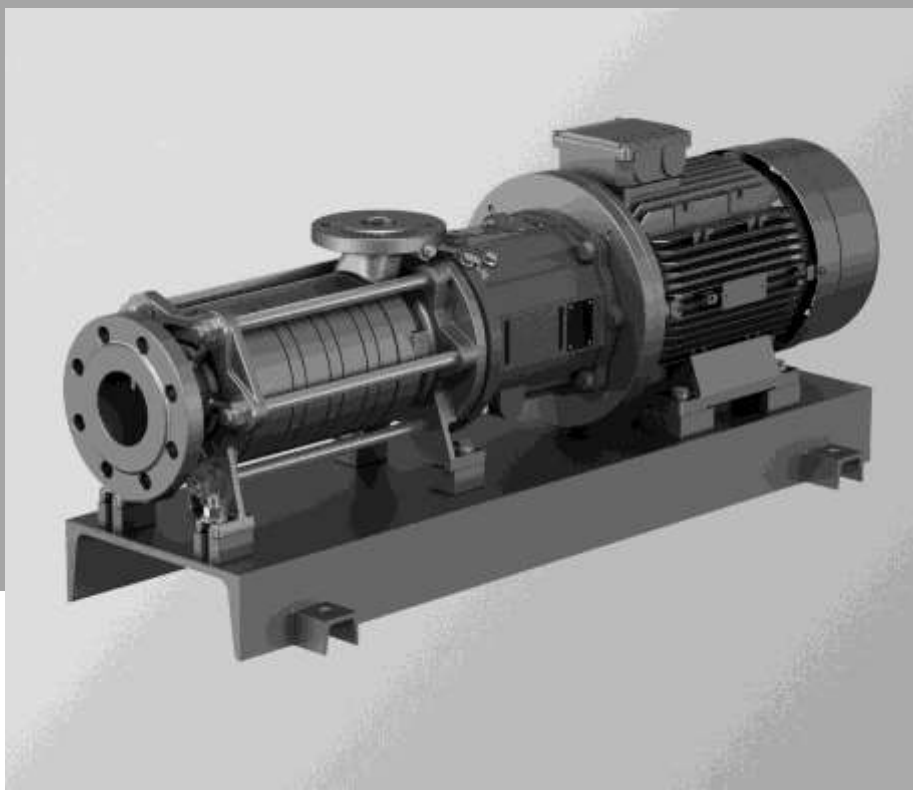


Operating Manual

ASKM Series

Side Channel Pumps with Magnetic Coupling

English translation of the original operating manual

CE Documentation

It is imperative to read the operating manual prior to commissioning!

This document as well as all documents included in the appendix is not subject to any update service!

Subject to technical changes.

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1 Important basic information

This operating manual forms part of the technical documentation of the system in accordance with the EC machinery directive.

CE

This operating manual complies with machinery directive 2006/42/EC of the European Parliament and the Council on the approximation of the laws, regulations and administrative provisions of the Member States relating to machinery, Appendix I, Paragraph 1.7.4.

This operating manual is addressed to the person in charge of the plant, who is obliged to provide it to the staff responsible for system set-up, connection, operation and maintenance.

He must ensure that all information included in the operating manual and the enclosed documents has been read and understood.

The operating manual must be kept at a designated and easily accessible place and consulted at the slightest doubt.

The manufacturer does not accept liability for damage to persons, animals, objects or the system itself incurred by improper use, non-observance or incomplete observance of the safety precautions included in this operating manual or by modifications to the system or use of improper spare parts.

This operating manual is the exclusive copyright of

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or its legal successor.

Duplication or transfer of this operating manual to third parties requires written approval of the manufacturer. This also applies to the duplication or transfer of excerpts of this operating manual and to the transfer of this operating manual in digital form.

This manual

- forms part of the pump/aggregate,
- applies to all series mentioned herein,
- describes safe and proper operation during all operational phases,
- must be stowed safely throughout the entire service life of the machine,
- must be handed over to future owners of the machine

Scope of supply

- Side channel pump (ASKM)
- Operating manual
- Motor (optional)
- Magnetic coupling/coupling guard
- Base plate (optional)

Technical support address

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Warranty and liability

Generally, the “General Conditions of Sale and Delivery” of

Speck Pumpen Systemtechnik GmbH applies.

They have been provided to the operator at the time of contract conclusion at the latest.

Warranty and liability claims arising from personal injury and material damage are excluded if one of the following conditions applies:

- improper use of the machine
- improper mounting, commissioning, operation and maintenance of the machine
- operation of the machine despite defective safety devices
- non-observance of the notes in the operating manual
- unauthorized constructional changes to the machine
- inadequate maintenance, repair and servicing measures
- catastrophic events caused by foreign bodies or acts of God

1.1 Target groups

Target group	Task
Operator	► Keep this manual available at the location of the system, also for later consultation. ► Advise staff to read and observe this manual and the provided documents, particularly the safety precautions and warnings. ► Observe additional provisions and regulations related to the system.
Qualified staff, assembler	► Read, observe and adhere to this operating manual and all applicable documents, particularly the safety precautions and warnings.

Tab. 1 Target groups and their tasks

1.2 Applicable documents

Document	Purpose
ATEX additional instructions	Operation in potentially explosive areas (only applicable to pumps designed for use in potentially explosive areas)
Technical data sheet	Technical data, conditions of use
Dimensional drawing	Set-up dimensions, mating dimensions, etc.
Characteristic curves	Characteristic curves showing total head, flow rate, NPSH required, efficiency and power input
Documentation for parts supplied	Technical documentation for installed parts from suppliers
Declaration of conformity	Conformity with standards

Tab. 2 Applicable documents

1.3 Incorporation of partly completed machinery

Incorporation of partly completed machinery supplied by Speck Pumpen is subject to the respective notes/descriptions included in Chapter 5.8 “Motor installation” (→ page 15).

1.4 Warnings and symbols

Warning	Security level	Consequences of non-observance
⚠ DANGER	imminently hazardous situation	death, severe personal injuries
⚠ WARNING	potentially hazardous situation	death, severe personal injuries
⚠ CAUTION	potentially dangerous situation	minor personal injuries
CAUTION	potentially dangerous situation	material damage

Tab. 3 Warnings and consequences of non-observance

Symbol	Meaning
	Safety sign ► Observe all measures marked with the safety sign to avoid personal injuries or death.
	Safety sign ► Observe all measures marked with the safety sign to avoid personal injuries or death by electric shock.
	Safety sign ► Observe all measures marked with the safety sign to avoid personal injuries or death caused by exposure to magnetic fields.
►	Instruction for action
1. , 2. , …	Multi-step instruction for action
✓	Pre-requisite
→	Cross-reference
ⓘ	Information, note

Tab. 4 Symbols and meaning

1.5 Terminology

Term	Meaning
Pump	Machine without drive, components or accessories
Aggregate	Complete aggregate including pump, drive with magnetic coupling, components and accessories
Auxiliary operating systems	Devices for operating the pump

Tab. 5 Terminology and meaning

2 Safety

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

2.1 Intended use

- Observe all provisions included in the operating manual.
- Observe all safety instructions.
- Comply with inspection and maintenance intervals.
- Operate the pump/aggregate exclusively within the permissible operating range (→ Technical data sheet).
- Use the pump/aggregate exclusively for delivery of the permissible media to be pumped (→ General technical data, page 32).
- Observe the operating limits and the minimum flow rate depending on size.
- Prevent dry running:
  - Ensure that the pump/aggregate is only operated with medium to be pumped, never without medium to be pumped.
- Prevent cavitation:
  - Completely open the suction-side fitting and do not use it for controlling the flow rate.
  - Do not close the pressure-side fitting beyond the admissible operating pressure.
- Prevent overheating:
  - Do not operate the aggregate when the pressure-side fitting is closed.
  - Observe the minimum flow rate (→ Technical data sheet).
- Prevent motor damage:
  - Do not close the pressure-side fitting beyond the admissible operating pressure.
  - Observe the switching frequency of the aggregate.
  - The motor protection switch must not be set to a value above nominal current.
- Any use other than the intended use must be agreed with the manufacturer.

