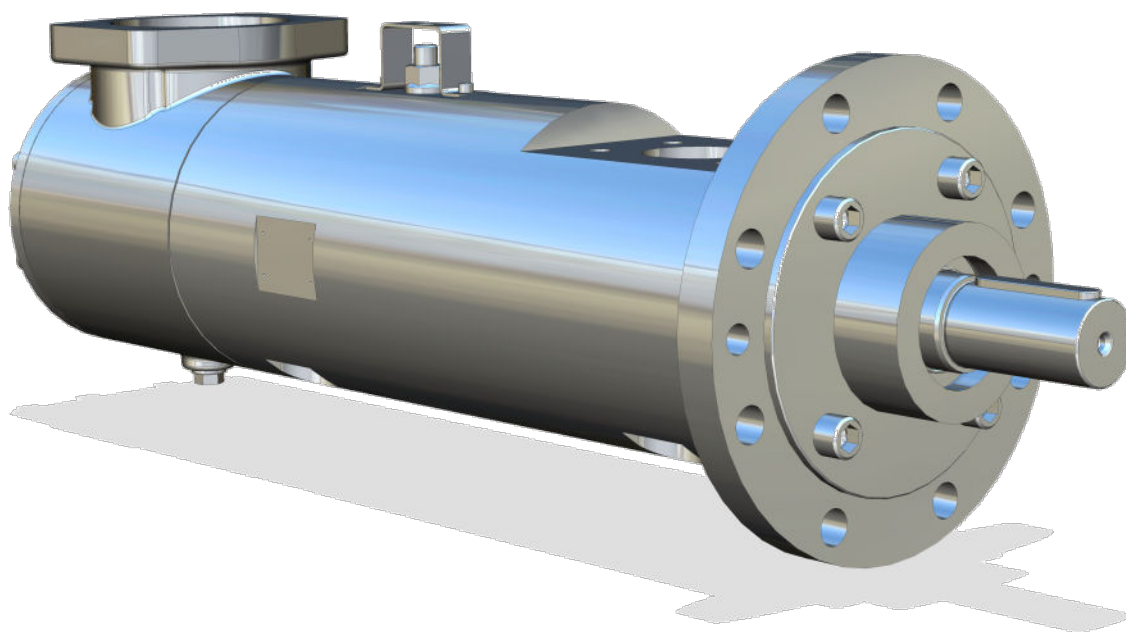


OPERATING INSTRUCTIONS



Screw pump L3MF IFOKSO-W

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1 General information

1.1 Quality characteristics

An extensive quality management system ensures a high quality standard for Leistritz screw spindle pumps. The quality management to ISO 9001 includes all planned and systematic tasks for meeting the specified quality requirements.

Quality assurance measures, their scope, the type of testing and documentation are determined by the customer in the requirements they set us, including compliance with specific standards and regulations.

All Leistritz products are subjected to extensive tests and a performance test. Only products that meet our quality standard leave the factory.

The proof of performance is provided in accordance with the general test rules for rotating displacement pumps.

The test results are recorded in the manufacturer's test certificates.

1.2 About these instructions

These instructions are part of the product and apply to all the named series.

These instructions describe safe and proper operation in all the product's life cycle phases.

1.2.1 Target group

These instructions are directed at the owner/operating company of the product and their qualified personnel.

1.2.2 Related Documents

- Data sheet
- Design drawings
- If applicable: supplier documentation
- If required: test records
- If required: certificates
- If necessary: Documentation on use of the product in a potentially explosive atmosphere
- Declaration of conformity


1.2.3 Tips on using these instructions

1.2.3.1 Warnings and symbols

The safety instructions and warnings in these operating instructions are structured in compliance with the standards. General safety instructions and warnings are given in the [Chapter 2 'Safety' on page 11](#). Chapter-related safety instructions and warnings are given at the beginning of the respective chapter.

In addition, imminent dangers are pointed out in different places (e.g. in an instruction).




The safety instructions and warnings are highlighted in colour and are structured as follows:

	<p>DANGER</p> <p>Type and source of danger!</p> <p>Consequences of disregard.</p> <ul style="list-style-type: none"> - Evasion (prevention measures)
---	---

Signal words

Warning	Danger level	Consequences of noncompliance
DANGER!	Imminent danger	Death, serious injury
WARNING!	Potential imminent danger	Death, serious injury
ATTENTION!	Potentially dangerous situation	Minor physical injury
NOTE!	Potentially dangerous situation	Material damage

Symbols used

Symbol	Meaning
	General warning symbol
	Warning: electricity
	Warning: rotating parts

Symbol	Meaning
	Warning: overhead loads
	Warning: dangerous substances
	Warning: corrosive substance
	Warning: crushing of hands
	Warning: hot surfaces
	Warning: explosion
	Note, tip or additional information

1.2.3.2 Instructions

Figures are positioned next to the step in an instruction for clarification.

Instructions have a heading, which can be identified in the objective of the action.

Requirements for the actions and achieved interim results are marked accordingly.

Example

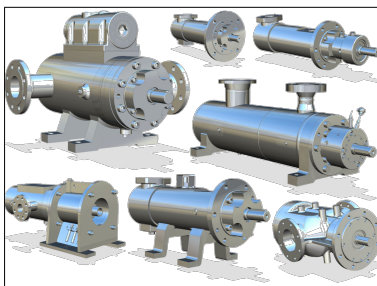
How to carry out a task:

- First requirement.
- Second requirement.

1. → 1st step.



2. → 2nd step.



1.2.4 Figures

As these instructions apply to different series, for standardisation purposes, the figures used are by way of example and may differ from the delivered product. For details, the project-related design drawings are relevant.

1.3 Operating data

Data given in the manual apply generally to this series.

In the event of deviating conditions, refer to and always comply with the technical operating data and use limits specified in the product-related data sheet.

2 Safety



DANGER

Danger due to noncompliance with the documentation!

Noncompliance with the information and safety instructions in these operating instructions can cause injuries or material damage to occur.

- Read and follow these operating instructions and all related documents carefully.
- Note and comply with the additional documentation on operating the product in a potentially explosive atmosphere.

2.1 Intended use

The pump unit is intended to be used to pump liquid media in compliance with all relevant technical data, which are given in the “Technical data” chapter.

All uses extended beyond this are deemed to be not as intended (misuse).

2.2 Reasonably foreseeable misuse

- Exceeding the use limits of the pump unit regarding pumped medium, temperature, pressure, viscosity, delivery rate and speed. → [Appendix A 'Technical data' on page 69](#)
- Use of untested and non-approved supply systems (if present). → [Appendix A 'Technical data' on page 69](#)
- Operating the pump unit against a closed outlet valve.
- Operating the pump unit with a closed inlet valve.

2.3 Duties of the owner/operating company

2.3.1 Personnel qualifications



WARNING

Risk of injury or material damage due to the assignment of unqualified personnel!

The assignment of unqualified personnel can cause personal injuries or material damage.

- Only allow trained skilled personnel who have the following knowledge to carry out assembly, overhaul and maintenance work:
 - Knowledge of standards, guidelines, directives and accident prevention regulations
 - Knowledge of mechanics
 - Knowledge of hydraulics
 - Knowledge of electrics

2.3.2 General information for the personnel

- Read and comply with these operating instructions carefully and in full.
- Pay attention to any notes on the pump unit and keep them legible, e.g. rotational direction arrow, labelling for fluid connections.
- Renew stickers that are damaged or have become illegible.
- Pump unit and all attachments:
 - do not enter or use as climbing aid
 - do not use as a support for boards, ramps or profiles
 - do not use as an anchor point for cable winches or supports
 - do not de-ice with gas burners or similar tools
 - do not use high-pressure jet cleaners for cleaning
- do not remove protective devices.
- Avoid sparking and naked flames in the workplace.
- Avoid standing near the pump or the pump unit during rain or a storm.
- Wear personal protective equipment.
- Only carry out work on the pump unit if it is de-energised.
- Completely disconnect the drive motor and secure against reconnection before carrying out any assembly or maintenance work.
- Re-install the safety devices according to the regulations after all work on the pump unit.

2.3.3 Safety-conscious working



WARNING

Danger due to noncompliance with the general safety regulations!

Noncompliance with the general regulations on safe operation of the product can cause personal injuries and material damage.

- Only use the pump unit if it is in a technically faultless condition and only operate it as intended, safely and aware of the dangers in compliance with these instructions.
- Comply with the legal and company safety and accident prevention regulations.
- Comply with the safety provisions for handling hazardous substances.
- Comply with the relevant standards, guidelines and directives of the respective country in which the owner/operating company operates.
- If applicable: Comply with the regulations on operation in a potentially explosive atmosphere.
- Wear personal protective equipment for all work on the pump unit.

- Use the pump unit only for the given pumped media.
- Adhere to the operating limits.
- Prevent dry running:
 - Make sure that the pump unit is only operated with pumped medium.
- Avoid cavitation:
 - Open suction valves completely and do not use them to control the delivery rate.
 - Clean the filter regularly.
- Completely open the outlet valve.
- Avoid motor damage:
 - Note the number of allowable motor activations per hour.
- Consult the manufacturer if the pump unit is to be operated outside the limits of the original specifications.
- In case of delivery of pumps without motor, its completion to a pump unit must be according to the provisions of the Machinery Directive 2006/42/EC.

2.4 Use in potentially explosive atmospheres



DANGER

Danger due to explosions!

Operating the pump unit in a potentially explosive atmosphere can cause explosions due to sparking.

- Consult the manufacturer regarding operation in a potentially explosive atmosphere.
- Additional measures must be taken for operation in a potentially explosive atmosphere.
- Only use appropriately protected drives.
- Always carry out repair work outside the Ex-zone.

The pumps and pump units are suitable for use in an explosion hazard area according to EC directive ATEX 2014/34/EU. However, this requires prior consultation with the manufacturer.



The ATEX release relates solely to the information on the area and condition of use given in the order.

The ATEX release expires if all data was not given completely in the order.

Changes of any kind (area of use, zone, operating data, etc.) must be agreed with the manufacturer.

2.5 General safety regulations



DANGER

Risk to life due to electricity!

Life-threatening situations can occur during work on live parts.

- Allow work on the electrics to be carried out by an electrically skilled person only.
- Make sure that the electrical supply is completely disconnected and secured against reconnection (lock-out).
- Plan the earthing and equipotential bonding carefully.
- Comply with the operating instructions of the electrical components.



WARNING

Risk of injury or poisoning due to dangerous pumped media!

When pumping dangerous media, leakages or residues on or in the pump unit can cause risks of injury or poisoning.

- During operation: Do not undo any closures or screws on or in the pump unit.
- Adhere to all maintenance intervals.
- Only use the pump unit within the operating data.
- Wear personal protective equipment for all work on the pump unit.
- Avoid sparking and naked flames.
- Avoid skin contact with the medium.
- Do not eat food in the workplace or in the place in which the pump unit is used.
- Instruct the personnel in handling hazardous substances.
- Collect leakages safely and remove and dispose of them in an environmentally compatible way.
- Provide collecting and removal equipment for leakages.
- Ensure free flow of the leakage.



WARNING

Risk of injury or material damage due to overpressure!

Overpressure in the pipe can cause dangerous situations and/or material damage.

- Adhere to the operating data. → [Appendix A 'Technical data' on page 69](#)
- If there is no pressure relief valve directly at the pump unit: Provide a suitable pressure relief valve in the pressure pipe.
- Comply with the operating instructions of the pressure relief valve manufacturer.
- Make sure that the factory setting of the pressure relief valve meets the requirements of the system.



CAUTION

Risk of injury due to hot surfaces!

The housing of the pump unit can heat up to higher temperatures than the medium to be pumped.

