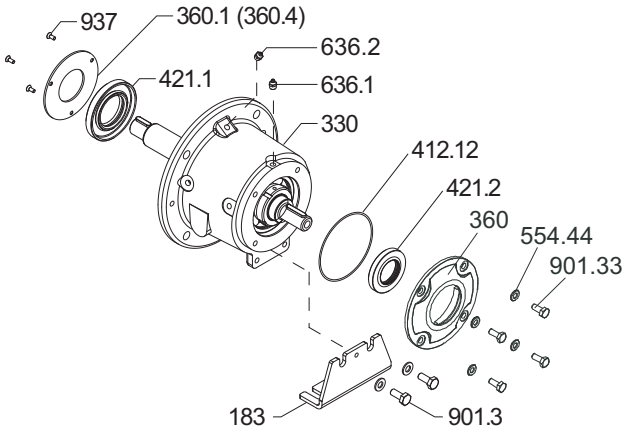

Fig. 31 Dismounting the bearing bracket (grease lubrication)

1. To dismount support foot **183**: Undo the hexagon head screws **901.3**.
2. Unscrew grease nipples **636.1** and **636.2** if applicable.
3. If applicable, undo the countersunk screws **937** and remove the bearing cover **360.1** (**360.4**).
4. Undo the hexagon head bolts **901.33** and remove them together with the washers **554.44**.
5. Take off the bearing cover **360**.
6. Remove radial shaft seal ring **421.2**and O-ring **412.12** from bearing cover **360**.
7. Remove radial shaft seal rings **421.1** from bearing bracket **330**.

7.3.11 Dismounting the pump shaft

Bearing bracket, no lifetime lubrication

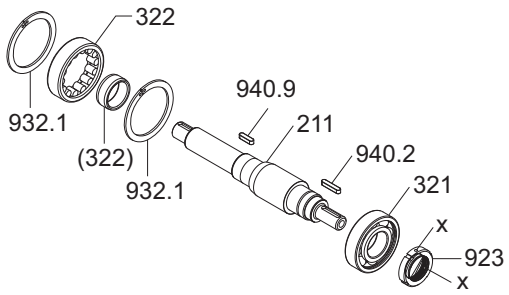

Fig. 32 Pump shaft disassembly (bearing bracket, no lifetime lubrication)

1. Press out pump shaft **211** with radial ball bearing **321** from bearing bracket **330** towards the motor end.
2. Undo the threaded pins **x** of the bearing nuts **923**. Then undo the mechanical guard by hitting the bearing nut between the threaded pins slightly with a hammer.
3. Unscrew the bearing nut **923**.
4. Pull the radial ball bearing **321** and inner ball race **(322)** off the radial roller bearing **322** off the pump shaft **211**.
5. Remove the circlip **932.1**.
6. Press the radial roller bearing **322** out of the bearing bracket **330** and remove the second circlip **932.1**.

Bearing bracket with lifetime-lubricated roller bearings

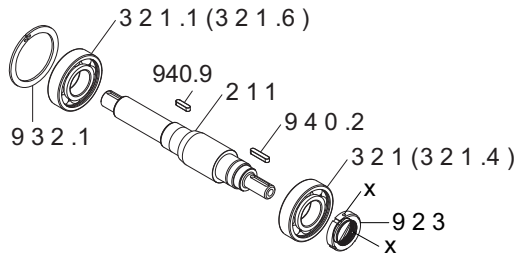

Fig. 33 Pump shaft disassembly (bearing bracket with lifetime-lubricated roller bearings)

1. Remove the circlip **932.1**.
2. Press the pump shaft **211** with radial ball bearings **321** (**321.4**) and **321.1** (**321.6**) out of the bearing bracket **330** towards the drive side.
3. Undo the threaded pins **x** of the bearing nuts **923**. Then undo the mechanical guard by hitting the bearing nut between the threaded pins slightly with a hammer.
4. Unscrew the bearing nut **923**.
5. Pull the radial ball bearings **321** (**321.4**) and **321.1** (**321.6**) off the pump shaft **211**.

7.4 Installing the pump

7.4.1 Preparing the installation

1. Observe the following for the installation:
   - Replace worn out parts with original spare parts.
   - Replace the seals.
   - Before installation, lubricate all O-rings (**412.4/.8/.10/.18/.43/.47/.51/.96**) that are stressed by shearing during installation with lubricant which is approved for the process and compatible with the O-ring material.
   - Tighten the screws/nuts crosswise with a torque key in an appropriate manner. Observe any tightening torques which deviate from standard (→ 9.2.4 Tightening torques, Page 51).
   - Reinstall the components concentrically without canting according to the applied marks.
2. Clean all components (→ 9.2.6 Cleaning agents, Page 52). but do not remove the applied marks.
3. Install the pump (→ sectional drawing).

The pump is installed in the reverse order ofi ts disassembly. The following sections show particular aspects to be observed when installing the pump.

7.4.2 Fitting the pump shaft

With roller bearings without lifetime lubrication

1. Heat up inner ball race of radial roller bearing **322** and press it onto pump shaft **211**.
2. Heat up radial ball bearing **321** and press it onto pump shaft **211**.
3. Let the radial ball bearing **321** cool down and grease ifi t is grease-lubricated (→ Table 25 Initial grease filling amount, Page 51).
4. Tighten the radial ball bearing **321** with the bearing nut **923**. Tighten the bearing nut **923** with a hook spanner against the radial ball bearing **321**.
5. Screw in the threaded pins with one drop of LOCTITE 243 in the bearing nut **923**.

With lifetime-lubricated roller bearings

1. Heat the radial ball bearings **321** and **321.1** (**321.6**) and press them onto the pump shaft **211**.
2. Tighten the radial ball bearing **321** with the bearing nut **923**. Tighten the bearing nut **923** with a hook spanner against the radial ball bearing **321**.
3. Screw in the threaded pins with one drop of LOCTITE 243 in the bearing nut **923**.

7.4.3 Fitting the bearing bracket

For bearing brackets with labyrinth rings (→ Manual 0312-... Bearing bracket with labyrinth rings for oil-lubricated roller bearings).

On a grease-lubricated bearing bracket suitable for relubrication (→ Table 25 Initial grease filling amount, Page 51).

Pay attention to the sectional drawings for details on other versions.

1. For versions with bearings without lifetime lubrication: Insert the motor-side circlip **932.1** in the bearing bracket **330**.
2. For versions with bearings without lifetime lubrication: Press the radial roller bearing **322** in the bearing bracket **330** and grease ifi t is grease-lubricated (→ Table 25 Initial grease filling amount, Page 51).
3. Insert the impeller-side circlip **932.1** in the bearing bracket **330**.
4. Press the pre-assembled pump shaft **211** into the bearing bracket **330**.
5. Insert radial shaft seal ring **421.2** and O-ring **412.12** into bearing cover **360**.
6. Tighten the preassembled unit with socket head cap screws **914.3** or hexagon head bolts **901.33** and washers **554.44** on the bearing bracket **330**.
7. Insert radial shaft seal ring **421.1** in bearing bracket **330**.
8. On a grease-lubricated pump, screw the bearing cover **360.1** (**360.4**) on the bearing bracket **330** with the countersunk screws **937**.
9. Screw in grease nipples **636.1** and **636.2** if applicable.