2.2 Potential misuse

- Observe the operating limits of the aggregate concerning temperature, pressure, speed, flow rate, density and viscosity (→ Operating limit values, page 32).
- The higher the density of the medium to be pumped, the higher the motor power consumption. Observe the permissible density to protect the aggregate against overload (→ Technical data sheet). Lower densities are permissible. In this case, adjust the auxiliary systems accordingly.
- Refrain from delivering abrasive and solid laden liquids.
- Do not combine multiple limit values (→ Operating limit values, page 32).
- Prevent sudden temperature changes of the medium to be pumped.
- Do not use in rooms where explosive gases may be present unless the aggregate has been expressly intended for such purpose.
- Do not extract, deliver or compact explosive, inflammable, aggressive or toxic media unless the aggregates have been expressly intended for such purpose.
- Do not operate the aggregate in a partially assembled state.
- Do not obstruct the cooling stream.
- Unauthorized opening of the pump/aggregate results in the forfeiture of any and all claims for defects.

2.3 General safety instructions

ⓘ The following provisions must be observed prior to executing any works.

2.3.1 Product safety

The pump/aggregate has been designed in accordance with state-of-the-art technology and the generally acknowledged rules on safety.
Yet, operation of this pump/aggregate may present a threat to the life or physical health of the user or third parties and impair the pump/aggregate and other property.

- Only operate the pump/aggregate in a technically flawless condition and in accordance with the provisions, safety precautions and warnings included in this operating manual.
- Keep this operating manual as well as all supplied documents complete and legible and ensure that they can be accessed by staff at all times.
- Refrain from any operating methods, which may put staff or uninvolved third parties at risk.
- In case of defects having safety implications: shut down the aggregate immediately and consult the person in charge to rectify the defect.
- In addition to the overall documentation, all legal or other safety and accident prevention regulations as well as all applicable standards and guidelines of the respective country of operation must be observed.

2.3.2 Obligations of the operator

2.3.2.1 Safety-conscious working

- Only operate the aggregate in a technically flawless condition and in accordance with the provisions, safety precautions and warnings included in this operating manual.
- Ensure and verify compliance with:
  - intended use
  - legal or other safety and accident prevention regulations
  - safety regulations applying to handling hazardous substances
  - applicable standards and guidelines of the respective country of operation
- Provide for protective equipment.

2.3.2.2 Staff qualification

- Ensure that staff involved in aggregate operation has read and understood this operating manual and all applicable documents, particularly all safety, maintenance and servicing information, prior to starting work.
- Define clear roles and responsibilities and arrange for staff monitoring.
- All works must only be carried out by technically qualified staff:
  - assembly, servicing, maintenance works
  - works on electrical equipment
- Staff undergoing training must only work on the pump/aggregate under the supervision of technically qualified staff.

2.3.2.3 Safety devices

- Provide for the following safety devices and ensure their proper functioning:
  - for hot, cold and moving parts: on-site protection against contact with the pump/aggregate
  - when electrostatic charging is likely to occur: provide for grounding

2.3.2.4 Warranty

- During the warranty period, conversion works, repairs and modifications are subject to approval by the manufacturer.
- Use original parts or parts approved by the manufacturer only.
- All warranty and damage claims will expire in case of non-observance of this operating manual.

2.3.3 Obligations of the staff

- Notes attached to the pump/aggregate must be observed and kept legible, e.g. arrows indicating the direction of rotation, symbols indicating media connections.
- Guards for protection against contact with hot, cold and moving parts must not be removed during operation.
- If required, use protective equipment.
- Works on the pump/aggregate must only be carried out at standstill.
- Prior to carrying out any assembly or maintenance works, de-energize the motor and protect it against restart.
- Having completed all works on the pump/aggregate, duly re-assemble the safety devices.

2.4 Residual risks

⚠ WARNING

Long and loose hair as well as loose clothing (e.g. ties) may become entangled in the protective covers of the motor and the shaft coupling.

► Wear a hairnet!

► Wear close-fitting clothing!

Risk of injuries caused by flying objects, which were inserted in the openings of the motor fan cover or in the openings of the coupling protection!

► Do not insert any objects!

Risk of burns/scalds when getting in contact with hot surfaces or hot media!

► Do not touch!

► Wear protective gloves!

Risk of injuries caused by media to be pumped escaping from defective separating can!

► Shut down the aggregate!

► Repair the aggregate!

2.5 Special risks

2.5.1 Potentially explosive area

- (→ ATEX additional instructions)

2.5.2 Dangerous media to be pumped

- When dealing with dangerous media to be pumped (e.g. hot, inflammable, explosive, toxic, hazardous to health), observe the safety regulations applying to handling hazardous substances.
- Use protective equipment when carrying out any works on the pump/aggregate.

2.5.3 Magnetic drive

The strong magnetic field generated in the area of the magnetic couplings or individual magnets may involve the following risks:

- Persons with cardiac pacemakers are at risk of death
- Magnetic data carriers (ID cards with magnetic stripes, credit and cheque cards, electrical, electronic, precision devices, components or instruments (e.g. mechanical, digital clocks, pocket calculators, hard disks) may be damaged
- Magnetic components (e.g. tools, screws) are attracted to the magnetic field in an uncontrolled manner

► A safety distance of at least 200 mm must be maintained between objects sensitive to magnetic fields / cardiac pacemakers and open magnets or magnetic couplings or partly completed drive units.

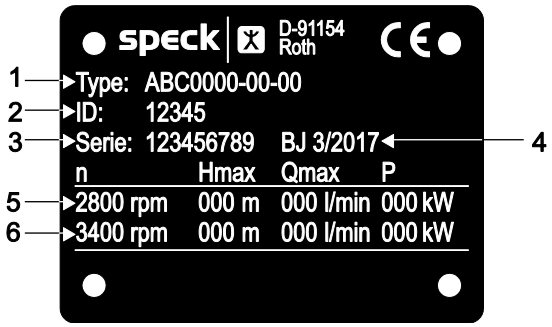
ⓘ Distance to completely assembled aggregates:

► In completely assembled aggregates, the magnetic fields of the magnetic coupling are reliably confined by the surrounding components. Magnetic couplings do not pose any risk either during operation or during standstill periods.

3 Design and functioning

3.1 Marking

3.1.1 Nameplate



1 Type designation

2 Item identification number (pump / aggregate)

3 Serial number

4 Year of manufacture

5 Delivery data at 50 Hz
Nominal speed
Maximum total head
Minimum flow rate
Power requirements

6 Delivery data at 60 Hz
Nominal speed
Maximum total head
Minimum flow rate
Power requirements

Fig. 1 Nameplate (example)

3.1.2 ATEX plate



1 Explosion protection mark

Fig. 2 ATEX plate (example)

3.1.3 Pump type code

	ASK	M	32	04-	62	4-	60
1							
2							
3							
4							
5							
6							
7							

1 Pump type

2 Sealing

3 Pump size

4 Number of stages

5 Size of magnetic coupling

6 Magnetic coupling -PN

7 Material design

Tab. 6 Pump type code ASKM (example)

3.2 General description

Pumps of the ASKM series are horizontal, self-priming side channel pumps with upstream centrifugal stage in modular design. They can be dimensioned for up to 8 stages.

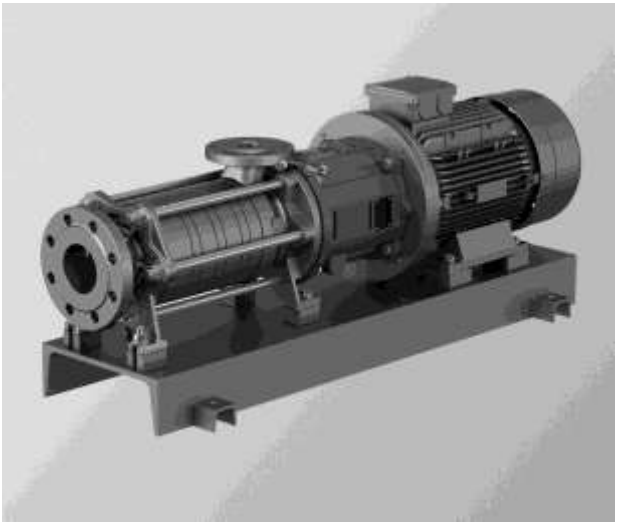


Fig. 3 ASKM

The pump shaft is supported by a combined axial/radial sleeve bearing at the drive side and a radial sleeve bearing at the opposite side. The sleeve bearings are lubricated by the medium to be pumped and are made of pure silicone carbide (SIC).

The shaft sealing is sealless. The pump shaft is driven by a permanent magnetic coupling.