- Do not touch the pump unit during operation.
- Wear personal protective equipment for all work on the pump unit.
- Maintenance work may only be carried out if the pump unit is at a standstill and only by trained skilled personnel.
- In case of heated units: Switch off the heating and leave to cool.



CAUTION

Risk of injury due to rotating parts!

Work on rotating parts can lead to injuries.

- Wear personal protective equipment for all work on the unit.
- Maintenance work may only be carried out if the unit is at a standstill and only by trained skilled personnel.
- Always secure the drive motor against restarting before starting any maintenance work.
- Check the rotational direction of the drive only if the pump has been uncoupled.



NOTICE

Material damage due to solids or foreign materials in the pump unit!

Dirt, solids or foreign materials that could get into the pump unit can cause material damage.

- Flush all piping parts, fittings and valves before assembling. If the pipe network is flushed and cleaned with the pump unit during the initial commissioning, an additional commissioning filter must be installed temporarily, upstream of the pump unit on the system side.
- Make sure that gaskets do not protrude towards the inside.
- Remove any blank flanges, plugs, protective films and/or protective coatings on flanges.
- In case of welded pipes: remove weld beads.

2.6 Unauthorised changes



CAUTION

Danger due to unauthorised changes to the pump unit!

Improperly carried out structural changes to the pump unit can cause dangerous situations for the personnel or material damage to occur.

- The manufacturer's consent must be obtained before carrying out any modification work or making any changes to the unit.
- Only use original parts or parts approved by the manufacturer.



NOTICE

Warning of cancellation of the guarantee or warranty!

Unauthorised structural changes to the unit result in loss of the guarantee or warranty.

- The manufacturer's consent must be obtained before carrying out any modification work or making any changes to the unit.
- Only use original parts or parts approved by the manufacturer.

3 Transport, storage and installation

3.1 Transport



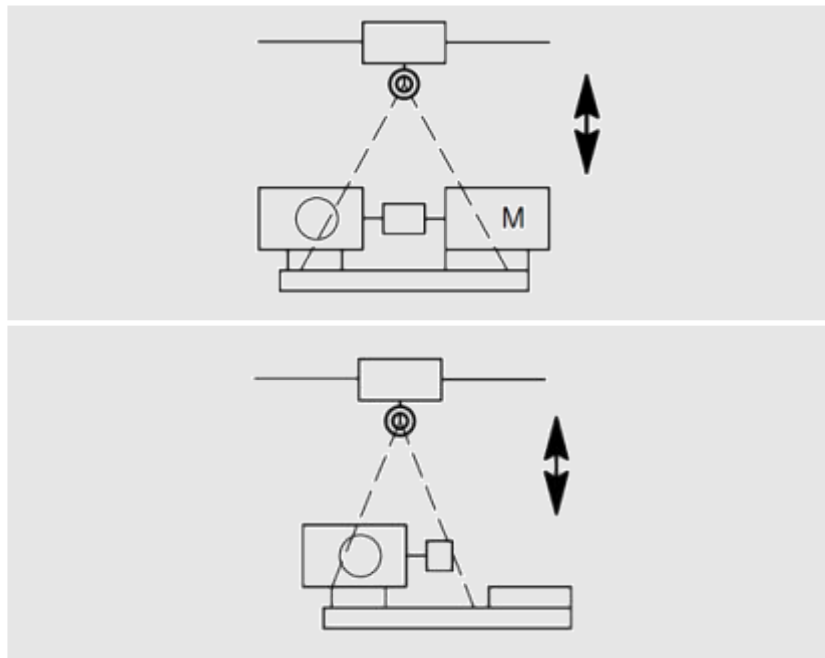
DANGER

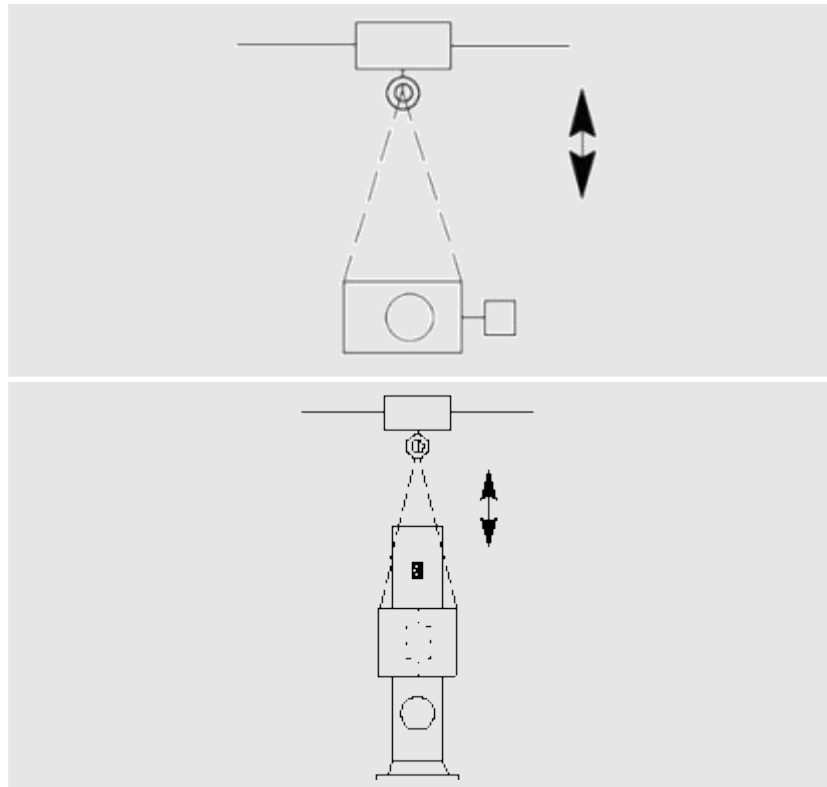
Danger due to falling or tilting transported items

Disregard of the total weight of the unit and the maximum load capacity of the lifting gear can cause the product to fall and can result in death or crushing injuries.

- Use suitable lifting gear from a total weight of max 20 kg.
- Do not stand under overhead loads.
- Select lifting gear appropriate for the total weight to be transported. → [Appendix A 'Technical data' on page 69](#)
- Select lashing points according to the centre of gravity and weight distribution.
- Use at least two load ropes.
- Do not fix the lifting gear to the eye of the motor (except to secure against overturning of units with high centre of gravity).

The hanging of a pump unit or pump on lifting gear is shown in the following.





3.2 Storage



NOTICE

Material damage due to noncompliance with the storage conditions!

Noncompliance with the storage conditions can result in material damage.

- Note and comply with the installation and storage conditions of the pump unit. → [Appendix A 'Technical data' on page 69](#)



The pump unit is preserved (waxed) in the factory.



It is not necessary to dewax rustproof material

How to store the pump unit

- If the pump unit is stored for longer than 6 months: The pump unit is preserved (waxed). → [Chapter 9.3 'Preserving the pump unit' on page 60](#)
- 1. → If the pump unit is stored for a longer time: Close the shut-off devices. → [Chapter 7.2 'Shutting down the pump unit for a longer period' on page 52](#)
- 2. → If the pump unit is stored for a longer time: Empty the pump unit. → [Chapter 7.3 'Emptying the pump unit' on page 53](#)
- 3. → Close off all openings with blind flanges, blind plugs or plastic covers.
- 4. → Make sure that the storage location meets the following conditions:
 - Dry
 - Rust-free
 - Vibration-free
 - Dust-free
- 5. → Turn the drive shaft once a month. At the same time, change the position of the shaft and the bearing.
- 6. → Check the pump unit for leakages.
- 7. → Check the preservative on the bright surfaces. → [Chapter 9.3 'Preserving the pump unit' on page 60](#)

3.3 Unpacking and checking the as-delivered condition



NOTICE

Material damage due to soiling of the pump unit!

Removing the packaging of the pump unit without using the pump can cause soiling and material damage.

- Do not remove the pump unit packaging until it is actually to be used.
- At all unsealed openings of the unit, such as the inspection hole of the bell housing, etc. watch out for small parts that may have falling in (nails, screws, wood chips, metal clamps, etc.) and remove them if necessary.
- All end covers, blank plugs and similar must also be removed.
- Note and comply with the installation and storage conditions of the pump unit. → [Appendix A 'Technical data' on page 69](#)

How to unpack the pump unit:

1. → Remove all shipping and packaging materials.
2. → Remove the pump unit from the packaging.

3. ▶ Check the following data against the enclosed documents:
 - Serial number
 - Type and size
 - Direction of rotation and operating mode
4. ▶ Check the pump unit for completeness and transport damage.
5. ▶ Report any defects or damage to the manufacturer, supplier or transport company.
6. ▶ Dispose of the packaging material according to the local regulations.

3.4 Installation



WARNING

Dangerous situations or material damage due to disregard of the total weight of the pump unit!

Disregard of the total weight of the unit as well as the maximum load capacity of the ground can cause dangerous situations or material damage.

- The fixing of the pump unit must be designed depending on its type and size.
- Use the fixing holes provided.
- The fixing must generally be chosen so that no movement or displacement of the unit is possible.
- All surfaces and foundations must ensure structurally faultless fixing.
- Vibrations caused by other machines or components must not act on the unit.
- Provide suitable vibration isolators if necessary.
- If the unit is fixed with the help of a tank plate: Make sure of adequate dimensioning and stiffening of the tank surface and supporting walls. It is advisable to fix with vibration isolators. This reduces the noise emission from the tank walls significantly.



NOTICE

Material damage due to disregard of the ambient conditions!

Noncompliance with the ambient conditions can cause material damage.

- Choose the installation location so that faultless operation and uncomplicated maintenance of the unit is possible.
- Make sure that all ambient influences that can have a negative effect on operation of the unit, e.g. high radiation temperatures of adjacent components, splash water, etc. are excluded.
- Additional operating measures such as insulation, vibration dampers, etc. must be planned
- Comply with all safety regulations regarding operation of the pump unit.
- Note and comply with the installation and storage conditions of the pump unit. → [Appendix A 'Technical data' on page 69](#)



When using foundations or fastenings: The respective manufacturer's information must be noted!

How to install the pump unit:

- The pump unit is freely accessible from all sides.
 - There is sufficient space available for the installation/dismantling of the pipes, as well as maintenance and overhaul work on the pump unit.
 - Action of external vibrations on the pump unit (bearing damage) is excluded
1. → Place the product on a clean, stable, level surface. Note the information on the total weight, as well as the ambient conditions. → [Appendix A 'Technical data' on page 69](#)
 2. → Before tightening the screws: Level out all unevenness if applicable.
 3. → Check the unit for stability and strain.