7.4.4 Fitting the casing cover

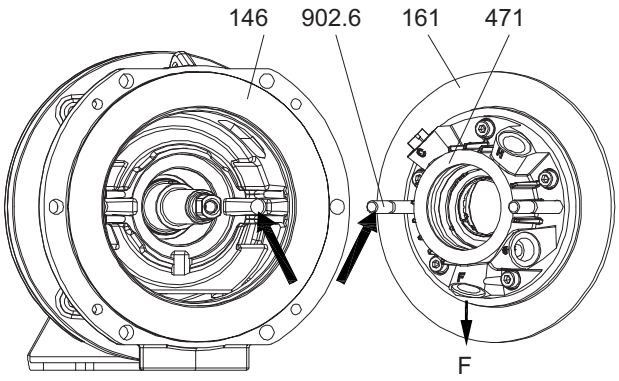

Fig. 34 Fitting the casing cover

► Fit casing cover sub-assembly **161** into intermediate lantern **146**.
Make sure that the studs **902.6** in bore holes ofi ntermediate lantern **146** are inserted and the F connection on the seal cover **471** is facing downwards vertically.

7.4.5 Installing the pump in the installation

⚠ DANGER

Risk off atal injury due to rotating parts!

► Make sure the coupling guard is installed after carrying out any work on the pump.

► (→ 5 Setup and connection, Page 16).

7.5 Ordering spare parts

For trouble-free replacement in the event of damage, we recommend keeping entire plug-in units or spare pumps available on site.

The application guidelines according to DIN 24296 recommend keeping a supply for two years of continuous use (→ 9.3 Spare parts for two years of continuous operation according to DIN 24296, Page 57).

► Have the following information ready to hand when ordering spare parts (→ type plate):
- Short designation of the pump
- Serial number
- Year of construction
- Part number
- Designation
- Quantity

8 Troubleshooting

Iff aults occur which are not specified in the following table or cannot be traced back to the specified causes, please consult the manufacturer.

Possible faults are assigned a number in the table below. Use this number to find the cause and remedy in the troubleshooting table.

Fault	Number
Pump not pumping	1
Pumping rate insufficient	2
Pumping rate too high	3
Pumping pressure too low	4
Pumping pressure too high	5
Pump running roughly	6
Roller bearing temperature too high	7
Pump leaking	8
Excessive motor power uptake	9

Tab. 12 Fault/number assignment

Fault number									Cause	Remedy
1	2	3	4	5	6	7	8	9		
X	–	–	–	–	–	–	–	–	Supply/Suction pipe and/or pressure pipe closed by fitting	▶ Open the fitting.
–	X	–	X	–	–	–	–	–	Supply/Suction pipe not fully opened	▶ Open the fitting.
X	X	–	X	–	X	–	–	–	Supply/Suction pipe, pump or suction strainer blocked or encrusted	▶ Clean the supply/suction pipe, pump or suction strainer.
–	X	–	X	–	X	–	–	–	Supply/Suction pipe cross-section too narrow	▶ Increase the cross-section. ▶ Remove encrustations from the suction pipe. ▶ Open the fitting completely.
X	–	–	–	–	–	–	–	–	Transport sealing cover not removed	▶ Remove the transport sealing cover. ▶ Dismount the pump and check for dry-running damage.
–	X	–	X	–	X	–	–	–	Suction head too large: $NPSH_{pump}$ larger than $NPSH_{installation}$	▶ Increase the supply pressure. ▶ Consult the manufacturer.
X	–	–	–	–	X	–	–	–	Supply/Suction pipe and pump not bled properly or not filled up completely	▶ Fill the pump and/or pipes completely and bleed them.
X	–	–	–	–	X	–	–	–	Supply/Suction pipe contains air pockets	▶ Install a fitting for bleeding. ▶ Correct the pipe installation.
X	X	–	X	–	X	–	–	–	Air is sucked in	▶ Seal the source of malfunction.
X	X	–	X	–	X	–	–	–	Excessive amount of gas: pump cavitating	▶ Consult the manufacturer.
–	X	–	X	–	X	–	–	–	Temperature of pumped medium too high: pump cavitating	▶ Increase the supply pressure. ▶ Lower the temperature. ▶ Consult the manufacturer.

Fault number									Cause	Remedy
1	2	3	4	5	6	7	8	9		
–	X	–	X	–	–	–	–	X	Viscosity or density of the pumped medium outside the specified range for the pump	▶ Consult the manufacturer.
–	X	–	X	–	–	–	–	–	Geodetic pump head and/or pipe flow resistance too high	▶ Remove sediments from the pump and/or pressure pipe. ▶ Install a larger impeller and consult the manufacturer.
–	X	–	–	X	X	–	–	–	Pressure-side fitting not opened wide enough	▶ Open the pressure-side fitting.
X	X	–	–	X	X	–	–	–	Pressure pipe blocked	▶ Clean the pressure pipe.
X	X	–	X	–	X	–	–	–	Pump running in wrong direction	▶ Swap any two phases at the motor.
X	X	–	X	–	–	–	–	–	Motor speed too low	▶ Compare the required motor speed with the specification on the pump type plate. Replace the motor if necessary. ▶ Increase the motor speed if speed control is available.
–	X	–	X	–	X	X	–	–	Pump components worn out	▶ Replace any worn-out pump components.
–	–	X	X	–	X	–	–	X	Pressure-side fitting opened too wide	▶ Throttle with pressure-side fitting. ▶ Mill down the impeller. Consult the manufacturer and adjust the impeller diameter.
–	–	X	–	–	X	–	–	X	Geodetic pump head, pipe flow resistances and/or other resistances lower than specified	▶ Throttle the flow rate with the pressure-side fitting. Observe the minimum flow rate. ▶ Mill down the impeller. Consult the manufacturer and adjust the impeller diameter.
–	–	X	–	X	–	–	–	–	Viscosity lower than expected	▶ Mill down the impeller. Consult the manufacturer and adjust the impeller diameter.
–	–	X	–	X	X	X	–	X	Motor speed too high	▶ Compare the required motor speed with the specification on the pump type plate. Replace the motor if necessary. ▶ Reduce the motor speed if speed control is available.
–	–	X	–	X	X	–	–	X	Impeller diameter too large	▶ Throttle the flow rate with the pressure-side fitting. Observe the minimum flow rate. ▶ Mill down the impeller. Consult the manufacturer and adjust the impeller diameter.
X	X	–	X	–	X	–	–	–	Impeller out of balance or clogged up	▶ Dismount the pump and check for dry-running damage. ▶ Clean the impeller.
–	X	–	X	–	X	–	–	–	Hydraulic components of the pump dirty, clotted or encrusted	▶ Dismount the pump. ▶ Clean the components.
–	–	–	–	–	X	X	–	X	Roller bearing in bearing bracket defective	▶ Replace the roller bearing.
–	–	–	–	–	–	X	–	X	Roller bearing in motor defective	▶ Replace the roller bearing.

Fault number									Cause	Remedy
1	2	3	4	5	6	7	8	9		
–	–	–	–	–	–	X	–	–	Lubricant: excessive, insufficient or unsuitable	▶ Reduce, top up or replace the lubricant.
–	–	–	–	–	–	–	X	–	Connecting screws not tightened properly	▶ Tighten the connecting screws.
–	–	–	–	–	–	–	X	–	Mechanical seal worn	▶ Replace mechanical seal.
–	–	–	–	–	–	–	X	–	Housing seal defective	▶ Replace the housing seal.
–	–	–	–	–	–	–	X	–	Shaft sleeve is infiltrated	▶ Replace shaft sleeve and/or O-rings.
–	–	–	–	–	X	X	X	X	Pump distorted	▶ Check the pipes and pump fastenings. ▶ Check the coupling alignment. ▶ Check support foot fixation.
–	–	–	–	–	X	X	–	–	Coupling not aligned properly	▶ Align the coupling.
–	–	–	–	–	X	–	–	–	Coupling packets worn	▶ Replace the coupling packets and realign them.
–	X	–	X	–	X	–	–	X	Motor running on 2 phases	▶ Check the fuse and replace it if necessary. ▶ Check the cable connections and insulation.