After having been initially filled with the medium to be pumped, the pumps are self-priming. Even under adverse conditions at the suction side, the pumps are also able to deliver gases.

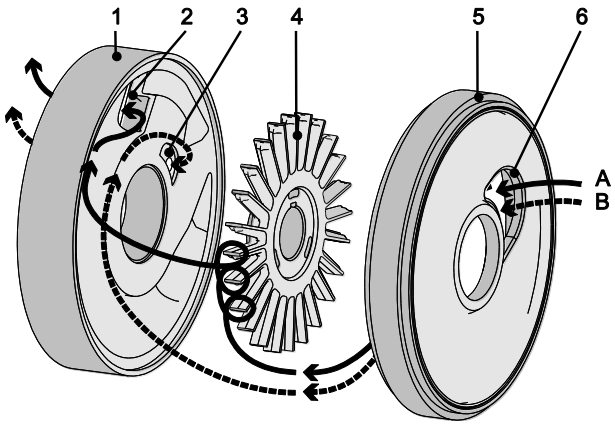
Pumps of the ASK series offer an upstream centrifugal stage providing for optimum net positive suction heads (NPSH).

They are used for delivery of pure, aqueous liquids, which do not contain abrasive or fibrous particles.

The selection of materials and seals depends on the medium to be pumped and the operating conditions. The available materials range from spheroidal graphite cast iron to high-alloyed stainless steels.

Such multi-function pumps are perfectly suitable for delivering liquids near the boiling point such as condensates, liquid gases, hydrocarbons, aerosols or refrigerating media.

3.3 Design and functional principle



A Liquid

B Gas/air

1 Side channel casing

2 Liquid outlet

3 Gas outlet

4 Star impeller

5 Sleeve

6 Suction opening

Fig. 4 Mode of operation of a side channel pump

The liquid or liquid-gas mixture to be pumped enters the impeller chambers and the interrupted side channel through the suction opening (6). The rotating star impeller (4) then accelerates the liquid (A).

The medium to be pumped now moves back and forth between the chambers of the star impeller and the side channel due to the centrifugal forces. This means that a huge amount of energy is transferred.

The liquid flows through the outlet of the side channel (2) into the next stage or the pump's outlet nozzle. The centrifugal action of the impeller separates air and liquid. The liquid collects in the outside area of the impeller chambers and the side channel. The gas (B) remains in the inside area close to the impeller hub.

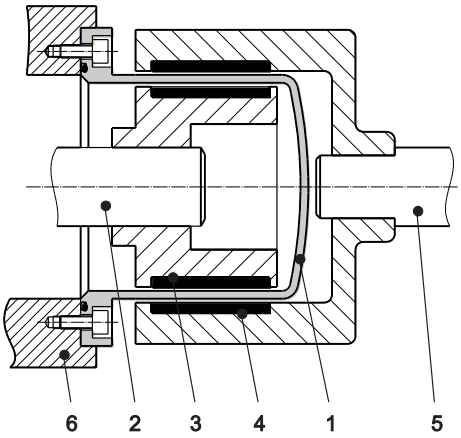
The gas channel (3) in the hub area enables the air to flow to the next stage or the outlet nozzle.

Thanks to this integrated gas channel, a side channel pump is able to vent a suction line, i.e. evacuate air without any additional equipment. Thus, side-channel pumps can handle media to be pumped with a gas ratio of up to 50 %.

However, the self-priming feature only works if the pump has once been filled with liquid and reliably retains sufficient liquid.

3.4 Shaft sealing

3.4.1 Without shaft sealing, driven by magnetic coupling



1 Separating can

2 Pump shaft

3 Magnet on the inner rotor

4 Magnet on the outer rotor

5 Motor shaft

6 Pump casing

Fig. 5 Mode of operation of a magnetic coupling

The pump shaft is driven by a magnetic coupling. Below the separating can (1), which seals the pump casing (6), an inner rotor (3) equipped with magnets is installed on the pump shaft (2).

An outer rotor (4), which is also equipped with magnets and installed on the motor shaft (5), is positioned outside the separating can. The pump casing (6) and the motor are connected to each other by means of a bracket.

4 Transport, storage and disposal

ⓘ The accident prevention regulations have to be observed prior to following transport and handling regulations:

4.1 Transport

ⓘ Weight data (→ order documents)

⚠ DANGER

Strong magnetic field in the area of the magnetic coupling, individual magnets or the pump.

Risk of death and material damage caused by magnetic fields!

- ► Ensure that persons with cardiac pacemakers do not carry out any works on the pump/aggregate.
- ► Secure and, where required, prevent access to the workplace:
  - – Ensure that persons with cardiac pacemakers keep a safety distance of > 1 m.
  - – Make sure no magnetizable metal components can be attracted to the magnetic coupling.
  - – Make sure that parts of the magnetic coupling cannot be attracted to magnetizable metal components.
- ► A safety distance of > 150 mm must be maintained between objects sensitive to magnetic fields and magnetic coupling or pump.

4.1.1 Unpacking and inspection on delivery

1. Unpack the pump/aggregate on delivery and inspect it for transport damage.
2. Report any transport damage to the manufacturer immediately.
3. Dispose of packaging material according to local regulations.

4.1.2 Transport with lifting gear

⚠ DANGER

Risk of death or contusions from falling goods to be transported!

- ► Select lifting gear in accordance with the total weight to be transported.
- ► Transport the aggregate in horizontal position only.
- ► Never suspend the aggregate to the separating can or the ring lug of the motor.
- ► Attach the lifting gear in accordance with the following figures.
- ► Do not stand under suspended loads.

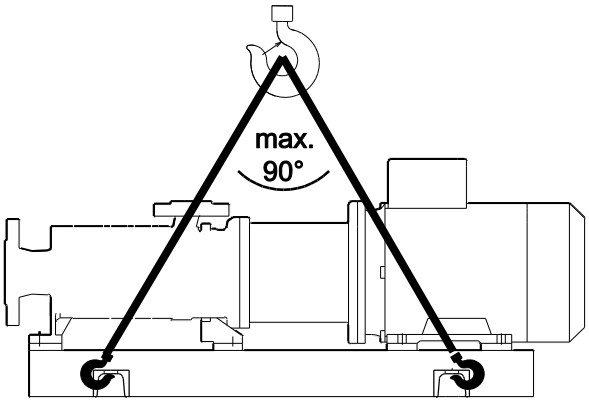


Fig. 6 Attaching lifting gear to the aggregate

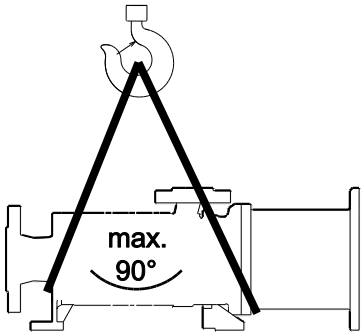


Fig. 7 Attaching lifting gear to the pump

- ► Lift the pump/aggregate accordingly.

4.2 Storage

⚠ DANGER

Strong magnetic field in the area of the magnetic coupling, individual magnets or the pump.

Risk of death and material damage caused by magnetic fields!

- ► Ensure that persons with cardiac pacemakers do not carry out any works on the pump/aggregate.
- ► Secure and, where required, prevent access to the workplace:
  - – Ensure that persons with cardiac pacemakers keep a safety distance of > 1 m.
  - – Make sure no magnetizable metal components can be attracted to the magnetic coupling.
  - – Make sure that parts of the magnetic coupling cannot be attracted to magnetizable metal components.
- ► A safety distance of > 150 mm must be maintained between objects sensitive to magnetic fields and magnetic coupling or pump.

Pumps/aggregates treated by the factory have been provided with an anticorrosive coating. When properly stored indoors, the pump/aggregate is protected for a maximum of 3 months. In case of longer storage periods, the pump/aggregate has to be treated with a preserving agent again (→ Preservation, Paragraph 4.3).

For storing pumps/aggregates, which have already been in use, the preparations specified in Paragraph 4.3 Preservation must be made.

Applied preserving agents (→ page 34)

CAUTION

Risk of material damage caused by improper storage!

► Store the pump/aggregate accordingly.

1. Close all openings with blank flanges, plugs or plastic covers.
2. Make sure the storage room meets the following conditions:
   - dry
   - frost-free
   - vibration-free
   - protected
   - constant humidity
3. Turn the motor shaft once per month.
4. Make sure the motor shaft and bearing change their rotational position in this process.