4 Description

4.1 Components overview

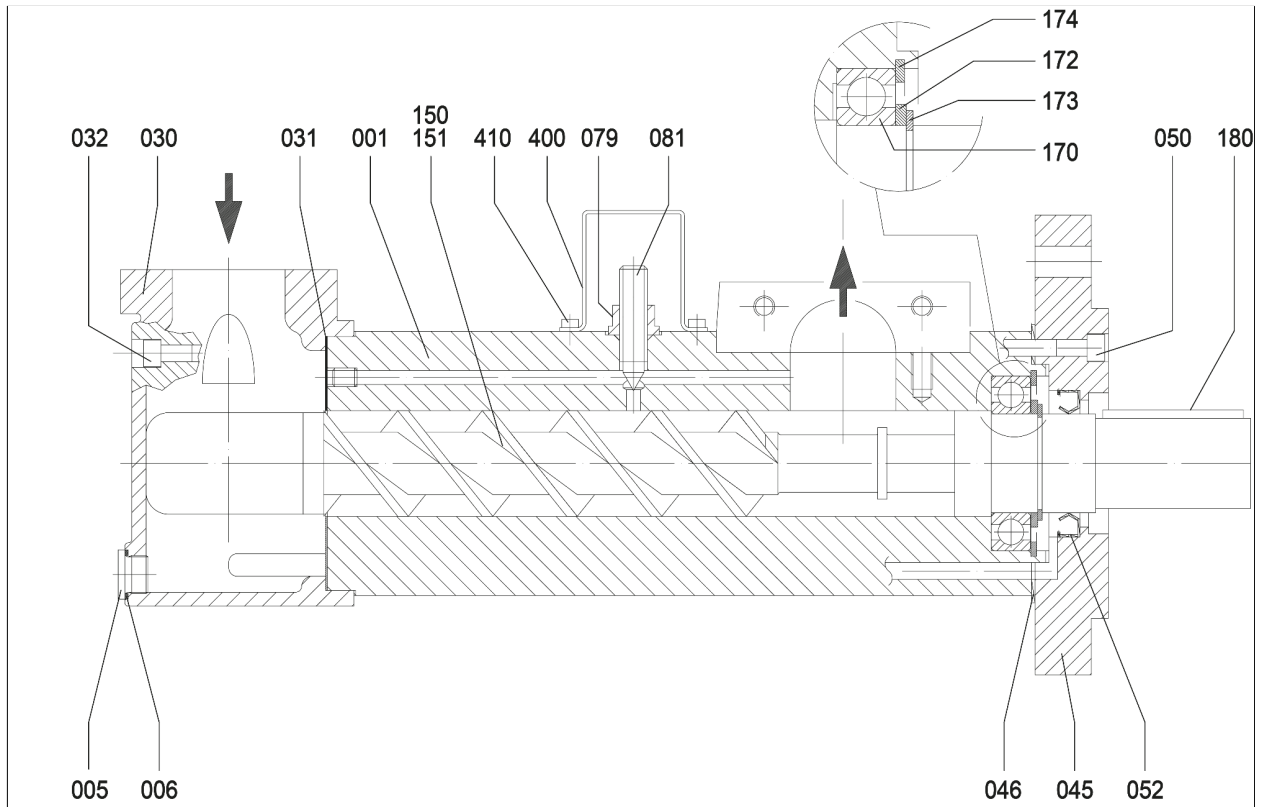


Fig. 1: Component overview L3MF IFOKSO-W (example figure)

001 Pump casing	081 Adjusting screw
005 Plug	150 Driving spindle
006 Sealing ring	151 Idler spindle
030 Suction casing	170 Bearing
031 Gasket	172 Support washer
032 Cap screw	173 Circlip (shaft)
045 Cover, drive side	174 Circlip (bore)
046 Gasket	180 Parallel key
050 Cap screw	400 Hoop guard
052 Shaft seal ring	410 Cap screw
079 Seal lock nut	

Description

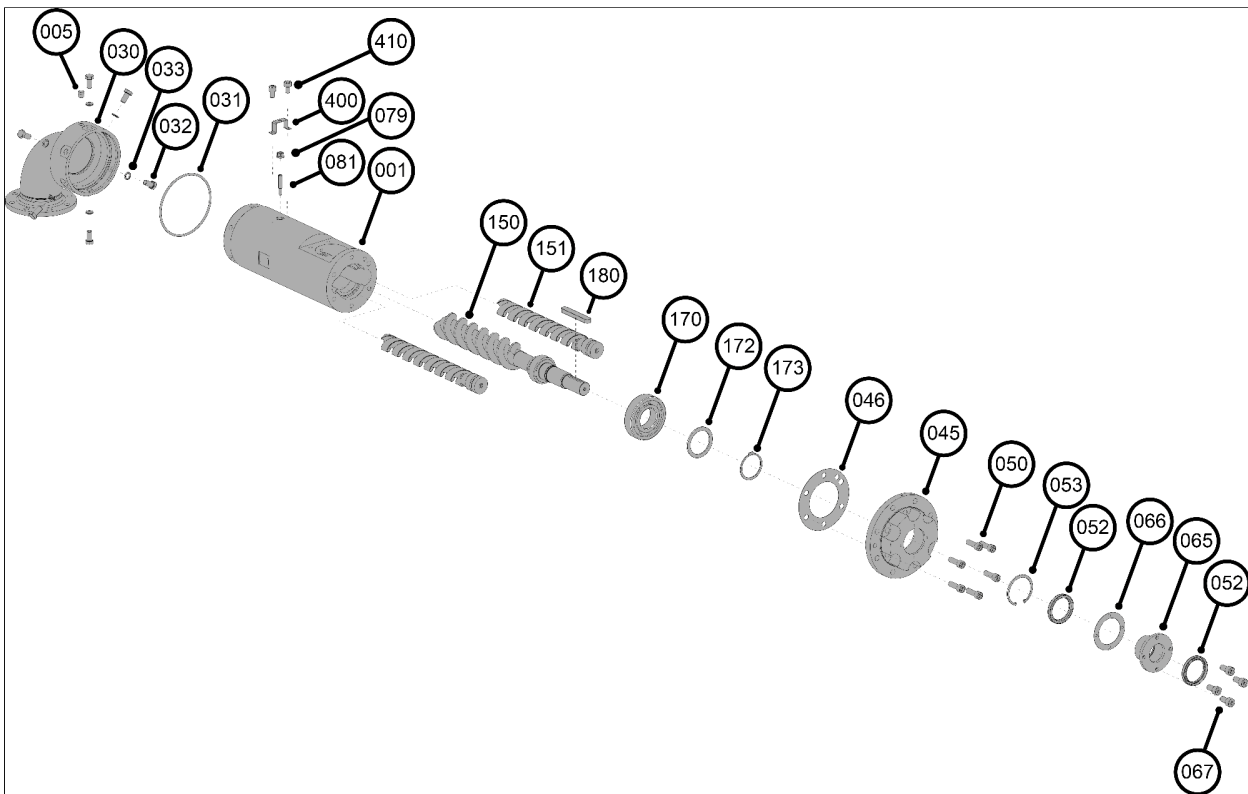


Fig. 2: Component overview L3MF IFOKSO-W (example figure)

- | | |
|------------------------|---------------------|
| 001 Pump casing | 066 Gasket |
| 005 Plug | 067 Cap screw |
| 030 Flange adapter | 079 Seal lock nut |
| 031 O-ring | 081 Set screw |
| 032 Hexagon head screw | 150 Driving spindle |
| 033 Washer | 151 Idler spindle |
| 045 Cover, drive side | 170 Bearing |
| 046 Gasket | 172 Support washer |
| 050 Cap screw | 173 Circlip |
| 052 Shaft seal ring | 180 Parallel key |
| 053 Circlip | 400 Hoop guard |
| 065 End cover | 410 Cap screw |

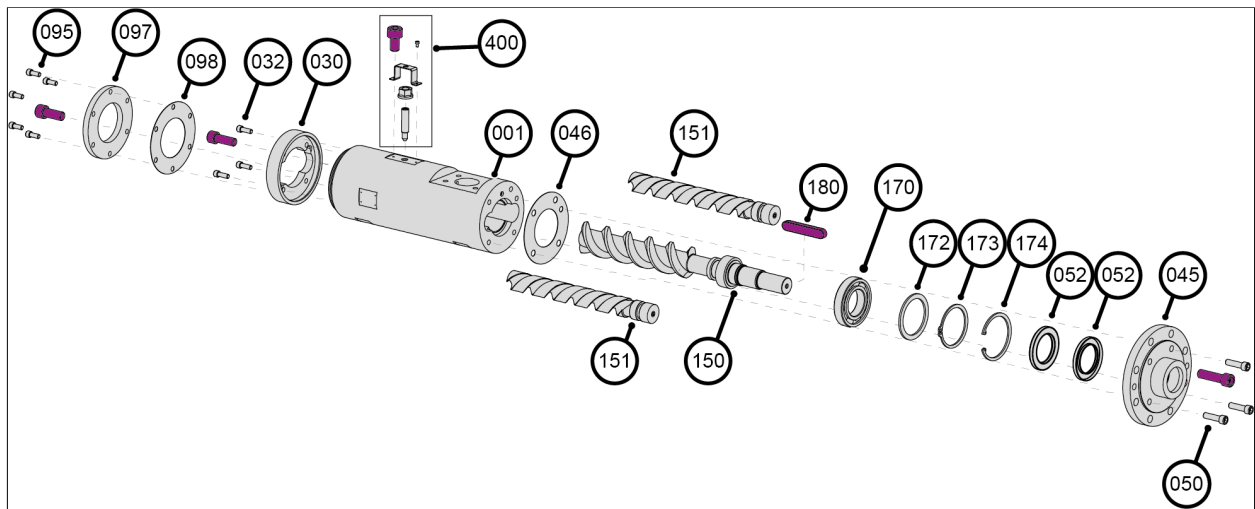


Fig. 3: Component overview - L3MF, L3HF IFOKSO-W / VFOKSO-W (example figure)

- | | |
|-----------------------|--------------------------------|
| 001 Pump casing | 098 Gasket |
| 030 Cover | 150 Driving spindle |
| 032 Cap screw | 151 Idler spindle |
| 045 Cover | 170 Bearing |
| 046 Gasket | 172 Support washer |
| 050 Cap screw | 173 Circlip (shaft) |
| 052 Radial shaft seal | 174 Circlip (bore) |
| 095 Cap screw | 180 Parallel key |
| 097 Ring | 400 Adjusting screw (aeration) |

Description

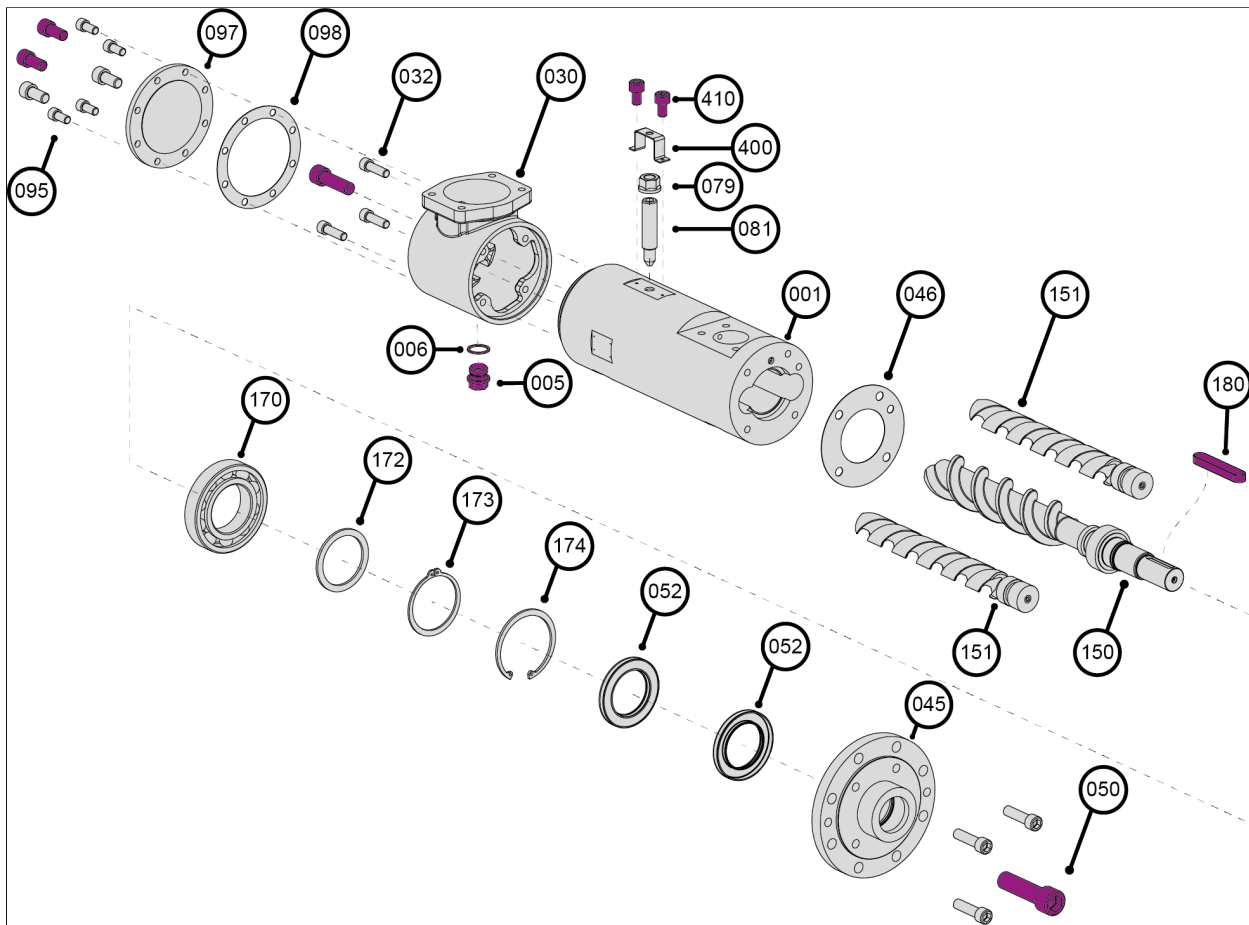


Fig. 4: Component overview L3MF IFOKSO-W (example figure)