Tab. 13 Troubleshooting table

9 Appendix

9.1 Sectional drawing

9.1.1 Part numbers and designations

Part no.	Designation
102	Volute casing
122	Blind cover
132	Intermediate piece
146	Intermediate lantern
155	Casing armour plating
161.xxx	Casing cover
167	Cover insert
183	Support foot
187	Casing foot
211	Pump shaft
230	Impeller
321.xxx	Radial ball bearing
322	Radial roller bearing
330	Bearing bracket
360.xxx	Bearing cover
400.xxx	Gasket
412.xxx	O-ring
421.xxx	Radial shaft seal ring
423	Axial shaft seal ring
423.xxx	Labyrinth ring
471	Seal cover
472.xxx	Rotating seal ring
473.xxx	Stationary seal
474.xxx	Thrust ring
475.xxx	Stationary seal ring
477.xxx	Spring
488	Conveying ring
500	Ring
507	Splash ring
509.xx	Intermediate ring
513	Insert ring
523.xxx	Shaft sleeve
533	Guide sleeve
554.xxx	Washer
560.xxx	Pin
636.xxx	Grease nipple
637	Oil filler plug
642	Oil level sight glass
710.xxx	Pipe
718.xxx	Socket
721.xx	Taper piece
724	Blank flange
738.xxx	Fitting
739.xx	Hose coupling
901.xxx	Hexagon head screw
902.xxx	Stud bolt
903.xx	Screwed plug
906	Impeller screw
914.xxx	Socket head cap screw
920.xxx	Nut
923	Bearing nut
925.xxx	Lock nut
932.xxx	Circlip
937	Countersunk screw
938	Schnorr spring washer
940.xxx	Fitting key

Tab. 14 Designation of components according to part numbers

9.1.2 Sub-assemblies

The individual sub-assemblies consist of the following parts.

Product-side shaft sleeve sub-assembly

Part no.	Designation
412.61	O-ring
472	Rotating seal ring
509	Intermediate ring
523	Shaft sleeve

Tab. 15 Part numbers of the product-side shaft sleeve sub-assembly

ALFA KSS RS cover casing sub-assembly

Part no.	Designation
161	Casing cover
412.2	O-ring
412.3	O-ring
412.84	O-ring
471	Seal cover
473	Stationary seal
474.1	Thrust ring
474.2	Thrust ring
475	Stationary seal ring
477	Spring
554.26	Washer
902.6	Stud bolt
914.18	Socket head cap screw

Tab. 16 Part numbers of the ALFA KSS-RS cover casing sub-assembly

ALFA KSS RS/D cover casing sub-assembly

Part no.	Designation
161	Casing cover
412.2	O-ring
412.3	O-ring
412.84	O-ring
471	Seal cover
473	Stationary seal
474.1	Thrust ring
474.2	Thrust ring
475	Stationary seal ring
477	Spring
513 [1)]	Insert ring
533 [1)]	Guide sleeve
554.26	Washer
902.6	Stud bolt
914.18	Socket head cap screw

Tab. 17 Part numbers of the ALFA KSS-RS/D cover casing sub-assembly

[1)] optional, depending on the version

ALFA KSS RS/D atmosphere-side shaft sleeve sub-assembly

Part no.	Designation
412.52	O-ring
472.2	Rotating seal ring
488	Conveying ring
509.1	Intermediate ring
523.1	Shaft sleeve

Tab. 18 Part numbers of the atmosphere-side shaft sleeve sub-assembly

ALFA KSS RS/D atmosphere -side mechanical seal sub-assembly

Part no.	Designation
412.9	O-ring
412.45	O-ring
473.2	Stationary seal
475.2	Stationary seal ring
477.2	Spring

Tab. 19 Part numbers of the atmosphere-side mechanical seal sub-assembly

9.1.3 Overview sectional drawing

The position numbers in brackets in the following illustrations only apply to previous versions of the pump.