4.3 Preservation

ⓘ Not necessary for rust-proof material

CAUTION

Risk of material damage caused by improper preservation!

► Properly apply preserving agent to the inside and outside of the pump/aggregate.

1. Select a preserving agent in accordance with the type and duration of storage (→ page 34).
2. Use preserving agents in accordance with the manufacturer's specifications.
3. Coat all bare metal components positioned inside and outside the pump with preserving agent.
4. Treat the impeller gap with a preserving agent.

4.3.1 Preservation inside the system

CAUTION

Risk of material damage caused by improper preservation!

► Shut down the aggregate (→ Decommissioning, page 19).

ⓘ Use appropriate collecting trays. Position of drainage bores (U_e) (→ dimensional drawing).

- Unscrew the screw plugs of all drainage bores (U_e).
- Drain the medium to be pumped.
- Occasionally rotate the motor shaft towards the direction of rotation of the aggregate.
- Continue with this process until no more medium to be pumped escapes.
- Plug all drainage bores with screw plugs.
- Remove the pipes from the suction and pressure connections.
- Plug the inlet nozzle with a blank flange.
- Fill in preserving agent into the open outlet nozzle.
- Plug the outlet nozzle with a blank flange.
- Switch the aggregate shortly on and off to allow for a proper distribution of the preserving agent.
- Unscrew the screw plugs of all drainage bores (U_e).
- Drain the preserving agent into collecting trays.
- Occasionally rotate the motor shaft towards the direction of rotation of the aggregate.
- Continue with this process until no more preserving agent escapes.
- Close the suction and pressure connection using transport or sealing covers.
- Plug all drainage bores (U_e) with screw plugs.

4.3.2 Preservation outside the system

CAUTION

Risk of material damage caused by improper preservation!

► Shut down the aggregate (→ Decommissioning, page 19; Return to manufacturer, page 23).

ⓘ Use appropriate collecting trays. Position of drainage bores (U_e) (→ dimensional drawing).

- Plug all drainage bores (U_e) with screw plugs.
- Plug the inlet nozzle with a blank flange.
- Fill in preserving agent into the open outlet nozzle until the agent becomes visible.
- Occasionally rotate the motor shaft towards the direction of rotation of the aggregate.
- Continue this process until the preserving agent appears below the upper edge of the outlet nozzle.
- Unscrew the screw plugs of all drainage bores (U_e).
- Drain the preserving agent into collecting trays.
- Occasionally rotate the motor shaft towards the direction of rotation of the aggregate.
- Continue with this process until no more preserving agent escapes.
- Close the suction and pressure connection using transport or sealing covers.
- Plug all drainage bores (U_e) with screw plugs.

4.4 Removing preserving agent

ⓘ Only required for pumps/aggregates treated with preserving agent.

CAUTION

Risk of bearing damage caused by excessive water pressure or splash water!

► Do not treat bearing areas with water or steam jet.

CAUTION

Risk of seal damage caused by improper cleaning agents!

► Ensure that cleaning agents do not harm the seals.

1. Use cleaning agents, which are appropriate for your respective application.
2. Rinse off preserving agent and collect it together with the rinsing agent.
3. Dispose of preserving agent according to local regulations.
4. For storage periods exceeding 6 months:
   - Check all elastomer components (O-rings, shaft sealings) for proper elasticity and replace if required.

4.5 Return to manufacturer

1. Decontaminate the pump.
2. Attach transportation and sealing covers.
3. Always send a certificate of conformity to the manufacturer. Copy certificate of conformity → page 47.

4.6 Disposal

⚠ DANGER



Strong magnetic field in the area of the magnetic coupling, individual magnets or the pump.

Risk of death and material damage caused by magnetic fields!

► Ensure that persons with cardiac pacemakers do not carry out any works on the pump/aggregate.

► Secure and, where required, prevent access to the workplace:

- Ensure that persons with cardiac pacemakers keep a safety distance of > 1 m.
- Make sure no magnetizable metal components can be attracted to the magnetic coupling.
- Make sure that parts of the magnetic coupling cannot be attracted to magnetizable metal components.

► A safety distance of > 150 mm must be maintained between objects sensitive to magnetic fields and magnetic coupling or pump.

⚠ WARNING

Risk of intoxication and environmental damage caused by media to be pumped!

► Prior to disposing the aggregate:

- Collect escaping media to be pumped and dispose of separately in accordance with local regulations.
- Neutralize residues of media to be pumped in the pump.
- Remove preserving agent (→ page 11).
- Disassemble plastic parts and dispose of in accordance with local regulations.

► Assign an authorized company to dispose of the aggregate to prevent the risk of environmental damage!

5 Set-up and connection

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

CAUTION

Risk of material damage caused by contamination!

► Do not remove transport locks until immediately before setting up the aggregate.

► Do not remove covers, transport and sealing caps until immediately before connection of the pipes to the aggregate.

5.1 Planning pipe system

5.1.1 Dimensioning supports and connections

CAUTION

Risk of material damage if the pipes apply excessive forces and torques to the aggregate!

► Make sure the permissible values are complied with.
→ Tables 20 – 22, page 34 et seq.

1. Calculate the piping forces and observe all operating conditions:
   – cold/warm
   – empty/filled
   – depressurized/pressurized
   – position changes
2. Make sure the pipe supports have permanent low-friction properties and do not seize up due to corrosion.
3. If required, provide for compensators in the pipes.

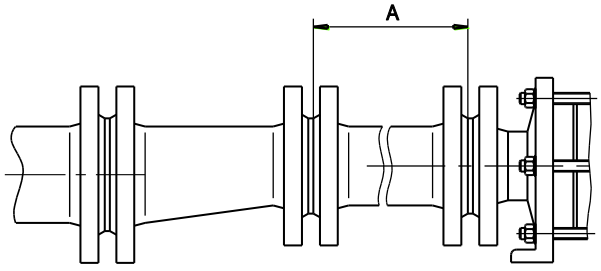
5.1.2 Specifying nominal diameter

ⓘ Size of suction/pressure connections
(→ dimensonal drawing)

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

1. Nominal suction pipe diameter ≥ nominal suction connection diameter
2. Nominal pressure pipe diameter ≥ nominal pressure connection diameter.

5.1.3 Specifying pipe lengths



A ≥ 10 x nominal inlet nozzle width

Fig. 8 Specifying pipe lengths

► Comply with the recommended minimum values **A** when installing the pump.

ⓘ When changing the diameter, use off-centre transition pieces to prevent formation of gas bubbles.

5.1.4 Changes in cross-section and direction

1. Avoid radii of curvature of less than 1.5 times the nominal pipe diameter.
2. Avoid sudden changes of cross-section and direction along the piping.

5.2 Safety and control devices

ⓘ For maintenance and repair works

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

5.2.1 Avoiding contamination

ⓘ To prevent bearing damage at the sleeve bearing and overheating in the area of the magnetic coupling, these areas are continuously flushed and cooled through a directed flow control of the medium to be pumped. A filter with magnetic insert should be installed in the suction/feed pipe to prevent foreign bodies from clogging the sleeve bearing and the ducts of the flow control system.

1. Install filters in the suction pipe
(screen cross-section = 3x DN_s, mesh size 0.1 mm).
2. Install a differential pressure gauge with a contact manometer to monitor the contamination of the filter/screen.

5.2.2 Provisions for measuring operating conditions

1. For pressure measuring: provide for manometers in the suction and pressure pipe.
2. Provide for a power sensor at the motor side.
3. Provide for temperature measurement at the pump side.

5.3 Preparing set-up

⚠ DANGER



Strong magnetic field in the area of the magnetic coupling, individual magnets or the pump. Risk of death and material damage caused by magnetic fields!

► Ensure that persons with cardiac pacemakers do not carry out any works on the pump/aggregate.

► Secure and, where required, prevent access to the workplace:
   – Ensure that persons with cardiac pacemakers keep a safety distance of > 1 m.
   – Make sure no magnetizable metal components can be attracted to the magnetic coupling.
   – Make sure that parts of the magnetic coupling cannot be attracted to magnetizable metal components.

► A safety distance of > 150 mm must be maintained between objects sensitive to magnetic fields and magnetic coupling or pump.

5.3.1 Checking ambient conditions

► Make sure the required ambient conditions are maintained (→ Technical data sheet).