001 Pump casing	097 Cover (non-drive side)
005 Plug	098 Gasket
006 Sealing ring	150 Driving spindle
030 Suction casing	151 Idler spindle
032 Cap screw	170 Bearing
045 Cover	172 Support washer
046 Gasket	173 Circlip (shaft)
050 Cap screw	174 Circlip (bore)
079 Seal lock nut	180 Parallel key
081 Set screw	400 Hoop guard
095 Cap screw	410 Cap screw

4.2 Nameplate



The pump units are fitted with different name plates depending on the pump types, size and requirements. The information they contain can therefore vary.

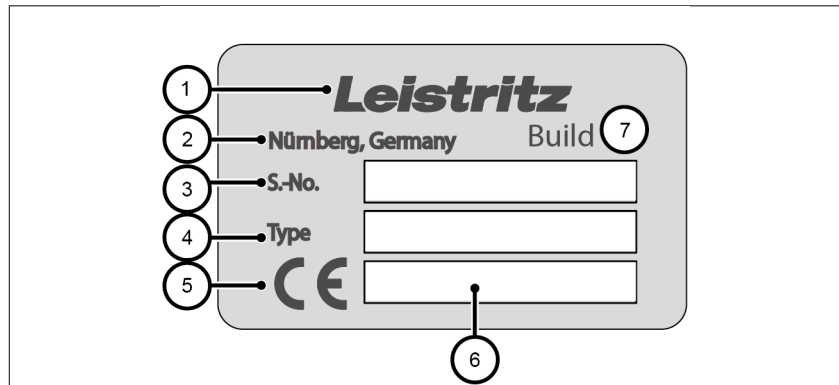


Fig. 5: Contents of the nameplate (standard)

- 1 Name of the manufacturer
- 2 Registered office of the manufacturer
- 3 Serial number
- 4 Product type
- 5 CE marking
- 6 Type
- 7 Year of manufacture

4.3 General information on the pump unit

Leistritz pumps are self-priming screw pumps. The pumping is produced by spindles, which are operated in a joint pump housing or a casing insert with small internal running clearance. The meshing spindle profiles form the pump chambers with the enclosing pump housing, which carry the pumped medium in the axial direction from the suction connection to the pressure connection of the pump unit.

The double-thread driving spindle rotates intermeshing (without surface contact of the metals) with the two double-thread idler spindles in the spindle bore of the pump body, which encloses the spindle package with tight clearance.

The two idler spindles are driven hydraulically by appropriate dimensioning.

Only the torque resulting from liquid friction is transferred via the flanks of the spindle profiles. The spindle package is therefore virtually load-free and is not subject to wear. Based on this principle, the pumps pump continuously without crushing and turbulence from the suction side to the discharge side.

This design and action ensures a low noise level and virtually pulsation-free pumping. The entire spindle geometry is chosen so that no axial shear is exerted on the rolling bearing.

Depending on the delivery pressure, a corresponding throttle gap sets in between the balance piston of the driving spindle and the idler spindles, which ensures the hydrodynamic bearing of the idler spindles. The following sealing space is connected to the suction-side pump chamber by means of a hole and is therefore always subject to suction pressure.

This geometric design of the spindle package ensures equalisation of the axial shear.

Description

Main areas of use

The main areas of use of the pump unit include, for example, the following sectors:

- General industrial engineering
- Oil-firing, energy, shipping and offshore technology
- Mechanical engineering and heavy machinery construction
- Tank depots
- Chemical and petrochemical industry
- Processing industry
- Food industry

4.4 Radial shaft seal



Shaft seals of different types, designs and materials (with or without additional supply systems) are available as a special version.

Appropriate shaft sealing rings are used for suction and inlet pressures up to a maximum of 0.5 bar, provided the composition of the pumped medium does not require other materials. This standard seal consists of at least two shaft sealing rings with a grease fill between them and whose sealing lips face each other.

Operating temperatures	Materials of the shaft seal rings
up to 100°C	Perbunan
100°C to 160°C	Viton
160°C to 200°C	Teflon

In case of special use conditions or operating conditions, it may be necessary to arrange the shaft sealing rings differently, possibly with support rings. The shaft sealing rings are lubricated in the factory with a grease fill. The sealing rings are therefore maintenance free.

4.5 Aeration

The pump is equipped with an aeration device with adjustable flow. This ensures smoother running of the pump during operation. The noise damping is set using the adjustment screws.

The design configuration is shown in the following by way of example:

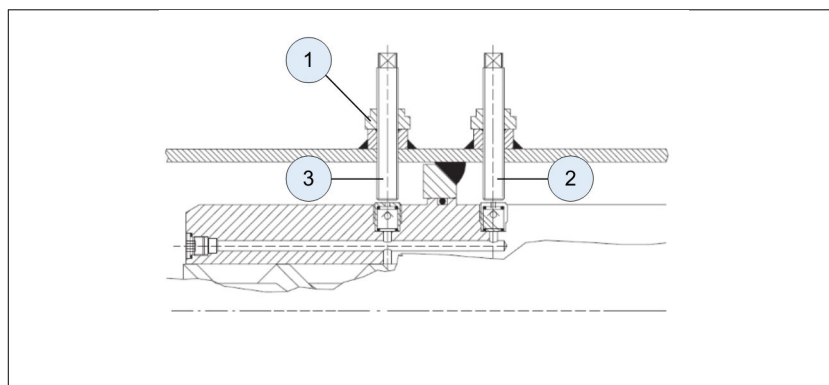


Fig. 6: Aeration settings

4.6 Bearing

Depending on the application, pump units can be equipped with an inner or outer bearing. → [Appendix A 'Technical data' on page 69](#)

Bearings that lie within the pumped medium are maintenance-free.

5 Commissioning



DANGER

Hazard due to independent rotating of the pump!

If a differential pressure exists, the spindles can rotate independently.

- Before carrying out any work on the pump unit, shut-off the inlet and pressure pipe.
- Wear personal protective equipment for all work on the pump unit.



NOTICE

Risk of injury or material damage due to improper assembly!

Improper assembly can cause dangerous situations or material damage to occur.

- Only allow trained skilled personnel to work on the pump unit.
- Do not exceed the use limit of the pump unit.
→ [Appendix A 'Technical data' on page 69](#)
- Adhere to the tightening torques for fixing elements (screws, bolts, nuts, etc.). → [Appendix A 'Technical data' on page 69](#)

5.1 Preparation tasks

5.1.1 Designing supports and flange connections



NOTICE

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

High torques and extreme conditions can cause material damage to the pump unit.

- The pump unit must not be used as a fixing point for the pipe.
- Do not exceed the allowable values for the respective materials (e.g. flange loads to EN ISO 14847; API 676 or the installation drawing / dimensioned sheet).
- Calculate pipe forces and comply with all operating states.
 - cold/hot
 - empty/filled
 - unpressurised/pressurised
 - Flange position changes
- Make sure that pipe supports are permanently lubricated and do not seize up with rust.
- Unused connections for draining, venting or heating must be closed off properly before commissioning.

5.1.2 Determining the nominal sizes



Keep the flow resistance in pipes as low as possible.

The nominal sizes of the pressure and suction pipes should at least be equal to those of the pump connections. They must be selected according to the flow velocities that exist.

When laying the suction and pressure pipe, pay particular attention to ensuring that the flow of the pumped medium is not hindered by the installation of tight bends, angle pattern valves, swing check valves or non-return valves in the suction pipe.

Unavoidable cross-section changes in the pumping routes must be made with gentle transitions and sudden changes in direction must be avoided.

The suction and pressure pipes must be absolutely leaktight and laid so that air pockets cannot form. The pipes must therefore always be rising.

Arrange the sliding spindles of shut-off valves either horizontally or vertically downwards and design the pressure pipes to be ventable at the highest point.

The flange seals must not protrude into the pipe inner diameter.

5.1.3 Planning the tank

When installing the tank, make sure that air bubbles and foam carpets that have formed in the medium are separated out of the pumped medium and are not sucked back in by the pump.

The tank must be dimensioned and installed so that the maximum allowable pumped or medium temperature is not exceeded. Suitable measures for this must be taken on site.

5.1.4 Removing leakages



WARNING

Risk of injury or poisoning due to dangerous pumped media!

When pumping dangerous media, leakages or residues on or in the pump unit can cause risks of injury or poisoning.

- During operation: Do not undo any closures or screws on or in the pump unit.
- Adhere to all maintenance intervals.
- Only use the pump unit within the operating data.
- Wear personal protective equipment for all work on the pump unit.
- Avoid sparking and naked flames.
- Avoid skin contact with the medium.
- Do not eat food in the workplace or in the place in which the pump unit is used.
- Instruct the personnel in handling hazardous substances.
- Collect leakages safely and remove and dispose of them in an environmentally compatible way.
- Provide collecting and removal equipment for leakages.
- Ensure free flow of the leakage.

5.1.5 Avoid overpressure



WARNING

Risk of injury or material damage due to overpressure!

Overpressure in the pipe can cause dangerous situations and/or material damage.

- Adhere to the operating data. → [Appendix A 'Technical data' on page 69](#)
- If there is no pressure relief valve directly at the pump unit: Provide a suitable pressure relief valve in the pressure pipe.
- Comply with the operating instructions of the pressure relief valve manufacturer.
- Make sure that the factory setting of the pressure relief valve meets the requirements of the system.

5.1.6 Avoid dirt

How to avoid dirt in the pump unit:

The life of the screw pump primarily depends on the degree of purity of the pumped medium.

1. → Clean all pipes, gate valves and valves thoroughly before installing the pump.
2. → Insert an inlet strainer into the suction pipe. → [Appendix B 'Recommended filter mesh sizes' on page 71](#)
3. → Insert a fine filter if necessary.

Choose filter fineness depending on the type, degree of soiling and delivery pressure. → [Appendix B 'Recommended filter mesh sizes' on page 71](#)

5.1.7 Avoid return flow of the medium

To avoid backflow of the medium, a swing check valve / a non-return valve must be installed between the pressure socket and shut-off valve.

5.1.8 Enable disconnection and shutting-off of the pipes

For maintenance and upkeep work: Provide shut-off devices in the suction and pressure pipe.