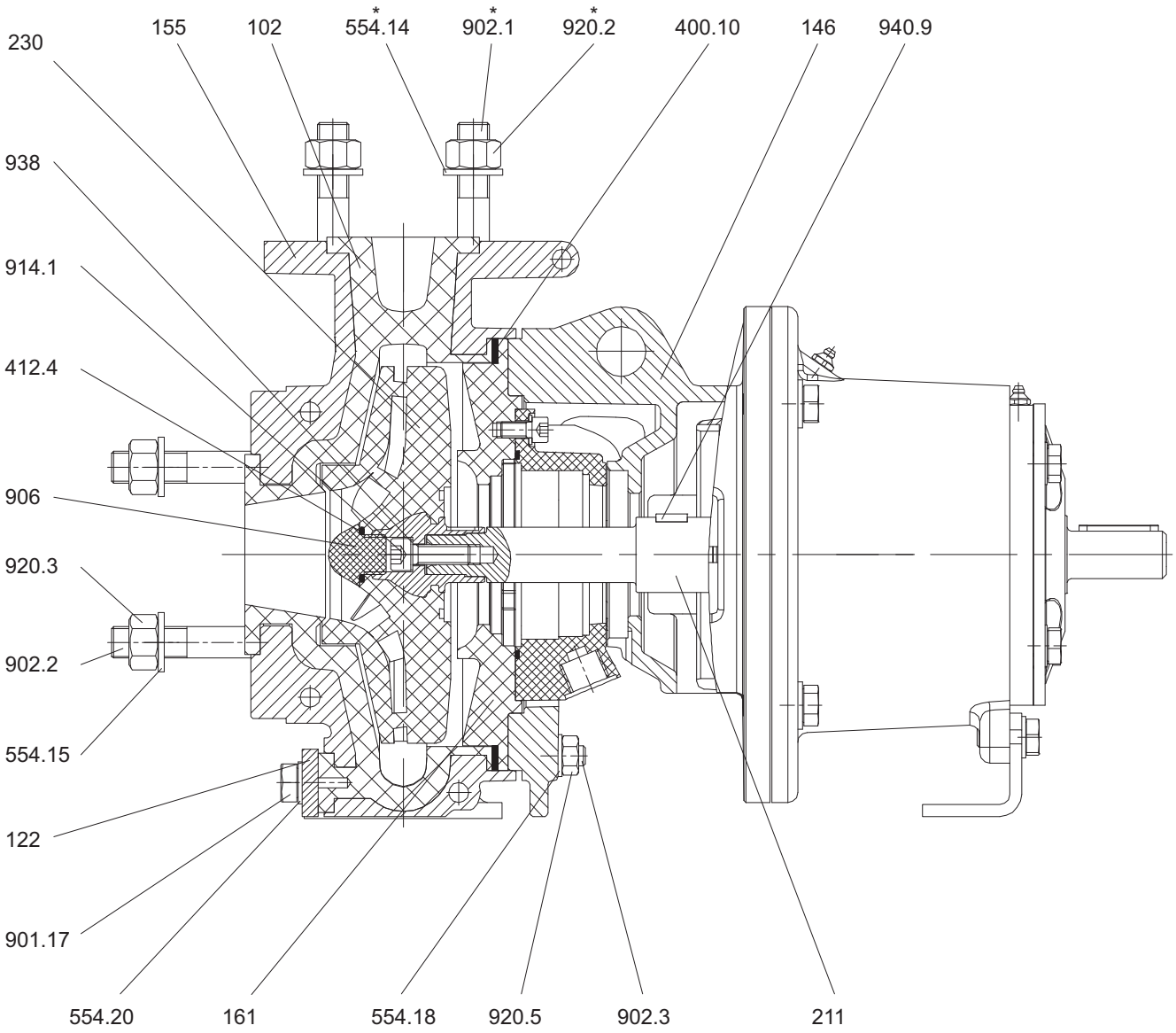

Fig. 35 CS – Overview sectional drawing

* Optional

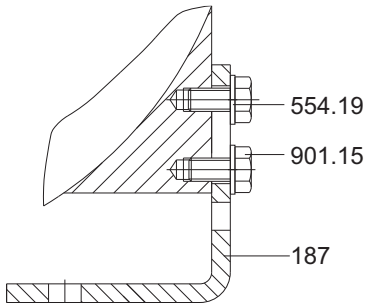

Fig. 36 CS – casing foot

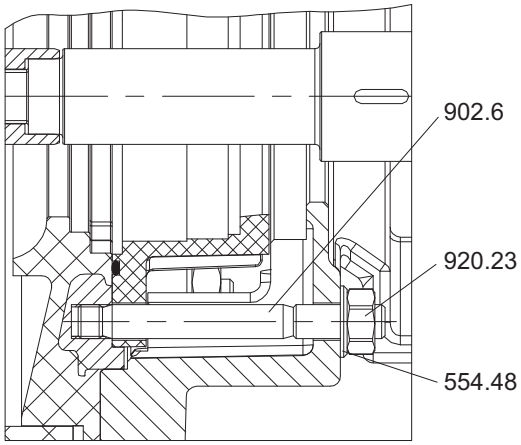

Fig. 37 Fastening the casing cover to the intermediate lantern

9.1.4 Variants

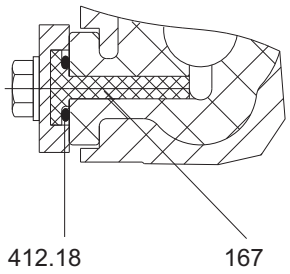

Fig. 38 Draining (optional)

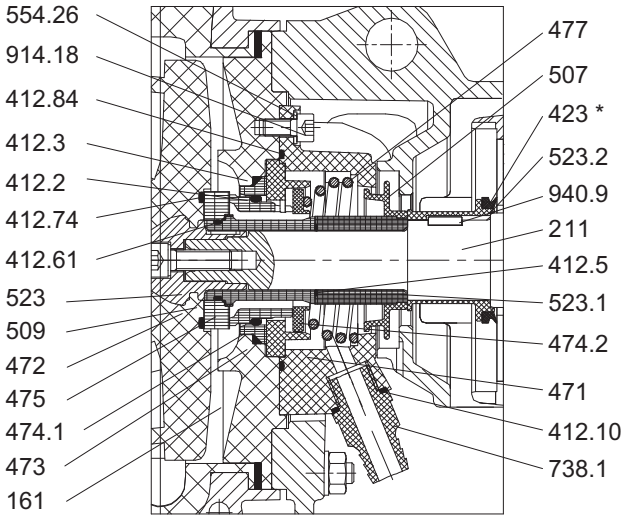

Fig. 39 ALFA-KSS-RS single mechanical seal

* Optional

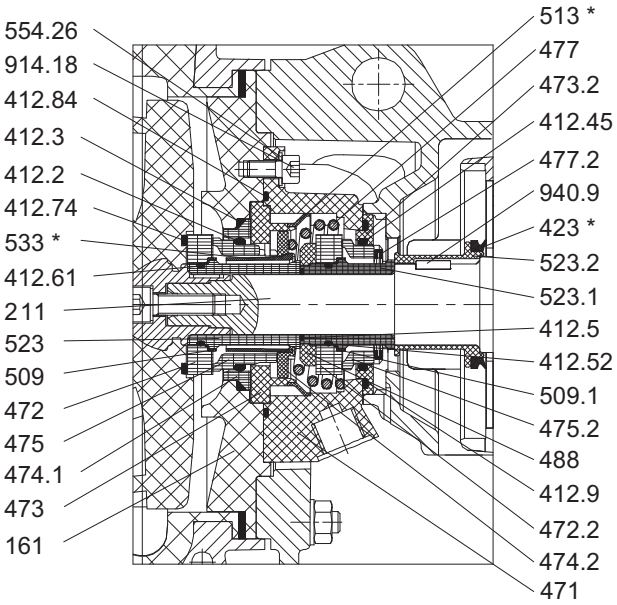

Fig. 40 ALFA-KSS-RS/D double mechanical seal

* Optional

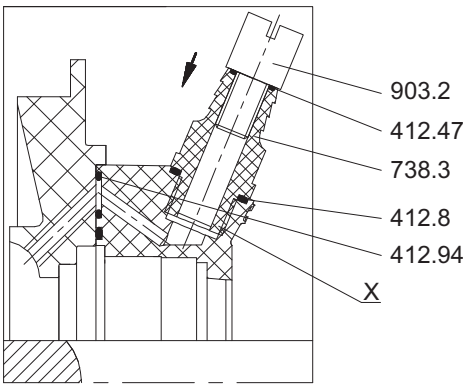

Fig. 41 Stationary flushing (supply connection)

x Drawn staggered

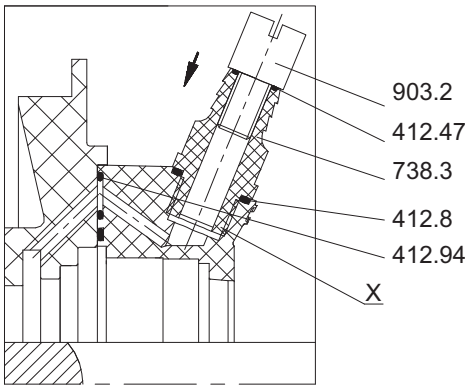

Fig. 42 Permanentfl ushing (supply connection)

x Drawn staggered

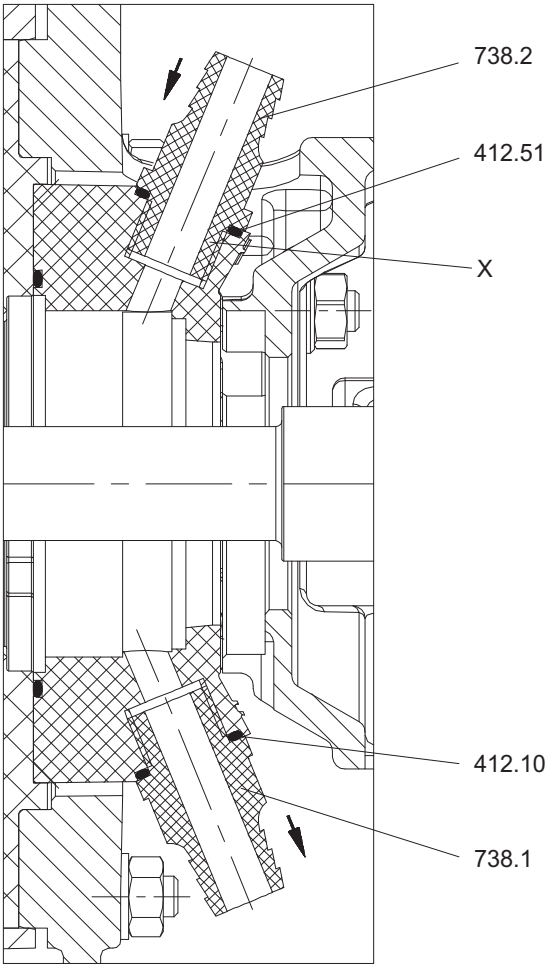

Fig. 43 Single mechanical seal unit with spring chamber flushing (supply connectors)