► For pump/aggregate set-up at an altitude of > 1000 m above sea level, consult the manufacturer.

5.3.2 Minimum clearances for heat dissipation

ⓘ Minimum clearances
(→ Clearances for heat dissipation, page 32).

5.3.3 Preparing installation site

► Make sure the installation site meets the following conditions:
  – the aggregate is freely accessible from all sides
  – sufficient space for installing/disassembling the pipes as well as for maintenance and repair works, particularly for installation/disassembly of the aggregate, is provided for
  – the aggregate is not exposed to external vibrations (bearing damage)
  – frost protection

5.3.4 Preparing foundation and surface

ⓘ Set-up options:
  – with concrete foundation
  – with steel foundation frame
  – without foundation

► Make sure foundation and surface meet the following conditions:
  – level
  – clean (free of oil, dust or other contaminations)
  – load carrying capacity is in accordance with the dead weight of the aggregate and all operating forces
  – adequate aggregate stability
  – with concrete foundation:
    standard concrete of strength class B 25

5.3.5 Removing preserving agent

► If the aggregate is commissioned directly after set-up and connection: remove preserving agent prior to set-up (→ Removing preserving agent, page 11).

5.4 Set-up with foundation

ⓘ Only possible with base plate

CAUTION

Risk of material damage caused by distortion of the base plate!

► Position and fix the base plate on the foundation as follows.

5.4.1 Placing aggregate on foundation

✓ Auxiliary means, tools, material:
  – wrench
  – foundation bolts (→ Set-up drawing)
  – steel washers
  – non-shrinking mortar grout
  – spirit level

1. Lift the aggregate (→ Transport, page 10).
2. Hook the foundation bolts from below into the base plate fixing holes.

ⓘ Observe the manufacturer's specifications when using adhesive anchors.

3. Place the aggregate on the foundation.
   Insert the foundation bolts into the provided anchoring holes.

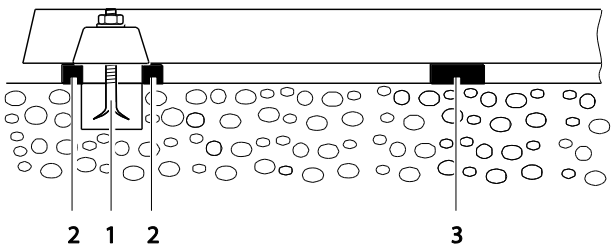


Fig. 9 Set-up with foundation

4. Use steel washers to align the aggregate to height and system dimensions as follows:
   – Place 1 steel washer (2) at the left and right hand side of each foundation bolt (1).
   – With > 750 mm clearances between the anchoring holes, an additional steel washer (3) must be positioned in the middle of each side of the base plate.
5. Make sure the steel washers are in surface contact with the base plate.
6. Use the integrated spirit level to check whether the aggregate is level end-to-end and side to side with a maximum allowable tilt of 1 mm/m.
7. Repeat this process until the base plate has been correctly aligned.

5.4.2 Fixing aggregate

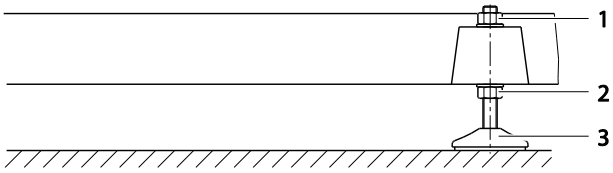
ⓘ Filling the base plate with mortar grout improves the dampening behaviour.

1. Fill the anchoring holes with mortar grout.
2. When the mortar grout has set, bolt down the base plate with the specified torque at three points (→ Tightening torques, page 33).
3. Before tightening the remaining bolts, compensate for any unevenness in the surface using metal spacing shims next to each bolt.
4. Make sure the base plate is not distorted.

5.5 Set-up without foundation

ⓘ With base plate

✓ Auxiliary means, tools, material:
  – wrench
  – spirit level



1 Hexagon nut
2 Hexagon nut
3 Levelling foot

Fig. 10 Set-up without foundation

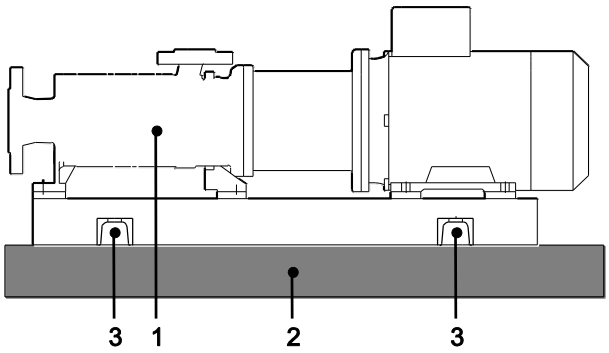
1. Lift the aggregate (→ Transport with lifting gear, page 10).
2. Mount the four levelling feet as illustrated.
3. Position the aggregate on the surface.
4. Adjust the base plate height by means of the levelling feet as illustrated above:
   – Use the wrench to hold the hexagon nut at the levelling foot (3).
   – Loosen the hexagon nut (1).
   – The height can be adjusted by turning the hexagon nut (2).
   – Tighten the hexagon nut (1) (→ Tightening torques, page 33).
   – Use the integrated spirit level to check whether the aggregate is level end-to-end and side to side with a maximum allowable tilt of 1 mm/m.
   – Repeat this process until the base plate has been correctly aligned.

5.6 Set-up on torsion-resistant level surface/frame

ⓘ Installation position: horizontal, outlet nozzle pointing vertically up

✓ Auxiliary means, tools, material:

– wrench



1 Aggregate

2 Surface/frame

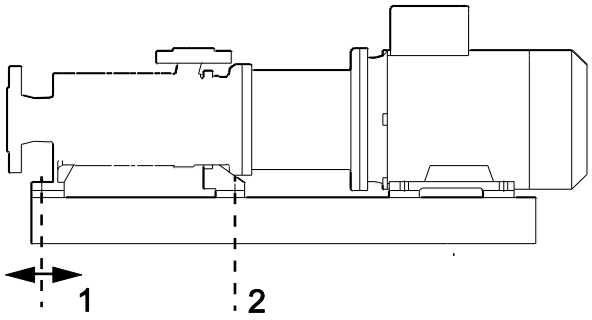
3 Screws

Fig. 11 Set-up on level surface/frame

1. Lift the aggregate (1) (→ Transport, page 10).
2. Position the aggregate on a torsion-resistant level surface/frame (2).
3. Screw the aggregate to the surface/frame (2) without overtightening the screws (3).

5.7 Foot mounting for operation with a hot medium to be pumped

If the pump is operated with a hot medium above 120 °C, the pump feet on the motor-side (2) must be fixed. The attachment of the other pump feet (1) must allow longitudinal extension.

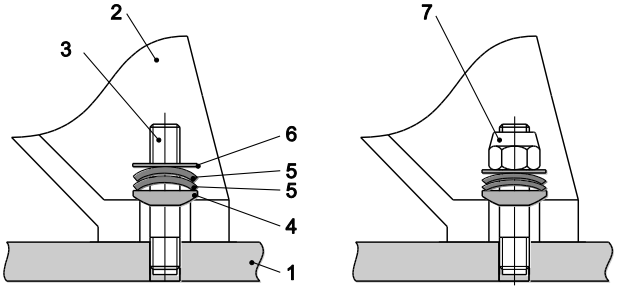


1 Allow longitudinal extension (foot mounting with horizontal clearance).

2 Fixed mounting.

Fig. 12 Casing foot attachment in the case of expansion due to hot media

Foot mounting with horizontal clearance



1 Base plate

2 Casing foot

3 Stud bolt

4 Spherical washer

5 2 x spring washer

6 Washer

7 Self-locking nut

Fig. 13 Casing foot attachment (view from the front)

1. Screw in the stud bolt (3) into the frame / base plate.
2. Push the spherical washer (4) onto the stud bolt (the concave part must be facing downwards).
3. Push the two spring washers (5) onto the stud bolt as shown in Fig. 13.
4. Push the washer (6) onto the stud bolt.
5. Screw on the self-locking nut (7) until it contacts the washer (6).
6. Tighten the self-locking nut (7) by a three-quarter turn.

5.8 Motor installation

⚠ DANGER

Strong magnetic field in the area of the magnetic coupling, individual magnets or the pump. Risk of death and material damage caused by magnetic fields!