5.1.9 Provide devices for measurement of the operating states

The following measures should be taken to ensure safe operation of the unit:

- Provide pressure gauges in the suction and pressure pipe.
- Provide temperature measurement on suction side.

5.2 Dewaxing/preservative removal



NOTICE

Material damage due to the use of pressure cleaners!

Use of pressure cleaners to clean or remove the preservative (dewax) the unit can cause material damage.

- Do not use pressure cleaners to clean or remove the preservative from (dewax) the unit.
- Only use cleaning agents recommended by the manufacturer. → [Appendix A 'Technical data' on page 69](#)

If the unit's pipes, tanks and other parts in the diverse circuits are wetted with the preservative containing paraffin, the whole unit must be dewaxed, as paraffin reduces the air separating capacity of the media. Under certain circumstances, this can cause irregular running of the pump, combined with loud noise development (aeration).

The preservative used for interior preservation can normally be removed by flushing the pump with the pumped medium, provided this does not damage the medium. A suitable solvent can also be used to remove the inner and outer preservative. → [Appendix A 'Technical data' on page 69](#)



It is not necessary to dewax rustproof material

How to remove the pump unit preservative:

1. → If the system is to be flushed with the pump unit: Make sure that the pump is filled with the pumped medium. → [Chapter 5.8 'Fill the pump unit with medium' on page 41](#)
2. → Clean all bright, unpainted surfaces (e.g. shaft ends, flanges, etc.). Use the substances recommended by the manufacturer. → [Appendix A 'Technical data' on page 69](#)
3. → Dispose of the cleaning agents according to the local regulations.

5.3 Setting the pressure relief valve



NOTICE

Danger or material damage due non-intended use of pressure relief valves!

Improper use of pressure relief valves (e.g. to control the discharge rate) can cause dangerous situations or material damage.

- Comply with the operating instructions for the pressure relief valve.
- Make sure that the adjusting screw is not screwed tight and the valve cone remains movable in its axis.
- Make sure that the factory setting of the pressure relief valve meets the requirements of the system. [↔ Appendix A 'Technical data' on page 69](#)
- Do not use the pressure relief valve to control the discharge rate.
- Comply with the rules and regulations on operating safety valves.

How to test the pressure relief valve:

- 1.** Make sure that the system-side pressure relief valve meets the requirements of the pump unit. [↔ Appendix A 'Technical data' on page 69](#)
- 2.** Close the outlet valve slowly and monitor the discharge side pressure gauge.
 - ➔ The pressure in the pressure pipe increases.
- 3.** Check whether the pressure relief valve opens at the set pressure.
 - ➔ The system-side pressure gauge constantly displays the maximum limit pressure.
 - ➔ The maximum set pressure must not be exceeded.
- 4.** Make sure that the setting of the limit pressure for the valve does not exceed the setpoint pressure value (+ 10 %) (except for pump types L3NL and L3NX). [↔ Appendix A 'Technical data' on page 69](#)
- 5.** Open the outlet valve again.

5.4 Checking the rotational direction of the drive motor



Pumps with a drive motor are checked and optimally set in the factory.

How to check the rotational direction of the drive motor:

Before assembling the pump or before coupling the pump on the drive motor the rotational direction of the drive motor must be checked in the uncoupled state.

1. → Switch on the drive motor and then immediately switch it off again.
2. → Check whether the rotational direction of the drive motor corresponds to the rotational direction arrow on the pump housing or the information in the technical data. → [Appendix A 'Technical data' on page 69](#)
3. → If the rotational direction is wrong: Change the polarity of the drive motor so that it corresponds to the circuit diagram.
4. → Check the rotational direction of the drive motor.

5.5 Aligning the coupling



CAUTION

Risk of injury due to rotating parts!

Work on rotating parts can lead to injuries.

- Wear personal protective equipment for all work on the unit.
- Maintenance work may only be carried out if the unit is at a standstill and only by trained skilled personnel.
- Always secure the drive motor against restarting before starting any maintenance work.
- Check the rotational direction of the drive only if the pump has been uncoupled.



NOTICE

Material damage due to improper alignment of the coupling!

Improper alignment of the coupling can cause material damage.

- In case of vertical, lateral or angular offset: Align the motor exactly with the pump.
- Read and follow the manufacturer's information carefully.



Pumps with a drive motor are optimally aligned with the drive motor in the factory. Nonetheless, the alignment of the coupling should be checked before assembling or commissioning.



For optimum and precise results when aligning the coupling, we recommend using a cross-line laser.

Tolerances for alignment of the coupling

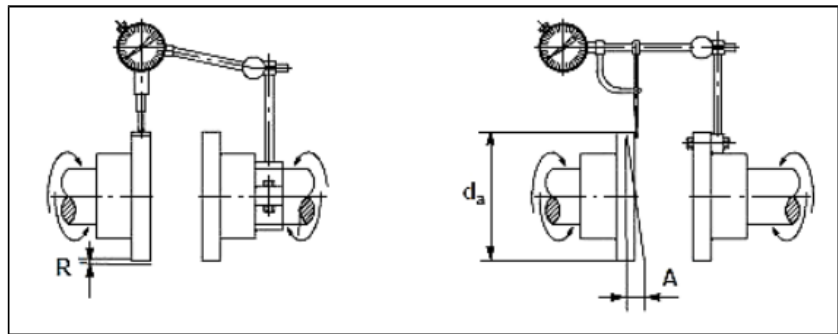


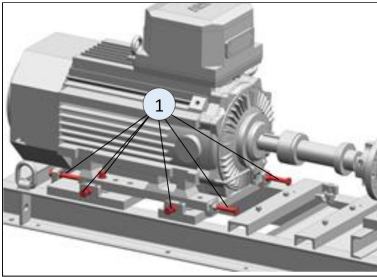
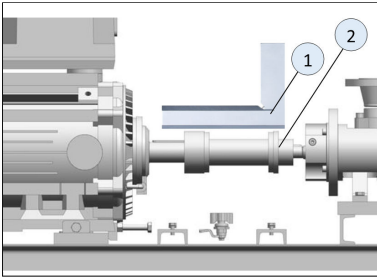
Fig. 7: Tolerances for alignment of the coupling

Tab. 1: Limit values for alignment of the shaft coupling

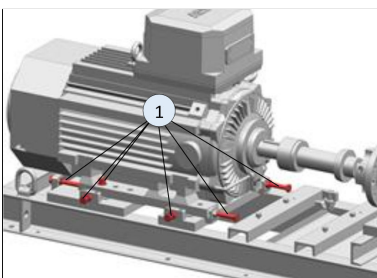
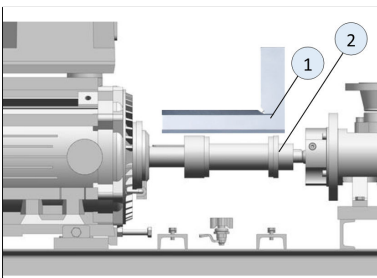
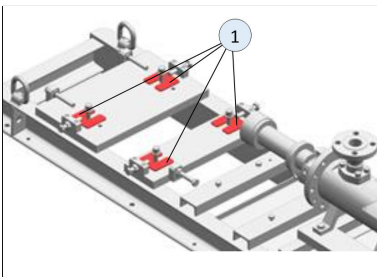
Ø coupling up to d_a [mm]	Speed $n \leq 1500$ 1/min		Speed $n \leq 3600$ 1/min	
	R_{max} [mm]	A_{max} [mm]	R_{max} [mm]	A_{max} [mm]
30	0.06	0.06	0.04	0.04
40	0.07	0.07	0.05	0.05
50	0.08	0.08	0.05	0.05
65	0.09	0.09	0.06	0.06
80	0.10	0.10	0.07	0.07
100	0.12	0.12	0.08	0.08
120	0.14	0.14	0.09	0.09
140	0.16	0.16	0.10	0.10
160	0.17	0.17	0.11	0.11
180	0.19	0.19	0.12	0.12
200	0.21	0.21	0.13	0.13
225	0.23	0.23	0.15	0.15
250	0.25	0.25	0.16	0.16

How to align the coupling:

- The pump is fixed.



How to align the drive motor with sets of shims:



1. → Check the radial displacement (ΔKr) of the coupling (Item 2) with straight edge (Item 1) and feeler gauge. Check several points on the circumference of the coupling.
2. → Check the angle displacement (ΔKw) of the coupling with a straight edge.
3. → Check the axial displacement ΔKa of the coupling with a vernier calliper and feeler gauge.
4. → If the limit values of the table above are exceeded: Undo the fixing of the pump or motor (Item 1) and move the pump or motor to correct the respective offset.



If the pump unit is operated at high temperatures, the temperature difference must be taken into account during the alignment process.

1. → Align the drive motor so that the coupling shafts are in exact alignment.
2. → If necessary: Place the shims (Item 1) under the motor.
3. → Check the alignment of the coupling (Item 2) with a straight edge (Item 1).
4. → If a vertical offset persists: Repeat the aligning procedure.
5. → Fix the screws of the drive motor (Item 1).



CAUTION

Risk of injury due to hot surfaces!

The housing of the pump unit can heat up to higher temperatures than the medium to be pumped.

- Do not touch the pump unit during operation.
- Wear personal protective equipment for all work on the pump unit.
- Maintenance work may only be carried out if the pump unit is at a standstill and only by trained skilled personnel.
- In case of heated units: Switch off the heating and leave to cool.

6. ▶ If the pump unit is operated at high temperatures: Check the alignment of the pump unit after reaching the operating temperature.

5.6 Connecting the pump unit



WARNING

Risk of injury or poisoning due to dangerous pumped media!

When pumping dangerous media, leakages or residues on or in the pump unit can cause risks of injury or poisoning.

- During operation: Do not undo any closures or screws on or in the pump unit.
- Adhere to all maintenance intervals.
- Only use the pump unit within the operating data.
- Wear personal protective equipment for all work on the pump unit.
- Avoid sparking and naked flames.
- Avoid skin contact with the medium.
- Do not eat food in the workplace or in the place in which the pump unit is used.
- Instruct the personnel in handling hazardous substances.
- Collect leakages safely and remove and dispose of them in an environmentally compatible way.
- Provide collecting and removal equipment for leakages.
- Ensure free flow of the leakage.



WARNING

Risk of material damage or dangerous situations caused by incorrect arrangement of the drive motor

Arranging the drive motor below the pump can cause dangerous situations or material damage, as the pumped medium could get into the motor and can cause a dangerous situation (e.g. short-circuit) or material damage.

- Never position the drive motor below the pump.
- Install the drive motor or the pump so that penetration of leakages into the drive motor is excluded.



NOTICE

Material damage due to solids or foreign materials in the pump unit!

Dirt, solids or foreign materials that could get into the pump unit can cause material damage.

- Flush all piping parts, fittings and valves before assembling. If the pipe network is flushed and cleaned with the pump unit during the initial commissioning, an additional commissioning filter must be installed temporarily, upstream of the pump unit on the system side.
- Make sure that gaskets do not protrude towards the inside.
- Remove any blank flanges, plugs, protective films and/or protective coatings on flanges.
- In case of welded pipes: remove weld beads.

How to connect the pump unit:

1. → Install the coupling.
2. → Check the alignment of the coupling.
3. → Connect the drive motor.
4. → Install the suction pipes.
5. → Install the pressure pipes.

5.7 Installing the coupling guard



A suitable coupling guard can be provided by the manufacturer.

How to install the coupling guard

1. → Insert the coupling guard.
2. → Fix the coupling guard with the corresponding screws.

5.8 Fill the pump unit with medium

To avoid damage to the pump unit due to friction, before it is switched on, the pump unit must be filled with medium to ensure lubrication of the rotating parts.