x Drawn staggered

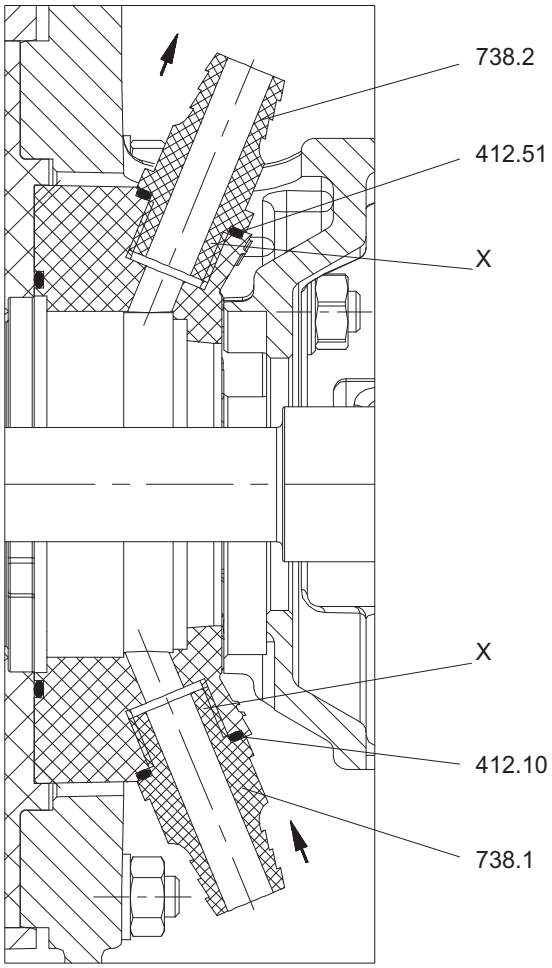

Fig. 44 ALFA KSS FS/D supply connectors (fittings)

x Drawn staggered

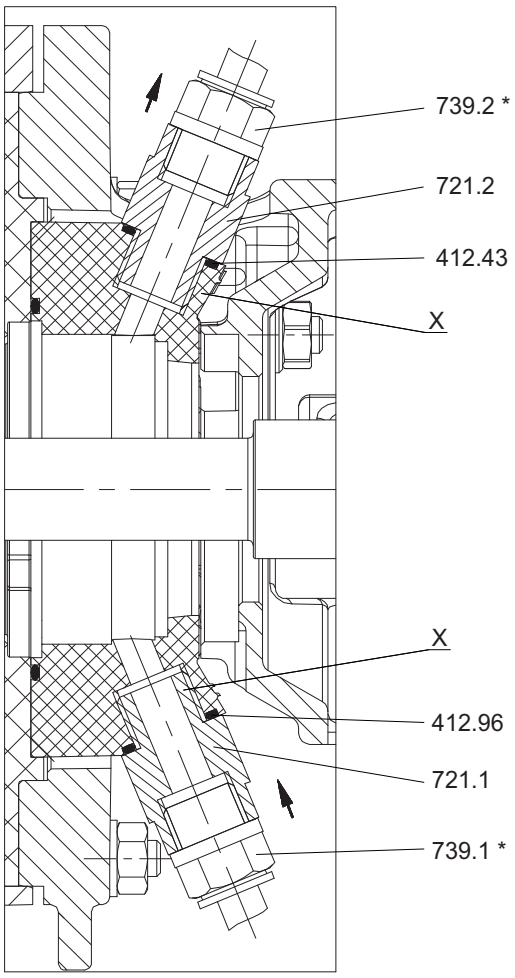

Fig. 45 ALFA KSS RS/D supply connectors (hose fittings)

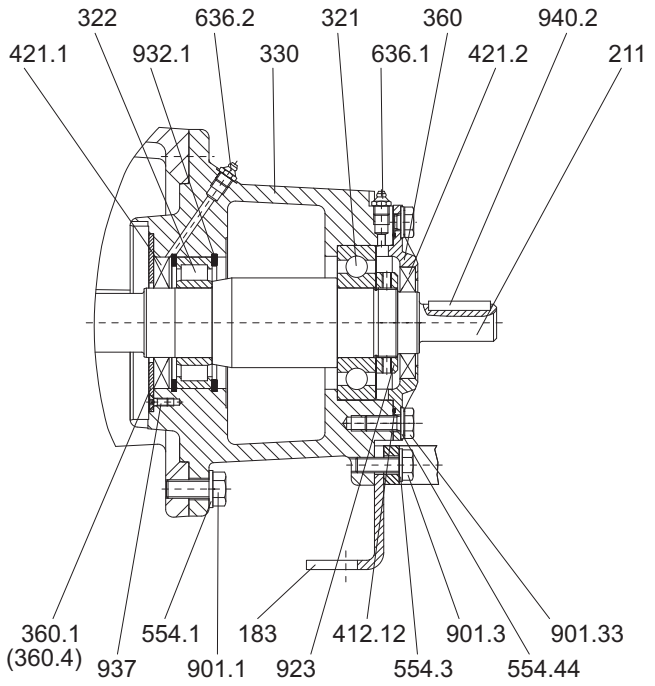

Fig. 46 Bearing bracket (grease-lubricated bearing)

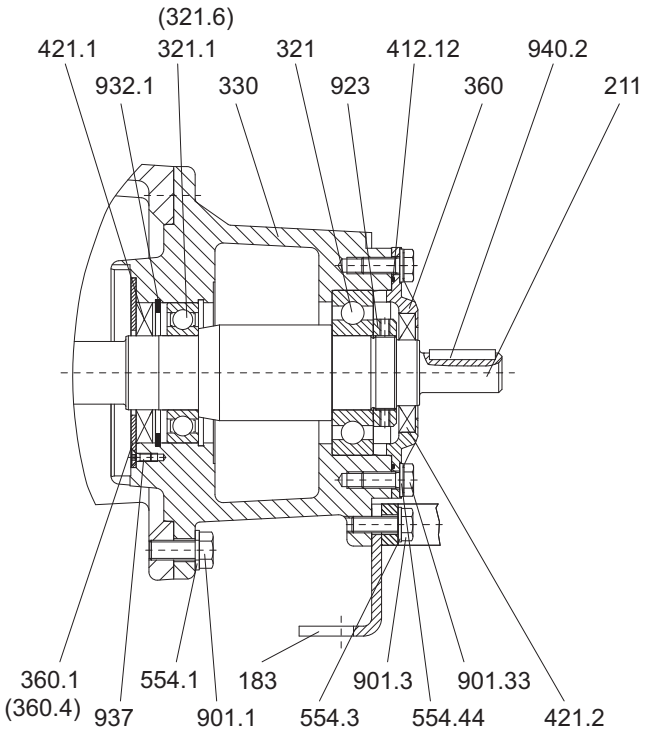

Fig. 47 Bearing bracket (grease-lubricated bearing, lifetime lubrication)