► Ensure that persons with cardiac pacemakers do not carry out any works on the pump/aggregate.

► Secure and, where required, prevent access to the workplace:

– Ensure that persons with cardiac pacemakers keep a safety distance of > 1 m.
– Make sure no magnetizable metal components can be attracted to the magnetic coupling.
– Make sure that parts of the magnetic coupling cannot be attracted to magnetizable metal components.

► A safety distance of > 150 mm must be maintained between objects sensitive to magnetic fields and magnetic coupling or pump.

ⓘ Only necessary if aggregate set-up is completed at the installation site.

CAUTION

Risk of material damage caused by knocks and bumps!

► Make sure the magnetic coupling does not get jammed when sliding it onto the motor shaft.

► Do not knock on or hit any pump/motor components.

1. Apply a razor-thin layer of molybdenum disulfide (e.g. Molykote®) to the motor shaft.
2. Insert the fitting key into the motor shaft.
3. Slide the pre-assembled magnetic coupling at the motor side onto the motor shaft.
4. Adjust the magnetic coupling (in accordance with the adjustment table) and fix it on the motor shaft by means of a set screw.
5. Lift the motor and put it down on the base plate.
6. Adjust the motor shaft to the height of the pump shaft putting suitable shims under the motor feet.
7. Move the motor and the magnetic coupling into the bracket at the pump.
8. Insert hexagon head screws into the motor flange and screw it to the bracket.

5.9 Connecting pipes

⚠ DANGER



Strong magnetic field in the area of the magnetic coupling, individual magnets or the pump.

Risk of death and material damage caused by magnetic fields!

► Ensure that persons with cardiac pacemakers do not carry out any works on the pump/aggregate.

► Secure and, where required, prevent access to the workplace:

- Ensure that persons with cardiac pacemakers keep a safety distance of > 1 m.
- Make sure no magnetizable metal components can be attracted to the magnetic coupling.
- Make sure that parts of the magnetic coupling cannot be attracted to magnetizable metal components.

► A safety distance of > 150 mm must be maintained between objects sensitive to magnetic fields and magnetic coupling or pump.

5.9.1 Stress-free pipe connection

► Provide for a stress-free pipe connection.

CAUTION

Risk of material damage if the pipes apply excessive forces and torques to the pump!

► Do not use the pump as anchoring point for the pipes.

► Observe the permissible forces and torques acting on the pump nozzles (Chap. 9.3).

✓ Pipe has been laid and cooled down

1. Disconnect the connection flanges of the pipes from the aggregate.
2. Check whether the pipe can be freely moved in the area of the expected expansion into all directions.
   - Nominal width < 150 mm: manually
   - Nominal width > 150 mm: with a small lever
3. Make sure the flanges are positioned plane-parallel.
4. Re-connect the connection flanges of the pipes to the aggregate.

5.9.2 Providing for clean piping

CAUTION

Risk of material damage caused by aggregate contamination!

► Make sure the inside of the aggregate is kept free of contamination.

1. Clean all piping parts and fittings prior to assembly.
2. Make sure no flange seals project inwards.
3. Make sure no sealing material (sealing tape, adhesive) projects inwards.
4. Remove any blank flanges, plugs, protective foils and/or protective paint from the flanges.

5.9.3 Installing suction/feed pipe

1. Remove transport and sealing covers from the aggregate.
2. Lay out the feed pipe with a continuous slope down to the aggregate.
3. Lay out the suction pipe with a continuous slope up to the aggregate.
4. Make sure the seal does not project inwards.
5. Suction lift mode:
   Install a foot valve in the suction pipe (at least 0.5 m below the aggregate) to prevent the suction pipe from running dry at standstill.
6. Gravity feed mode:
   liquid level at least 0.5 m above the pump shaft of the aggregate.
7. For pumping from vacuum reservoir:
   Pressure-relief pipe (1“~2“) leading back to the reservoir.

5.9.4 Installing pressure pipe

1. Remove transport and sealing covers from the aggregate.
2. Install the pressure pipe.
3. Make sure the seal does not project inwards.

5.10 Hydrostatic pressure test

ⓘ When subjecting the pipe system to a pressure test, do not apply pressure to the pump if possible. Prevent foreign bodies from entering the pump/aggregate.

CAUTION

Material damage caused by excessive pressure applied to the aggregate!

► Do not exceed the test pressure (max. 1.5 x pressure rating, Chapter 9.2.5).

5.11 Electrical connection

⚠ DANGER



Strong magnetic field in the area of the magnetic coupling, individual magnets or the pump. Risk of death and material damage caused by magnetic fields!

► Ensure that persons with cardiac pacemakers do not carry out any works on the pump/aggregate.

► Secure and, where required, prevent access to the workplace:
  – Ensure that persons with cardiac pacemakers keep a safety distance of > 1 m.
  – Make sure no magnetizable metal components can be attracted to the magnetic coupling.
  – Make sure that parts of the magnetic coupling cannot be attracted to magnetizable metal components.

► A safety distance of > 150 mm must be maintained between objects sensitive to magnetic fields and magnetic coupling or pump.

⚠ RISK OF ELECTRIC SHOCK

Risk of death from electric shock!

► Qualified electricians must carry out any electrical works only.

► Observe the IEC 60364 and for potentially explosive areas the IEC 60079 standard.

⚠ DANGER

Risk of death from rotating parts!

► Make sure to only operate the aggregate with all covers (fan hood, coupling guard) installed.

5.11.1 Mains power cable

CAUTION

Risk of material damage caused by improper installation!

► Connect the aggregate with a fixed mains power cable.

- Insert the power cable with cable glands in the terminal box.
- Use a cable with sufficient outer diameter to provide for protection against dripping water and strain relief.
- Bend the power cable with drain loop in the area of the cable gland to divert dripping water.
- Close unassigned openings in the terminal box by means of plugs provided by the manufacturer.
- In application areas with high temperatures (> 90° C), use a heat-resistant power cable.
- Make sure the power cable does not get in contact with pipes and aggregate components.
- The power supply (amperage and voltage) has to comply with the data on the nameplate of the motor.

5.11.2 Motor connection

ⓘ Observe the specifications of the motor manufacturer.

1. Connect the motor in accordance with the circuit diagram.
2. Exclude any risk associated with electric power.

ⓘ The electric motor must be protected by an upstream motor protection switch, which is set to I_N (I_N = nominal current).

5.11.3 Checking direction of rotation

⚠ DANGER

Risk of death from rotating parts!

► Use protective equipment when carrying out any works on the aggregate.

► Keep an adequate distance to rotating parts.

CAUTION

Risk of material damage caused by dry running or incorrect direction of rotation!

► Fill the aggregate and the suction pipe with the medium to be pumped (→ Filling and venting, page 18).

1. Switch the aggregate on and immediately off again.
2. Check whether the direction of rotation of the motor is in accordance with the arrow indicating the direction of rotation on the aggregate.

ⓘ Wrong direction of rotation results in bearing damage.

⚠ RISK OF ELECTRIC SHOCK

Risk of death from electric shock!

► Qualified electricians must carry out any electrical works only.

► Observe the IEC 60364 and for potentially explosive areas the IEC 60079 standard.

3. In case of deviating direction of rotation: Swap the two phases.

5.11.4 Aggregate operation with frequency converter

ⓘ The aggregate can be operated with a frequency converter. The following has to be considered.

CAUTION

Risk of motor damage caused by voltage peaks of the frequency converter!

► Make sure filters are installed between the motor and the frequency converter.

The following has to be considered when operating the aggregate with a frequency converter:

► The motor must be designed for operation with a frequency converter.

► The max. aggregate speed must not be exceeded (→ Technical data sheet).

► Operate the frequency converter in the range between 40 and 60 Hz.

► Depending on the type of frequency converter, the motor noise may increase.

► For operation in other frequency converter ranges, please contact the manufacturer.

► Do not protect the motor by means of an RCCB when using a frequency converter. Frequency converters may impair the proper functioning of RCCBs.
  – Exception: AC/DC sensitive RCCBs are permissible.

6 Operation

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

⚠ DANGER



Strong magnetic field in the area of the magnetic coupling, individual magnets or the pump.

Risk of death and material damage caused by magnetic fields!