The following media can be used for filling:

- Pumped liquid (lubricating)
- Lubricating oil or a lubricating liquid that is compatible with the pumped liquid



The fill quantity varies depending on the type and size of the pump unit.

How to fill the pump unit with medium:

- Fill the pump unit with medium or lubricant via the pressure connection or via a filling connection on the system side.

5.9 Connect the heating



Refer to the manufacturer of the heating module's operating instructions for details of the wiring and control unit.

How to connect the heating to the pump unit:

1. → Open the inlet and outlet (Item 1)
2. → If the pump is heated with heat transfer oil: Close the inlet of the heat transfer oil at the bottom connection.
If the pumps are heated with steam: Close the inlet at the top connection.
3. → Close the heat transfer medium's outlet at position 1.
4. → Check the connections for leaks

5.10 Electrical connection (for pumps with an electrical drive)



DANGER

Risk to life due to electricity!

Life-threatening situations can occur during work on live parts.

- Allow work on the electrics to be carried out by an electrically skilled person only.
- Make sure that the electrical supply is completely disconnected and secured against reconnection (lock-out).
- Plan the earthing and equipotential bonding carefully.
- Comply with the operating instructions of the electrical components.



The drive manufacturer's information must be noted

How to connect the drive motor:

- All safety devices (e.g. an emergency stop switch) are installed
1. ➔ Connect the drive motor to the mains as shown on the circuit diagram. ➔ [Appendix A 'Technical data' on page 69](#), and refer to the documentation of the drive motor manufacturer.
 2. ➔ Make sure that no electrical hazards occur.
 3. ➔ Make sure that the rotational direction of the drive motor corresponds to the information in the technical data. ➔ [Appendix A 'Technical data' on page 69](#)

5.11 Venting the pump unit



WARNING

Risk of injury or poisoning due to dangerous pumped media!

When pumping dangerous media, leakages or residues on or in the pump unit can cause risks of injury or poisoning.

- During operation: Do not undo any closures or screws on or in the pump unit.
- Adhere to all maintenance intervals.
- Only use the pump unit within the operating data.
- Wear personal protective equipment for all work on the pump unit.
- Avoid sparking and naked flames.
- Avoid skin contact with the medium.
- Do not eat food in the workplace or in the place in which the pump unit is used.
- Instruct the personnel in handling hazardous substances.
- Collect leakages safely and remove and dispose of them in an environmentally compatible way.
- Provide collecting and removal equipment for leakages.
- Ensure free flow of the leakage.

To avoid damage to the pump unit due to cavitation, the pump unit must be vented if necessary.

How to vent the pump unit:

- A collection container is provided for discharged pumped medium.
1. ▶ Open the venting element (valve, screw plug, etc.) at the highest point of the pressure pipe until pumped medium discharges from the venting opening.
 2. ▶ Re-close the venting element.
 3. ▶ Dispose of any leaked medium according to the local regulations.

5.12 Recommissioning the pump unit



If the pump unit was only switched off for a short time, preparations are not necessary before switching it on again.

How to recommission the pump unit:

- The pump unit has been taken out of service for a lengthy time.
1. ▶ If necessary: Change all elastomer seals (O-rings, gaskets, etc.) → [Chapter 4.1 'Components overview' on page 23](#)

- 2.** → If necessary: change the shaft seal rings.
- 3.** → If necessary: Change bearing.
- 4.** → Carry out the initial start-up steps.

6 Operation



WARNING

Risk of injury or poisoning due to dangerous pumped media!

When pumping dangerous media, leakages or residues on or in the pump unit can cause risks of injury or poisoning.

- During operation: Do not undo any closures or screws on or in the pump unit.
- Adhere to all maintenance intervals.
- Only use the pump unit within the operating data.
- Wear personal protective equipment for all work on the pump unit.
- Avoid sparking and naked flames.
- Avoid skin contact with the medium.
- Do not eat food in the workplace or in the place in which the pump unit is used.
- Instruct the personnel in handling hazardous substances.
- Collect leakages safely and remove and dispose of them in an environmentally compatible way.
- Provide collecting and removal equipment for leakages.
- Ensure free flow of the leakage.



WARNING

Risk of injury or material damage due to overpressure!

Overpressure in the pipe can cause dangerous situations and/or material damage.

- Adhere to the operating data. → [Appendix A 'Technical data' on page 69](#)
- If there is no pressure relief valve directly at the pump unit: Provide a suitable pressure relief valve in the pressure pipe.
- Comply with the operating instructions of the pressure relief valve manufacturer.
- Make sure that the factory setting of the pressure relief valve meets the requirements of the system.



CAUTION

Risk of injury due to hot surfaces!

The housing of the pump unit can heat up to higher temperatures than the medium to be pumped.

- Do not touch the pump unit during operation.
- Wear personal protective equipment for all work on the pump unit.
- Maintenance work may only be carried out if the pump unit is at a standstill and only by trained skilled personnel.
- In case of heated units: Switch off the heating and leave to cool.



NOTICE

Material damage due to cavitation or pressureless operation!

Throttling the suction flow or pressureless operation of the pump unit can cause material damage.

- Adhere to the operating data. → [Appendix A 'Technical data' on page 69](#)
- Open inlet valves completely and do not use them to control the delivery rate.
- Check the pressure before switching on the pump unit.
- The pump unit must never be operated without pressure.
- The differential pressure must be at least 1 - 1,5 bar.



NOTICE

Material damage due to dry running of the pump unit!

Operation of the pump unit in dry running can cause material damage.

- Before operation: Fill the pump unit with medium. → [Chapter 5.8 'Fill the pump unit with medium' on page 41](#)

6.1 Starting the pump unit



NOTICE

Material damage due to operation in short-circuit!

Operation of the pump unit in short-circuit can cause material damage.

- Check whether the pump unit is running in short-circuit mode.
- The pump unit must be switched off immediately and the cause of the error removed. → [Chapter 6.6 'Switching off the pump unit' on page 49](#) → [Chapter 8 'Troubleshooting' on page 54](#)

How to start the pump unit:

- All joints and connections are tight.
- 1.** ▶ Open the outlet valve.
- 2.** ▶ Open the inlet valve.
- 3.** ▶ Check the coupling alignment. → [Chapter 5.5 'Aligning the coupling' on page 36](#)
- 4.** ▶ Switch on the drive motor.
 - ➡ The pump unit pumps when the pressure on the discharge side of the pump unit increases or a system-side flow monitor responds.
 - ➡ If the pump unit does not pump after 10-15 seconds of operation: Cancel the commissioning. Remove the cause of the fault and only then continue with the commissioning. → [Chapter 8 'Troubleshooting' on page 54](#)
- 5.** ▶ Check the drive motor for smooth running.
- 6.** ▶ Make sure that the temperature increases at a maximum rate of 2 K/min, and that the maximum allowable temperature is not exceeded. → [Appendix A 'Technical data' on page 69](#)
- 7.** ▶ After the first stresses due to pressure and operating temperature, check whether the pump unit is leaktight.
- 8.** ▶ Check the pump unit for excessive vibrations: The vibration level must not exceed 4.5 mm/s (rms) continuously (for standard application) or 7.1 mm/s (rms) during the transition states.
- 9.** ▶ To completely vent the pipe network: Operate the pump unit for several minutes.
 - ➡ The pipe network is completely vented when the operating noise of the pump unit becomes uniform and more fluctuations can be observed at a pressure gauge attached on the discharge side.
- 10.** ▶ Test the function of the overflow valve. → [Further information on page 48](#)
- 11.** ▶ Make sure that the differential pressure is at least 1 - 1,5 bar.

6.2 Checking operation

How to check the pump unit during operation:

1. → Make sure that the differential pressure is at least 1 - 1,5 bar.
2. → Check the pump unit for excessing power consumption, vibrations, increased temperature and leakages. → [Further information on page 61](#)
 - The vibration level must not exceed 4.5 mm/s (rms) continuously or 7.1 mm/s (rms) during the transition states (guide values).
 - The sound pressure level must not exceed the values in the "Technical data" chapter. → [Appendix A 'Technical data' on page 69](#)
3. → Check the shaft seal for leakages.
4. → Carry out a visual inspection of the pump unit at least once a month. → ['How to visually inspect the pump unit:' on page 61](#)
5. → Check the operating data (total delivery pressure, delivery rate, viscosity, temperature, speed, power consumption, etc.). → [Appendix A 'Technical data' on page 69](#)
6. → Check the set valve pressure. → [Chapter 9.9 'Test the pressure relief valve' on page 62](#)

6.3 Check the suction-side pressure

How to test the suction-side pressure:

- Use the pressure sensor installed in the system to check the suction side pressure. Note the information in the Technical data. → [Appendix A 'Technical data' on page 69](#)

6.4 Test the overflow valve

How to check the overflow valve:

- Check the system pressure using the overflow valve installed in the system. Note the information in the Technical data. → [Appendix A 'Technical data' on page 69](#)

6.5 Setting the aeration

The damping of the noises can be set via the adjustable aeration if necessary.

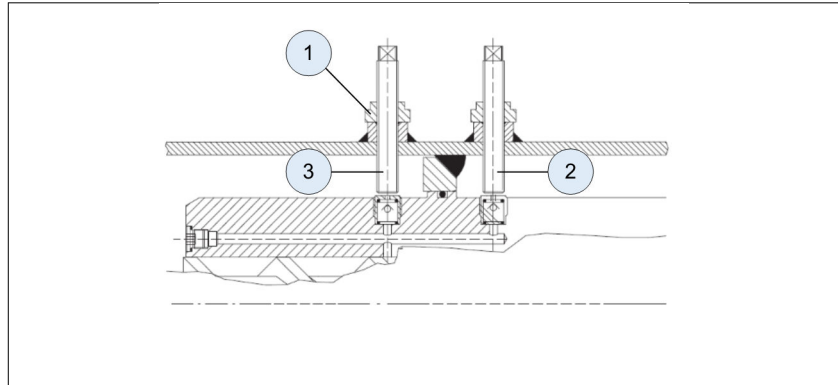


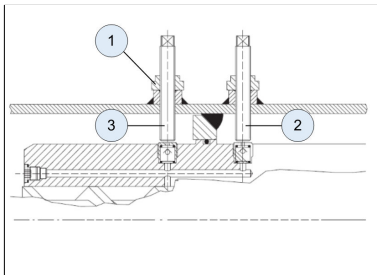
Fig. 8: Adjustable aeration

- 1 Lock nut
- 2 Adjustment screw
- 3 Adjustment screw

If the pump unit is operated in the opposite direction of rotation the aeration setting is made with the screw (Item 1).

If the pump unit is operated in the main direction of rotation the setting is made with the screw (Item 2).

How to set the aeration:



1. ➤ Loosen the lock nut (Item 1).
2. ➤ Turn the screw (Item 1 or Item 2) clockwise until it stops.
 - The hole is closed.



CAUTION

Risk of poisoning or contamination due to escaped pumped medium!

The aeration screws can be completely unscrewed. This can cause the pumped medium to escape and cause poisoning or contamination.

- Unscrew the aeration screws by 3-4 turns maximum.
- Wear personal protective equipment for all work on the pump unit.

3. ➤ To set the aeration: Turn the screw (Item 1 or Item 2) anti-clockwise until the required damping effect is achieved (3-4 turns maximum).
4. ➤ Resecure the aeration screws with the lock nut (Item 1).

6.6 Switching off the pump unit

How to switch off the pump unit:

1. ➤ Switch off the drive motor.
 - The pump and drive motor stop almost suddenly. This is safe for the pump and drive motor.