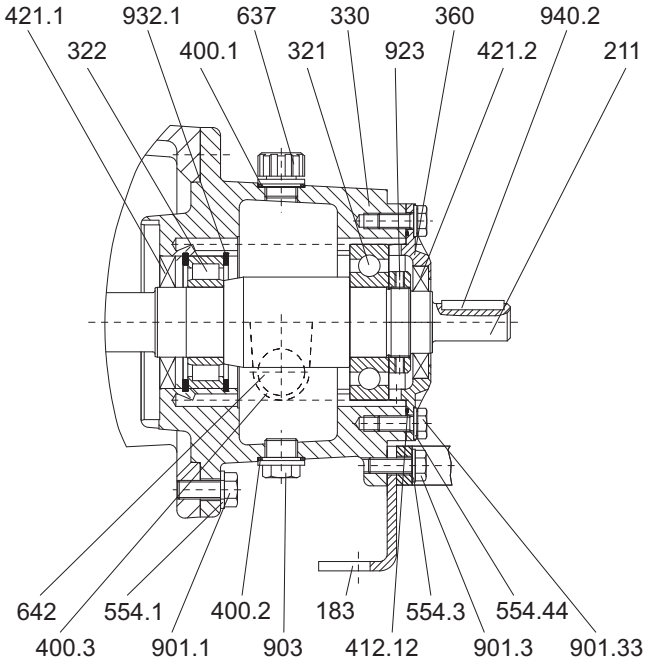

Fig. 48 Bearing bracket (oil-lubricated bearing)

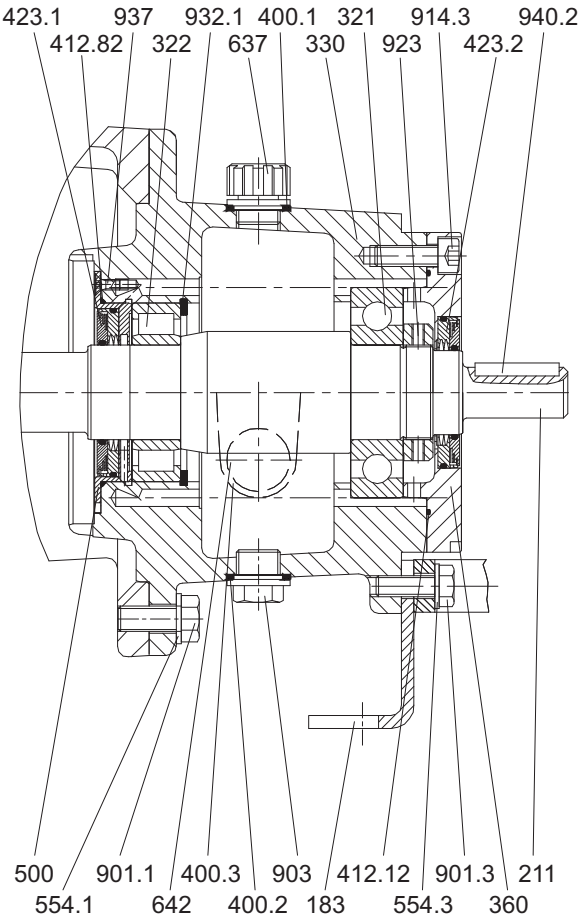

Fig. 49 Bearing bracket (oil-lubricated bearing with labyrinth seals)

9.2 Technical specifications

Further technical specifications (→ order data sheet)

9.2.1 Ambient conditions

Consult the manufacturer about operation under other ambient conditions.

Tempera-ture [°C]	Relative humidity [%]		Setup level above sea level [m]
	Long-term	Short-term	
–20 to +40	≤ 85	≤ 100	≤ 1000

Tab. 20 Ambient conditions

9.2.2 Parameters for auxiliary operating systems

Quenching/barrier medium in open system

Medium	Volume flow [l/h]	Pressure
Quenching medium	30	Unpressurised
Barrier medium	30	▶ (→ diagram below).

Tab. 21 Operating parameters for quenching/barrier medium in open system

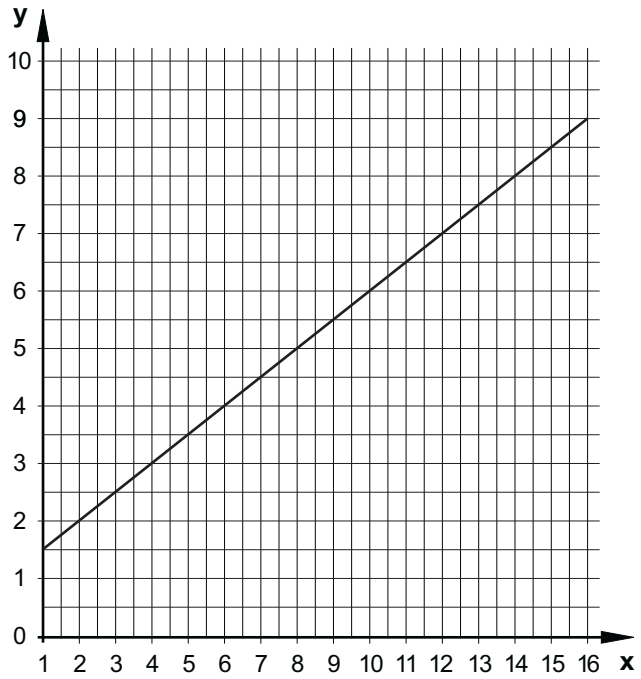

Fig. 50 Using a pressurised barrier medium – pressure of barrier medium

x Pressure at pressure socket [bar]

y Required pressure for using a pressurised barrier medium [bar]

9.2.3 Noise pressure levels

Measuring conditions:

- Distance to pump: 1 m
- Operation: no cavitation
- Motor: IEC standard motor
- Tolerance ±3 dB

Lower-noise motor versions are available if the expected noise values exceed the permissible limits.

Nominal motor power PM [kW]	Noise pressure level [dB] for pump with motor at speed [rpm]			
	1450	1750	2900	3500
1.5	58	58.5	63	64
2.2	60	60.5	66	67
3.0	62	62.5	68	69
4.0	63	63.5	69	70
5.5	65	65.5	71	72
7.5	66	66.5	72	73
11.0	68	68.5	74	75
15.0	69	69.5	75	76
18.5	70	70.5	76	77
22.0	71	71.5	77	78
30.0	72	72.5	78	79
37.0	73	73.5	79	80
45.0	74	74.5	80	81
55.0	75	75.5	80	81
75.0	76	76.5	81	82

Tab. 22 Noise pressure levels

9.2.4 Tightening torques

Tighten the screws/nuts with torques properly in accordance with the general technical rules. Deviating torques are dealt with in the following.

The following figures apply to new screws and nuts.

The following values only apply to the assembly procedure.