- ► Ensure that persons with cardiac pacemakers do not carry out any works on the pump/aggregate.
- ► Secure and, where required, prevent access to the workplace:
  - Ensure that persons with cardiac pacemakers keep a safety distance of > 1 m.
  - Make sure no magnetizable metal components can be attracted to the magnetic coupling.
  - Make sure that parts of the magnetic coupling cannot be attracted to magnetizable metal components.
- ► A safety distance of > 150 mm must be maintained between objects sensitive to magnetic fields and magnetic coupling or pump.

6.1 Preparations for commissioning

6.1.1 Identifying pump type

► Identify the pump/aggregate type (→ Nameplate, page 8).

ⓘ Pump/aggregate types vary, e.g. with regard to material, suction capacity, auxiliary operating systems.

6.1.2 Removing preserving agent

ⓘ Only required for pumps/aggregates treated with preserving agent.

► Remove preserving agent
(→ Removing preserving agent, page 11).

6.1.3 Checking shutdown period

► Shutdown periods > 1 year: contact the manufacturer and ask for required measures.

► Shutdown periods < 1 year: take all steps as required for commissioning (→ Commissioning, page 18).

6.1.4 Filling and venting

1. Fill the aggregate and the suction pipe with the medium to be pumped and vent.
2. Open the suction-side fitting.
3. Open the pressure-side fitting.
4. Make sure all ports and connections are tight.

6.1.5 Preparing auxiliary operating systems

The manufacturer does not accept liability for damage resulting from the installation or use of auxiliary operating systems manufactured by suppliers other than Speck or auxiliary operating systems, which have not been approved.

6.2 Commissioning

⚠ DANGER



Strong magnetic field in the area of the magnetic coupling, individual magnets or the pump.
Risk of death and material damage caused by magnetic fields!

- ► Ensure that persons with cardiac pacemakers do not carry out any works on the pump/aggregate.
- ► Secure and, where required, prevent access to the workplace:
  - Ensure that persons with cardiac pacemakers keep a safety distance of > 1 m.
  - Make sure no magnetizable metal components can be attracted to the magnetic coupling.
  - Make sure that parts of the magnetic coupling cannot be attracted to magnetizable metal components.
- ► A safety distance of > 150 mm must be maintained between objects sensitive to magnetic fields and magnetic coupling or pump.

6.2.1 Switch-on

- ✓ Aggregate correctly set up and connected
- ✓ Motor correctly connected
- ✓ Coupling guard installed
- ✓ All connections stress-free and sealed
- ✓ If available: auxiliary operating systems ready for operation
- ✓ All safety devices installed and checked for proper functioning
- ✓ Aggregate properly prepared and filled
- ✓ Direction of motor rotation checked

⚠ DANGER

Risk of injuries caused by running aggregate!

- ► Do not touch the running aggregate.
- ► Do not carry out any works on the running aggregate.
- ► Only work on the aggregate after it has completely cooled down.

⚠ WARNING

Risk of injuries caused by hot pump parts or hot media to be pumped!

- ► Use protective equipment when carrying out any works on the aggregate.

CAUTION

Risk of material damage caused by dry running!

- ► Make sure the aggregate has been properly filled and vented.

CAUTION

Risk of cavitation when throttling down the suction flow!

- ► Completely open the suction-side fitting and do not use it for controlling the flow rate.
- ► Do not close the pressure-side fitting beyond the admissible operating pressure.

CAUTION

Risk of material damage caused by a closed pressure pipe!

- ► Do not operate the aggregate when the pressure-side fitting is closed.
- ► Observe the minimum flow rate (→ Technical data sheet).
- ► Avoid sudden temperature changes of hot media to be pumped. Slowly increase the temperature of the medium.

CAUTION

Risk of material damage caused by pressure surges in the system!

- ► Protect the aggregate against pressure surges, which may be generated if the system is switched off too fast.

1. Open the suction-side fitting.
2. Open the pressure-side fitting halfway.
3. Switch on the motor and check whether pump and motor operate smoothly and synchronously. Unusual noises in the drive or insufficient total head indicate asynchronous operation.
4. When the nominal speed has been reached, set the operating point by means of the pressure-side fitting.
5. After the aggregate has been subjected to pressure and operating temperature for the first time, check whether the aggregate and all connections are tight.

6.2.2 Operation with hot media

CAUTION

Risk of material damage caused by sudden thermal stress!

- ► During commissioning, the temperature of the aggregate and the temperature of the medium to be pumped must not differ by more than 100°C.
- ► Continuously heat up the aggregate to keep it hot/heat it up and make sure the max.heating speed of 10°C/min is not exceeded.
- ► With media to be pumped at temperatures ≥ 150°C: Do not operate the aggregate until the aggregate has been sufficiently heated.

CAUTION

Risk of material damage caused by light ends and residual water (bearing damage)!

ⓘ Applies to delivery of thermal oil

- ► Ensure consistent oil quality in accordance with the specifications of the oil/system manufacturer by removing light ends and residual water (boil out). Protect the pump against steam surges and dry running during boiling.
- ► Check the oil quality in regular intervals in accordance with the specifications of the oil manufacturer.

6.2.3 Switch-off

⚠ DANGER



Strong magnetic field in the area of the magnetic coupling, individual magnets or the pump.

Risk of death and material damage caused by magnetic fields!

- ► Ensure that persons with cardiac pacemakers do not carry out any works on the pump/aggregate.
- ► Secure and, where required, prevent access to the workplace:
  - Ensure that persons with cardiac pacemakers keep a safety distance of > 1 m.
  - Make sure no magnetizable metal components can be attracted to the magnetic coupling.
  - Make sure that parts of the magnetic coupling cannot be attracted to magnetizable metal components.
- ► A safety distance of > 150 mm must be maintained between objects sensitive to magnetic fields and magnetic coupling or pump.

⚠ WARNING

Risk of injuries caused by hot pump parts or hot media to be pumped!

- ► Use protective equipment when carrying out any works on the aggregate.

1. Switch off the motor.
2. Close the pressure-side fitting. (Only necessary if the pressure-side pipe has not been provided with a backflow preventer or if there is no backpressure).
3. Check all connecting screws and tighten them if required (only after initial commissioning).

6.3 Operating limits

6.3.1 Temperature of the medium to be pumped

CAUTION

Risk of material damage due to overheating!

- ► Only operate the aggregate within the temperature range specified in the pump data sheet.

6.3.2 Minimum pressure on the inlet nozzle (NPSH)

CAUTION

Risk of material damage due to cavitation!

- ► Make sure the system NPSH value (NPSHA) > pump/aggregate NPSH value (NPSHR) (this applies to all operating conditions)
- ► Pumps/aggregates must only be operated with the NPSH values specified in the technical data sheet.

ⓘ When delivering liquids near boiling point, observe the NPSH value. Operation below the NPSH value of the pump/aggregate may result in material damage caused by cavitation or destruction due to overheating.

6.3.3 Switching frequency

CAUTION

Risk of material damage caused by excessive temperature increase or load!

- ► Do not start up the aggregate more than 15 times per hour.
- ► The aggregate must only be started from standstill.
- ► Observe the switching frequency of the electric motor (operating manual of the motor). In case of deviating values, the lower permissible switching frequency is applicable.

ⓘ To avoid excessive temperature increases inside the motor and excessive pump, coupling and bearing loads, observe the max. switching frequency.

6.3.4 Minimum flow rate

CAUTION

Risk of material damage due to overheating!

- ► Only operate the aggregate with the minimum flow rate specified in the data sheet.

ⓘ If operation against a closed pressure-side fitting is not excluded, a minimum flow rate (bypass) has to be ensured as otherwise the maximum permissible temperature may be exceeded.

6.3.5 Variable speeds

ⓘ All three-phase motors may be connected to a frequency converter.

CAUTION

Risk of material damage caused by voltage peaks! Increased motor noise!

- ► Install filters between the frequency converter and the motor.

CAUTION

Risk of material damage caused by overheating of the motor winding!

- ► Use PTC thermistors to monitor the winding temperature.

CAUTION

Risk of material damage caused by breaking the min. or max. speed limit!

- ► Only operate the aggregate with the limit speeds specified in the technical data sheet.

6.3.6 Density of the medium to be pumped

CAUTION

Risk of material damage caused by overload!

- ► Only operate the aggregate with media to be pumped specified in the technical data sheet.
- ► If you want to deliver media with densities other than those specified in the technical data sheet, please consult the manufacturer.