2. → If the pump unit is switched off for a long time: Close the shut-off devices. → [Chapter 7.1 'Shutting down the pump unit for a shorter period' on page 51](#)
→ [Chapter 7.2 'Shutting down the pump unit for a longer period' on page 52](#)

7 Decommissioning



DANGER

Hazard due to independent rotating of the pump!

If a differential pressure exists, the spindles can rotate independently.

- Before carrying out any work on the pump unit, shut-off the inlet and pressure pipe.
- Wear personal protective equipment for all work on the pump unit.



WARNING

Risk of injury or poisoning due to dangerous pumped media!

When pumping dangerous media, leakages or residues on or in the pump unit can cause risks of injury or poisoning.

- During operation: Do not undo any closures or screws on or in the pump unit.
- Adhere to all maintenance intervals.
- Only use the pump unit within the operating data.
- Wear personal protective equipment for all work on the pump unit.
- Avoid sparking and naked flames.
- Avoid skin contact with the medium.
- Do not eat food in the workplace or in the place in which the pump unit is used.
- Instruct the personnel in handling hazardous substances.
- Collect leakages safely and remove and dispose of them in an environmentally compatible way.
- Provide collecting and removal equipment for leakages.
- Ensure free flow of the leakage.

7.1 Shutting down the pump unit for a shorter period

Properties of the medium	Measures
Sediment solids	<ul style="list-style-type: none"> ■ Clean the pump unit. ↔ Further information on page 60
Solidified/frozen, non-corrosive impact	<ul style="list-style-type: none"> ■ Heat or empty the pump unit if necessary. ↔ Further information on page 53

Properties of the medium	Measures
Solidified/frozen, corrosive impact	<ul style="list-style-type: none"> Heat or empty the pump unit if necessary. ↪ Further information on page 53
Remains liquid, non-corrosive impact	---
Remains liquid, corrosive impact	---

7.2 Shutting down the pump unit for a longer period

Behaviour of the medium	Measures
Sediment solids	<ul style="list-style-type: none"> Clean the pump unit. ↪ Further information on page 60
Solidified/frozen, non-corrosive impact	<ul style="list-style-type: none"> Empty the pump unit. ↪ Further information on page 53
Solidified/frozen, corrosive impact	<ul style="list-style-type: none"> Empty the pump unit. ↪ Further information on page 53 Preserve the pump unit. ↪ Further information on page 60
Remains liquid, non-corrosive impact	---
Remains liquid, corrosive impact	<ul style="list-style-type: none"> Empty the pump unit. ↪ Further information on page 53 Preserve the pump unit. ↪ Further information on page 60

7.3 Emptying the pump unit



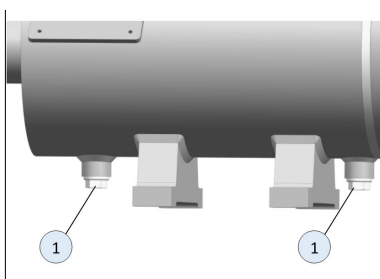
WARNING

Risk of injury or poisoning due to dangerous pumped media!

When pumping dangerous media, leakages or residues on or in the pump unit can cause risks of injury or poisoning.

- During operation: Do not undo any closures or screws on or in the pump unit.
- Adhere to all maintenance intervals.
- Only use the pump unit within the operating data.
- Wear personal protective equipment for all work on the pump unit.
- Avoid sparking and naked flames.
- Avoid skin contact with the medium.
- Do not eat food in the workplace or in the place in which the pump unit is used.
- Instruct the personnel in handling hazardous substances.
- Collect leakages safely and remove and dispose of them in an environmentally compatible way.
- Provide collecting and removal equipment for leakages.
- Ensure free flow of the leakage.

How to empty the pump unit:



- The pump unit is shut down. → [Chapter 7 'Decommissioning' on page 51](#)

1. → Place a suitable collection container under the pump unit.
2. → Open the plugs (Item 1).
3. → Completely drain the pump unit.
4. → Re-insert the plugs (Item 1).

7.4 Operating a standby pump

How to operate the pump unit as a standby unit:

- The pump unit is filled. → [Further information on page 41](#)

1. → Switch on the pump unit at least once a week.
2. → Check the operation of the pump unit. → [Chapter 6.2 'Checking operation' on page 48](#)

8 Troubleshooting



Contact the manufacturer in the event of faults that are not named in the following table or are not due to the given causes.

Finding	Cause	Removal
Unusual noise emissions	Trapped air in the unit	<ul style="list-style-type: none"> ■ Vent the pump unit. ↪ Chapter 5.11 'Venting the pump unit' on page 43
	Alignment (coupling) outside the allowable tolerance	<ul style="list-style-type: none"> ■ Check the alignment of the coupling. ↪ Chapter 5.5 'Aligning the coupling' on page 36
	Pump unit overload	<ul style="list-style-type: none"> ■ Reduce the differential pressure or the speed.
	Damage to the bearing	<ul style="list-style-type: none"> ■ Replace the bearing.
	Damage to the coupling	<ul style="list-style-type: none"> ■ Check the individual parts of the coupling and replace them if necessary.
	Leaking pipe connections.	<ul style="list-style-type: none"> ■ Check the pipe connections for leaktightness. ■ Retighten screws. ↪ Tightening torques' on page 70
	Operation within the cavitation range /condition	<ul style="list-style-type: none"> ■ Ensure adequate medium (fluid) supply. ■ Reduce the speed.
	Suction filter is blocked	<ul style="list-style-type: none"> ■ Check the suction filter and clean or replace it if necessary

Finding	Cause	Removal
Reduction in the discharge rate or the pressure during constant operating conditions	Shaft seal leak	<ul style="list-style-type: none"> ■ Check the seal and clean or replace if necessary.
	The speed of the pump unit is too low	<ul style="list-style-type: none"> ■ Adjust motor speed.
	Internal component of the pump unit is worn	<ul style="list-style-type: none"> ■ Repair the unit. ■ Contact the manufacturer.

Finding	Cause	Removal
	Leakage in suction or pressure pipe, possible bypass between inlet and outlet	<ul style="list-style-type: none"> Check pump unit for leakages. → Chapter 9.4 'Visually inspecting the pump unit' on page 61
	Viscosity of the pumped medium is too low	<ul style="list-style-type: none"> If possible: Adjust the drive speed.
	Trapped air in the unit	<ul style="list-style-type: none"> Vent the pump unit. → Chapter 5.11 'Venting the pump unit' on page 43
	Advanced wear of spindles and housing	<ul style="list-style-type: none"> Replace the spindles. Replace the housing. Replace the pump.
	The pressure release valve has opened	<ul style="list-style-type: none"> Check the pressure relief valve

Finding	Cause	Removal
The pump unit becomes hot	Wrong rotational direction of the pump unit	<ul style="list-style-type: none"> Check the rotational direction of the drive motor → Appendix A 'Technical data' on page 69 and adjust if necessary → Chapter 5.4 'Checking the rotational direction of the drive motor' on page 35
	Internal component of the pump unit is worn	<ul style="list-style-type: none"> Repair the pump unit. Contact the manufacturer.
	Air inclusion in the pump unit	<ul style="list-style-type: none"> Vent the pump unit. → Chapter 5.11 'Venting the pump unit' on page 43
	Pump unit overload	<ul style="list-style-type: none"> Reduce the differential pressure or the drive speed.
	Viscosity of the pumped medium is too high	<ul style="list-style-type: none"> If possible: Adjust the drive speed.
	Pressure relief valve is leaking.	<ul style="list-style-type: none"> Check pressure relief valve for possible bypass.
	Insufficient medium supply	<ul style="list-style-type: none"> Check the medium supply.

Troubleshooting

Finding	Cause	Removal
The drive motor is overloaded	Alignment (coupling) outside the allowable tolerance	<ul style="list-style-type: none"> Check the alignment of the coupling. → Chapter 5.5 'Aligning the coupling' on page 36
	Pump unit overload	<ul style="list-style-type: none"> Reduce the differential pressure or the drive speed.
	Viscosity of the pumped medium is too high	<ul style="list-style-type: none"> If possible: Adjust the drive speed.
	Resistance in the pressure pipe is too high	<ul style="list-style-type: none"> Check the medium supply. Check the pressure in the suction pipe. Check the suction filter and clean or replace if necessary.

Finding	Cause	Removal
No suction or delivery pressure	Pump unit not prefilled	<ul style="list-style-type: none"> Fill the pump unit with the medium to be pumped. → Chapter 5.8 'Fill the pump unit with medium' on page 41
	Air inclusion in the pump unit	<ul style="list-style-type: none"> Vent the pump unit. → Chapter 5.11 'Venting the pump unit' on page 43
	Wrong direction of rotation of the drive motor	<ul style="list-style-type: none"> Check the rotational direction of the drive motor → Appendix A 'Technical data' on page 69 and adjust if necessary → Chapter 5.4 'Checking the rotational direction of the drive motor' on page 35
	The drive speed is too low	<ul style="list-style-type: none"> If possible: Adjust the drive speed.
	Internal component of the pump unit is worn	<ul style="list-style-type: none"> Repair the pump unit. Contact the manufacturer.
	Check whether the pressure relief valve opens at the set pressure.	<ul style="list-style-type: none"> Check the pressure relief valve

Finding	Cause	Removal
The pump unit does not turn	Damage to the bearing	<ul style="list-style-type: none"> Replace the bearing.

Finding	Cause	Removal
	Damage to the coupling	<ul style="list-style-type: none"> Check the individual parts of the coupling and replace them if necessary.
	Pump unit is blocked	<ul style="list-style-type: none"> Repair the pump unit. Contact the manufacturer.
	No drive current	Check the power supply.

Finding	Cause	Removal
Fluctuating pumped quantity	Pump unit not prefilled	<ul style="list-style-type: none"> Fill the pump unit with the medium to be pumped. ↪ Chapter 5.8 'Fill the pump unit with medium' on page 41
	Shaft seal leak	<ul style="list-style-type: none"> Check the seal and clean or replace if necessary.
	Air inclusion in the pump unit	<ul style="list-style-type: none"> Vent the pump unit. ↪ Chapter 5.8 'Fill the pump unit with medium' on page 41
	Leakage in suction or pressure pipe, possible bypass between inlet and outlet	<ul style="list-style-type: none"> Check pump unit for leakages. ↪ Chapter 9.4 'Visually inspecting the pump unit' on page 61
	Air inclusion in the pump unit	<ul style="list-style-type: none"> Vent the pump unit. ↪ Chapter 5.11 'Venting the pump unit' on page 43
	Pressure relief valve is leaking.	<ul style="list-style-type: none"> Check pressure relief valve for possible bypass.

Finding	Cause	Removal
Excessive vibration of the pump unit	Pump unit not prefilled	<ul style="list-style-type: none"> Fill the pump unit with the medium to be pumped. ↪ Chapter 5.8 'Fill the pump unit with medium' on page 41
	Air inclusion in the pump unit	<ul style="list-style-type: none"> Vent the pump unit. ↪ Chapter 5.11 'Venting the pump unit' on page 43
	Leakage in suction or pressure pipe, possible bypass between inlet and outlet	<ul style="list-style-type: none"> Check pump unit for leakages. ↪ Chapter 9.4 'Visually inspecting the pump unit' on page 61

Finding	Cause	Removal
	Alignment (coupling) outside the allowable tolerance	■ Align the coupling. → Chapter 5.5 'Aligning the coupling' on page 36
	Damage to the bearing	■ Replace the bearing.
	Damage to the coupling	■ Replace the coupling. → Chapter 4.1 'Components overview' on page 23 → Chapter 5.5 'Aligning the coupling' on page 36

Finding	Cause	Removal
Increased leakage behaviour of the pump unit	Seal is soiled or damaged	■ Check the seal and clean or replace if necessary.