Thread size	Tightening torque [Nm]
M 10	45

Tab. 23 Socket head cap screw **914.1** and nuts **920.5**

Tighten hand-tight for plastic/plastic pairings, e.g. impeller screw **906**, taper pieces **721.xx**,

fittings **738.xx** or hose couplings **739.xx**

9.2.5 Lubricants

Manufacturer	Designation
SKF	LGMT3
ARAL	HL3
MOBIL-OIL	MOBILUX EP3
SHELL	ALVANIA GREASE 3

Tab. 24 Types ofl ubricating grease

Bearing bracket	Bearing	Pieces	Position [2]	Amount of grease in bearing [g]	Amount of grease in WDR bearing [1] [g]
L16A	NU2209	1	A	10	25
	6309	1	B	40	30
	QJ309	1	B	10	30

Tab. 25 Initial grease filling amount

1) Amount of grease between the shaft seal ring and bearing

2) (→ Figure CS – Overview sectional drawing, Page 45).(→ Figure CS layout (with single-action mechanical seal), Page 11).

Bearing bracket	Bearing types	Position	Lubricant amount per lubrication point [g]
L16A	1 x NU2209	A	10
	1 x 6309	B	13
	1 x QJ 309	B	13

Tab. 26 Minimum amounts for grease lubrication

Manufacturer	Designation
BP	ENERGOL GR-XP 68
DEA	FALCON CLP68
ESSO	SPARTAN EP68
MOBIL	GEAR 626
SHELL	OMALA 68

Tab. 27 Lubricating oils

Bearing bracket	Oil volume [l]
L16A	0.35

Tab. 28 Minimum amounts for oil lubrication

9.2.6 Cleaning agents

Application area	Cleaning agents
Foodstuff and drinking water sector	E.g. spirit, Ritzol 155, strong alkaline soap suds, steam blast (for individual components only)
Other	Benzine, wax solvents, diesel, petrol, alkaline cleaners

Tab. 29 Cleaning agents

9.2.7 Socket loads acc. to ISO 5199

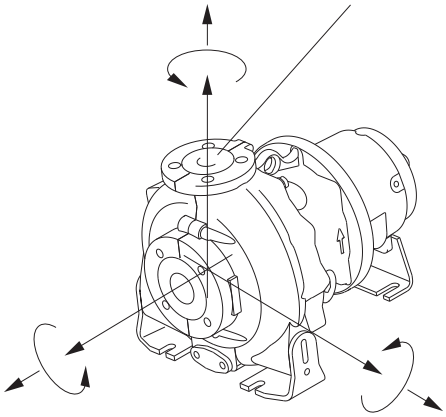

Fig. 51 Socket loads at the pump

1 Pressure socket

Nominal diameter DN [mm]	Fx [N]		Fy [N]	Fz [N]		∑ F [N]
	Pull	Push		Pull	Push	
25	600	300	500	700	350	1100
32	800	400	700	900	450	1500
40	1100	550	900	1200	600	2000
50	1500	750	1300	1600	800	2500
65	1900	950	1600	2000	1000	3500
80	2400	1200	2100	2600	1300	4500

Tab. 30 Socket load – forces

Nominal diameter DN [mm]	Mx [Nm]	My [Nm]	Mz [Nm]	∑ M [Nm]
25	900	600	800	1550
32	1200	800	700	1700
40	1300	900	1000	1850
50	1400	1000	1100	2000
65	1500	1100	1200	2150
80	1600	1200	1300	2300

Tab. 31 Socket load – torque

9.2.8 Coupling settings

Gap widths

Contact the manufacturer if any details are missing.

See also www.flender.com.

Observe the manufacturer's specifications when using other couplings.

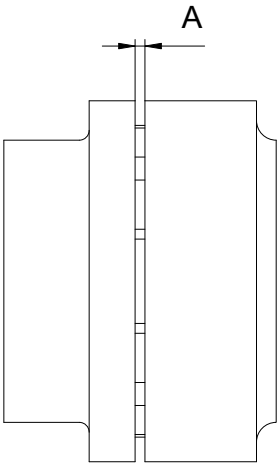

Fig. 52 Coupling, L Type

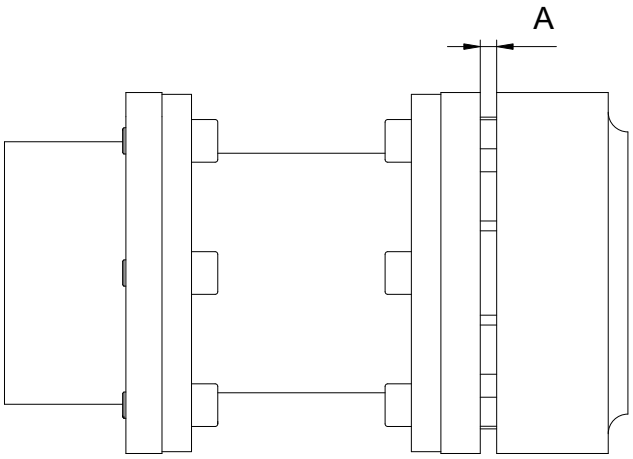

Fig. 53 Coupling, RRS Type(with spacer piece)

Design	Version	Permissible gap width A [mm]
L type RRS type	90	2-4
	95	2-4
	100	2-4
	110	2-4
	190	2-4

For more Version, check Lovejoy or manufacturer's manual

Tab. 32 Gap width – coupling

Permissible deviations

The following values apply to couplings (L & RRS types).

Observe the manufacturer's specifications when using other couplings.

Speed	Gap difference $A_{max} - A_{min}$ [mm]	Radial displace-ment kr [mm]
1500 rpm	max. 0.2	max. 0.2
3000 rpm	max. 0.15	max. 0.15