9 Maintenance



WARNING

Risk of injury or material damage due to the assignment of unqualified personnel!

The assignment of unqualified personnel can cause personal injuries or material damage.

- Only allow trained skilled personnel who have the following knowledge to carry out assembly, overhaul and maintenance work:
 - Knowledge of standards, guidelines, directives and accident prevention regulations
 - Knowledge of mechanics
 - Knowledge of hydraulics
 - Knowledge of electrics

9.1 Maintenance plan

Task	Interval	Implementation
Clean the pump	As and when required	→ Chapter 9.2 'Cleaning the pump unit' on page 60
Visual inspection of the pump	Every 4 weeks	→ Chapter 9.4 'Visually inspecting the pump unit' on page 61
Acoustic and vibration test	Every 4 weeks	→ Chapter 9.5 'Performing an acoustic and vibration test' on page 61
Testing the temperature	Every 4 weeks	→ Chapter 9.6 'Testing the temperature' on page 61
Check the coupling	Every 4 weeks	→ Chapter 5.5 'Aligning the coupling' on page 36
Check the suction-side pressure	Every 2 weeks	→ Chapter 6.3 'Check the suction-side pressure' on page 48
Test the overflow valve	≤ 5 years	→ Chapter 6.4 'Test the overflow valve' on page 48
Test the pressure relief valve	≤ 5 years	→ Chapter 9.9 'Test the pressure relief valve' on page 62
Inspect the complete pump	Every 2 years	→ Chapter 9.10 'Inspection of the pump' on page 62

9.2 Cleaning the pump unit



NOTICE

Material damage due to the use of unsuitable flushing media!

Flushing the pump and pipes with a medium whose viscosity is lower than that of the operating medium can cause damage to the pump.

- Only use suitable flushing media whose viscosity is identical to the operating medium. → [Appendix A 'Technical data' on page 69](#)
- When leak testing the unit or the pipes (static or hydraulic), encapsulate the pump.



NOTICE

Material damage due to the use of pressure cleaners!

Use of pressure cleaners to clean or remove the preservative (dewax) the unit can cause material damage.

- Do not use pressure cleaners to clean or remove the preservative from (dewax) the unit.
- Only use cleaning agents recommended by the manufacturer. → [Appendix A 'Technical data' on page 69](#)

How to clean the pump unit:

- The pump unit is switched off.
- The pump unit has cooled.
- Clean the pump unit to remove coarse dirt. Use the cleaning agents specified by the manufacturer. → [Appendix A 'Technical data' on page 69](#)

9.3 Preserving the pump unit

Before storing the pump or the pump unit, all bright surfaces must be treated with a preservative.

The active agents in the preservative provide adequate protection against corrosion even in high humidity (marine or tropical environment). There is therefore no temperature dependency.

How to preserve the pump unit:

- The pump unit is shut down. → [Chapter 7 'Decommissioning' on page 51](#)
- The pump unit has cooled.
- The pump unit has been thoroughly cleaned. → [Chapter 9.2 'Cleaning the pump unit' on page 60](#)
- 1. → Treat all bright, unpainted surfaces (e.g. shaft ends, flanges, etc.) with a preservative. Use the preservative specified by the manufacturer. → [Appendix A 'Technical data' on page 69](#)

2. → Depending on the manufacturer's instructions, renewed application of the preservative may be necessary after a storage period of 1 - 2.5 years (depending on the storage location/storage conditions).

9.4 Visually inspecting the pump unit

How to visually inspect the pump unit:

1. → Carry out a visual inspection of all components of the pump unit. When doing so, pay attention to the following points:
 - Stability of the pump unit
 - Screws and fixing elements
 - Leakages
 - If present: Coupling
 - If present: Measuring instruments and measurement displays
 - Etc.
2. → In case of damage or irregularities, contact the service personnel or the manufacturer.

9.5 Performing an acoustic and vibration test

How to perform an acoustic and vibration test:

1. → Check the pump unit for excessive vibrations or noises.
 - The vibration level (in standard applications) must not exceed 4.5 mm/s (rms) continuously or 7.1 mm/s (rms) during the transition states.
 - The sound pressure level must not exceed the figures in the "Technical data" chapter. → [Appendix A 'Technical data' on page 69](#)
 - In case of damage or irregularities, contact the service personnel or the manufacturer.
2. → Document your measurements.
 - In the event of an abrupt or steady increase in the vibration level, check the bearing for damage or contact your service personnel or the manufacturer.

9.6 Testing the temperature

How to test the temperature:

1. → Check the temperature at the (non-drive side) cover.
2. → Check the temperature at the (drive-side) cover.
 - The temperature difference must not exceed 20 - 25 °C.If the temperature difference is more than 25 °C the cause must be determined. → [Chapter 8 'Troubleshooting' on page 54](#)

9.7 Check the suction-side pressure

How to check the suction-side pressure:

- > Use the pressure sensor installed in the system to check the suction side pressure. Note the information in the Technical data. → [Appendix A 'Technical data' on page 69](#)

9.8 Test the overflow valve

How to check the overflow valve:

- > Check the system pressure using the overflow valve installed in the system. Note the information in the Technical data. → [Appendix A 'Technical data' on page 69](#)

9.9 Test the pressure relief valve

How to test the pressure relief valve:

1. → Make sure that the system-side pressure relief valve meets the requirements of the pump unit. → [Appendix A 'Technical data' on page 69](#)
2. → Close the outlet valve slowly and monitor the discharge side pressure gauge.
 - ➔ The pressure in the pressure pipe increases.
3. → Check whether the pressure relief valve opens at the set pressure.
 - ➔ The system-side pressure gauge constantly displays the maximum limit pressure.
 - ➔ The maximum set pressure must not be exceeded.
4. → Make sure that the setting of the limit pressure for the valve does not exceed the setpoint pressure value (+ 10 %) (except for pump types L3NL and L3NX). → [Appendix A 'Technical data' on page 69](#)
5. → Open the outlet valve again.

9.10 Inspection of the pump



Fig. 9: Leistritz HealthCheck sticker

To ensure continuous availability of your installation and increase the servicelife (time to failure) of the pump, we recommend that you get Leistritz to carry out an inspection or rather service the pump after 2 years. To this end, please note the Leistritz "Next inspection" sticker, which is attached to the screw pump on delivery or after an inspection/service by Leistritz.

10 Disposal



DANGER

Danger of contamination!

The pump unit or the packaging materials can be contaminated by toxic or radioactive pumped media so that cleaning is insufficient.

- Wear personal protective equipment for all work on the pump unit.
- Collect leaking pumped medium and/or oil and dispose of it according to the local regulations.
- Neutralise any pumped medium residues in the pump unit.
- Decontaminate the pump unit and dispose of it according to the local regulations.



ENVIRONMENT

Dangerous for the environment!

Disposing of machines or parts of machines or discharging liquids and materials into the sewers or bodies of water can cause dangers for the environment.

- Comply with the national and international provisions regarding the disposal of hazardous waste.

Appendix

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A Technical data



The pump unit technical data are given in the enclosed technical data sheet.

General data

Weight and dimensions		
Weight [kg]	Pump	Siehe Maßzeichnung / see dimensional drawing / patrz rysunek wymiarowy / ver desenho de dimensão / vedi disegno quotato
	Drive motor	Siehe Maßzeichnung / see dimensional drawing / patrz rysunek wymiarowy / ver desenho de dimensão / vedi disegno quotato
	Pump unit	Siehe Maßzeichnung / see dimensional drawing / patrz rysunek wymiarowy / ver desenho de dimensão / vedi disegno quotato
Dimensions [mm]	Pump	Siehe Maßzeichnung / see dimensional drawing / patrz rysunek wymiarowy / ver desenho de dimensão / vedi disegno quotato
	Drive motor	Siehe Maßzeichnung / see dimensional drawing / patrz rysunek wymiarowy / ver desenho de dimensão / vedi disegno quotato
	Pump unit	Siehe Maßzeichnung / see dimensional drawing / patrz rysunek wymiarowy / ver desenho de dimensão / vedi disegno quotato
Sound pressure level		
Pump [dB]	Siehe Datenblatt / see data sheet / patrz arkusz danych / ver folha de dados / vedi scheda tecnica	
Drive motor [dB]	Siehe Datenblatt / see data sheet / patrz arkusz danych / ver folha de dados / vedi scheda tecnica	
Pump unit [dB]	Siehe Datenblatt / see data sheet / patrz arkusz danych / ver folha de dados / vedi scheda tecnica	

Technical data

Operating materials

Operating material	Designation
Cleaning agent	"Loctite ® 7840" or any universal industrial cleaner
Preservative	"TECTYL 846", mix of "TECTYL 846" and "TECTYL 511-M"
Preservative remover/dewaxer	mineral oil, diesel, benzin, alcohol

Tightening torques

Thread size	Steel screws to DIN 912		VA screws made of stainless steel to DIN 912	
	Strength class	Tightening torque [Nm]	Strength class	Tightening torque [kN]
M6	8.8	10.25	70	6.67
M8		24.93		12.3
M10		49		19.5
M12		86		28.4
M16		215		53.6
M20		420		83.8
M24		726		121
M30		1445		1050
M33		1969		---
M36		2528		---

B Recommended filter mesh sizes



The mesh sizes given cannot completely protect the pump unit from foreign particles.



The recommended filter mesh sizes can prevent contamination of the pumped medium by foreign bodies.

Recommended filter mesh sizes during commissioning

Pump type	Size						
L3	20	25	32	38	45	52	60
[mm]	0.025	0.025	0.025	0.034	0.037	0.05	0.05
[μ m]	25	25	25	34	37	50	50
[inches]	0.0010	0.0010	0.0010	0.0013	0.0015	0.0020	0.0020
[μ -inches]	1.0	1.0	1.0	1.3	1.5	2.0	2.0

Pump type	Size						
L3	70	80	90	100	112	125	140
[mm]	0.06	0.06	0.06	0.08	0.1	0.1	0.1
[μ m]	60	60	60	80	100	100	100
[inches]	0.0024	0.0024	0.0024	0.0031	0.0039	0.0039	0.0039
[μ -inches]	2.4	2.4	2.4	3.1	3.9	3.9	3.9

Pump type	Size						
L3	160	180	200	225	250	256	275
[mm]	0.1	0.2	0.2	0.2	0.2	0.2	0.2
[μ m]	100	100	200	200	200	200	200
[inches]	0.0039	0.0039	0.0079	0.0079	0.0079	0.0079	0.0079
[μ -inches]	3.9	3.9	7.9	7.9	7.9	7.9	7.9

Recommended filter mesh sizes

Recommended filter mesh sizes during operation

Pump type	Size						
L3	20	25	32	38	45	52	60
[mm]	1	1	1	1	1	2	2
[μm]	1000	1000	1000	1000	1000	2000	2000
[inches]	0.0394	0.0394	0.0394	0.0394	0.0394	0.0787	0.0787
[μ -inches]	39.4	39.4	39.4	39.4	39.4	78.7	78.7

Pump type	Size						
L3	70	80	90	100	112	125	140
[mm]	2	2	2	2	2	2	2
[μm]	2000	2000	2000	2000	2000	2000	2000
[inches]	0.0787	0.0787	0.0787	0.0787	0.0787	0.0787	0.0787
[μ -inches]	78.7	78.7	78.7	78.7	78.7	78.7	78.7

Pump type	Size						
L3	160	180	200	225	250	256	275
[mm]	3	3	3	3	3	3	3
[μm]	3000	3000	3000	3000	3000	3000	3000
[inches]	0.1181	0.1181	0.1181	0.1181	0.1181	0.1181	0.1181
[μ -inches]	118.1	118.1	118.1	118.1	118.1	118.1	118.1