Tab. 33 Permissible deviations on coupling

9.2.9 Operating limits for pressure and temperature

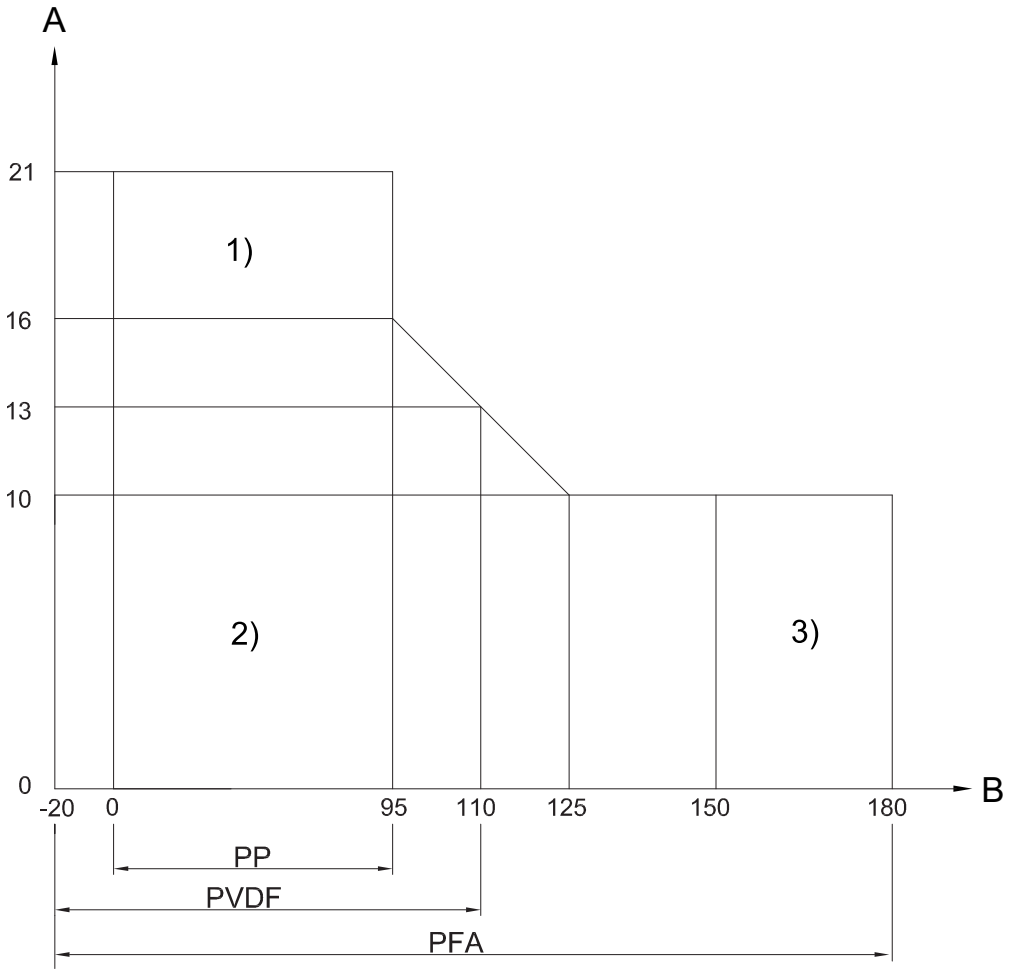

Fig. 54 Operating limits for pressure and temperature

A Permissible pump interior pressure [bar]

B Temperature of pumped medium [°C]

1) Extended application area for PVDF, PFA, only permissible with approval from ALFA PUMPS

2) Standard application area

3) Extended application area for PFA, only permissible with approval from ALFA PUMPS

9.2.10 Flushing options

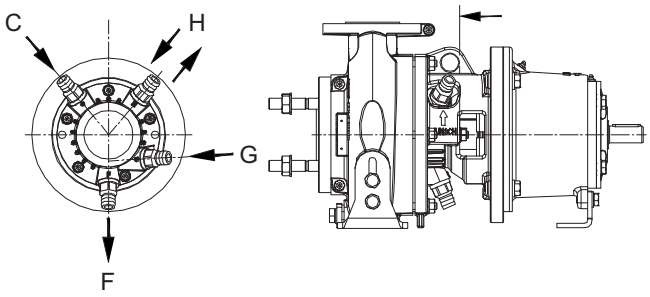

Fig. 55 Position of the flushing connectors KSS RS, RS/D

Seal type	Flushing type	Connection points	Flushing medium data	Supply	Notes / comments
KSS-RS	Spring chamber flushing	Input H Output F	Clean, product-compatible, non-corrosive, usually tap water	Internal supply system	Depressurised flushing
	Permanent flushing [1)]	C	Clean, product-compatible, non-corrosive Amount: 0.9 – 1.5 l/min Pressure: max. 10 bar		
	Stationary flushing [1)]	C	Clean, product-compatible, non-corrosive Amount: 5 – 8 l/min Pressure: max. 10 bar	Internal supply system	
KSS-RS/D	Continuous barrier fluid (with barrier pressure)	Input G Output H	Clean, product-compatible, non-corrosive Kinematic viscosity = max. 15 mm²/s Minimum throughput rate = 0.25 l/min Return temperature = max. 60 °C Temperature difference between feed and return flow = max. 25 K Does not exceed boiling point	Internal supply system	Example for barrier medium: Water Recommended throughput rate: 0.5 l/min
	Barrier fluid in thermal siphon circuit	Input G Output H	Clean, non-crystallising, product-compatible, high boiling point, good lubrication, environmentally friendly, non-corrosive Kinematic viscosity = max. 5 mm²/s Return temperature = max. 60 °C Temperature difference between feed and return flow = max. 25 K Does not exceed boiling point	Thermal siphon container, pressurised	Example for barrier medium: Water, vegetable oil, glycol/water mixture Barrier pressure > Pressure on medium side of mechanical seal. ► Attach the container 1.5 to 2 metres above the mechanical seal. Lines must be laid with an upward or downward slope. Avoid horizontal sections.
	Continuous barrier fluid (without barrier pressure)	Input G Output H	Clean, product-compatible, non-corrosive Kinematic viscosity = max. 15 mm²/s Minimum throughput rate = 0.25 l/min Return temperature = max. 60 °C Temperature difference between feed and return flow = max. 25 K Does not exceed boiling point	Internal supply system	Depressurised flushing

Seal type	Flushing type	Connection points	Flushing medium data	Supply	Notes / comments
KSS-RS/D	Quench	Input G Output H	Clean, non-crystallising, product-compatible, high boiling point, good lubrication, environmentally friendly, non-corrosive Kinematic viscosity = max. 5 mm²/s Return temperature = max. 60 °C Temperature difference between feed and return flow = max. 25 K Does not exceed boiling point	Depressurised operation with quench tank	Depressurised flushing with atmosphere-side mechanical seal operated as a quench seal ► Attach the container 1 to 2 metres above the mechanical seal. Lines must be laid with an upward or downward slope. Avoid horizontal sections.
	Permanent flushing [1)]	C	Clean, product-compatible, non-corrosive Amount: 0.9 – 1.5 l/min Pressure: max. 10 bar		
	Stationary flushing [1)]	C	Clean, product-compatible, non-corrosive Amount: 5 – 8 l/min Pressure: max. 10 bar		

Tab. 34 Flushing options and parameters for seals, KSS-RS, -RS/D

1) not possible for PFA material

9.3 Spare parts for two years of continuous operation according to DIN 24296

9.3.1 Commissioning

Part no.	Part designation	Number ofi dentical pumps (including spare pumps)							
		1	2	3	4	5	6 or 7	8 or 9	10 or more
		Set/Quantity of spare parts							
–	Repair set for mechanical seal	1	1	1	2	2	2	3	25 %
400.10	Gasket (casing)	1	2	3	4	5	100 %	100 %	100 %
523	Shaft sleeve	1	1	1	2	2	2	3	25 %
523.1	Shaft sleeve	1	1	1	2	2	2	3	25 %

Tab. 35 Replacement parts for 2 years' continuous operation – commissioning

9.3.2 Maintenance

Part no.	Part designation	Number ofi dentical pumps (including spare pumps)							
		1	2	3	4	5	6 or 7	8 or 9	10 or more
		Set/Quantity of spare parts							
–	Repair set for mechanical seal	1	1	1	2	2	2	3	25 %
161	Casing cover	1	1	1	1	2	2	2	20 %
211	Pump shaft	1	1	1	1	2	2	2	20 %
230	Impeller	1	1	1	1	2	2	2	20 %
321/ 321.1	Radial ball bearing	1	1	1	2	2	2	3	25 %
322	Radial roller bearing	1	1	1	2	2	2	3	25 %
400.10	Gasket (casing)	1	2	3	4	5	100 %	100 %	100 %
421.1	Radial shaft seal ring	1	1	1	2	2	2	3	25 %
421.2	Radial shaft seal ring	1	1	1	2	2	2	3	25 %
423[1)]	Axial shaft seal ring	1	1	1	2	2	2	3	25 %
523	Shaft sleeve	1	1	1	2	2	2	3	25 %
523.1	Shaft sleeve	1	1	1	2	2	2	3	25 %
867	Coupling buffer	1	1	1	2	2	3	4	30 %

Tab. 36 Replacement parts for 2 years' continuous operation – maintenance

1) Optional, depends on pump model