ⓘ The power consumption of the aggregate rises proportionally with the density of the medium to be pumped. Prevent overloading of the aggregate by using only media to be pumped complying with the density specified in the technical data sheet.

6.4 Decommissioning

⚠ DANGER



Strong magnetic field in the area of the magnetic coupling, individual magnets or the pump.

Risk of death and material damage caused by magnetic fields!

- ► Ensure that persons with cardiac pacemakers do not carry out any works on the pump/aggregate.
- ► Secure and, where required, prevent access to the workplace:
  - Ensure that persons with cardiac pacemakers keep a safety distance of > 1 m.
  - Make sure no magnetizable metal components can be attracted to the magnetic coupling.
  - Make sure that parts of the magnetic coupling cannot be attracted to magnetizable metal components.
- ► A safety distance of > 150 mm must be maintained between objects sensitive to magnetic fields and magnetic coupling or pump.

⚠ WARNING

Risk of injuries caused by hot pump parts or hot media to be pumped!

- ► Use protective equipment when carrying out any works on the aggregate.
- ► Reliably collect escaping media to be pumped and dispose of in an environmentally friendly way.

Implement the following measures when taking the pump/aggregate out of operation:

Aggregate is	Measure
shut down while remaining ready for operation	► Shortly operate (approx. 5 minutes) the aggregate at intervals of at least one month but not exceeding three months (→ Commissioning, page 18).
shut down for a longer period of time	► Implement measures in accordance with the condition of the medium to be pumped (→ Tab.8).
drained	► Close all fittings.
disassembled	► Disconnect the motor from the power supply and secure it against unauthorized switch-on.
stored	► Observe the measures to be implemented for storage (→ Storage, page 10).

Tab. 7 Measures to be taken when putting the pump out of operation

Behaviour of medium to be pumped	Duration of shutdown (process-dependent)	
	Short	Long
Solidifying/ freezing, non-corrosive	► Heat up or drain aggregate and reservoirs.	► Drain pump and reservoirs.
Solidifying/ freezing, non-corrosive	► Heat up or drain aggregate and reservoirs.	► Drain pump and reservoirs. ► Treat aggregate with a preserving agent (→ Preservation, page 11).
Remains liquid, non-corrosive	-	-
Remains liquid, corrosive	-	► Drain pump and reservoirs. ► Treat pump/ aggregate with a preserving agent (→ Preservation, page 11).

Tab. 8 Measures depending on the behaviour of the medium to be pumped

6.5 Re-commissioning

Shutdown periods > 1 year:

1. Prepare commissioning (→ Preparations for commissioning, page 18).
2. Perform commissioning procedures (→ Commissioning, page 18).
3. Monitor the aggregate following commissioning (→ Monitoring, page 22).

6.6 Operating stand-by aggregate

✓ Stand-by aggregate filled

ⓘ Operate the stand-by aggregate at least once per week.

7 Maintenance and servicing

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

7.1 General instructions

ⓘ The operator has to ensure that authorised and trained staff carry out all maintenance, inspection and installation works, which is adequately familiar with the aggregate after having carefully read the operating manual.

ⓘ A qualified service team provides support for assembly and repair works. Provide a certificate documenting the safety of the media to be pumped (DIN safety data sheet or certificate of conformity when ordering this service) (→ Certificate of conformity, page 47).

ⓘ A maintenance schedule will reduce maintenance expenditures to a minimum and prevent expensive repairs. Compliance with the maintenance schedule will guarantee a trouble-free and reliable system operation.

7.2 Monitoring

ⓘ Inspection intervals depend on the operational strain on the aggregate.

⚠ DANGER



Strong magnetic field in the area of the magnetic coupling, individual magnets or the pump. Risk of death and material damage caused by magnetic fields!

► Ensure that persons with cardiac pacemakers do not carry out any works on the pump/aggregate.

► Secure and, where required, prevent access to the workplace:
- Ensure that persons with cardiac pacemakers keep a safety distance of > 1 m.
- Make sure no magnetizable metal components can be attracted to the magnetic coupling.
- Make sure that parts of the magnetic coupling cannot be attracted to magnetizable metal components.

► A safety distance of > 150 mm must be maintained between objects sensitive to magnetic fields and magnetic coupling or pump.

⚠ RISK OF ELECTRIC SHOCK

Risk of death from electric shock!

► Qualified electricians must carry out any electrical works only.

► Observe the IEC 60364 and for potentially explosive areas the IEC 60079 standard.

⚠ DANGER

Risk of injuries caused by running aggregate!

► Do not touch the running aggregate.

► Do not carry out any works on the running aggregate.

⚠ WARNING

Risk of injuries caused by hot pump parts or hot media to be pumped!

► Use protective equipment when carrying out any works on the aggregate.

1. Check at appropriate intervals:
   - power consumption of the drive
   - contamination of the drive
   - contamination of filters (if available)
   - running noise of the sleeve bearings (pump)
   - running noise of the rolling bearings (motor)
   - availability of protective covers
   - normal operating conditions unchanged
2. For trouble-free operation, ensure the following:
   - no dry running
   - tightness
   - no cavitation
   - no heating of the medium to be pumped
   - open gate valves at the suction side
   - free and clean filters
   - no unusual running noise or vibrations
   - proper functioning of the auxiliary operating systems (if available)
3. Bearings in general
   - Sleeve bearings and rolling bearings are wear parts and should therefore be regularly checked for running noise and temperature increase. Unusual running noise or increased bearing temperatures are indicators of bearing damage. In such case, the bearing has to be immediately replaced. Bearing damage can also be prevented by checking the vibration values derived from shock pulse measurements on the rolling bearings.

   Drive-side support

   Support of outer magnetic coupling rotor
   - The drive-side support of the outer rotor of the magnetic coupling in the bearing casing is realized by means of rolling bearings, which are closed at both ends. The lifetime-lubricated rolling bearings are provided with special high-temperature grease and cannot be re-lubricated. The nominal lifetime of such bearings is approx. 17,500 operating hours during continuous operation.

   Output-side support

   Support of inner magnetic coupling rotor
   - The sleeve bearing of the pump shaft is lubricated by the medium to be pumped and does not require maintenance. The sleeve bearing should be inspected within the scope of a system inspection or after 3 operating years at the latest.

7.3 Disassembly

⚠ DANGER



Strong magnetic field in the area of the magnetic coupling, individual magnets or the pump. Risk of death and material damage caused by magnetic fields!

► Ensure that persons with cardiac pacemakers do not carry out any works on the pump/aggregate.

► Secure and, where required, prevent access to the workplace:
- Ensure that persons with cardiac pacemakers keep a safety distance of > 1 m.
- Make sure no magnetizable metal components can be attracted to the magnetic coupling.
- Make sure that parts of the magnetic coupling cannot be attracted to magnetizable metal components.

► A safety distance of > 150 mm must be maintained between objects sensitive to magnetic fields and magnetic coupling or pump.

⚠ DANGER

Risk of injuries caused by running aggregate!

► Do not touch the running aggregate.

► Do not carry out any works on the running aggregate.

► Prior to carrying out any assembly or maintenance works, de-energize the motor and protect it against restart.

⚠ RISK OF ELECTRIC SHOCK

Risk of death from electric shock!

► Qualified electricians must carry out any electrical works only.

► Observe the IEC 60364 and for potentially explosive areas the IEC 60079 standard.

⚠ WARNING

Risk of injuries caused by hot pump parts or hot media to be pumped!

► Use protective equipment when carrying out any works on the aggregate.

► Make sure the aggregate is depressurized.

► Drain the aggregate. Reliably collect media to be pumped and dispose of in an environmentally friendly way.

7.3.1 Return to manufacturer

✓ Aggregate shut down

✓ Aggregate depressurized

✓ Aggregate completely drained

✓ Electrical connections isolated and motor secured against re-start

✓ Auxiliary operating systems shut down, depressurized and drained (if available)

✓ Connecting pipes removed

✓ Manometer lines, manometer and fixtures removed

1. Loosen fixing screws.
2. Lift the aggregate out of the system (→Transport, page 10).
3. Decontaminate aggregate.
4. Attach transport and sealing covers.
5. In any case, send a certificate of conformity to the manufacturer (www.speck.de/en/downloads/certificates/) or copy page 47.

7.3.2 Spare parts

ⓘ Spare parts are available from your supplier or the manufacturer.

The following data are required for spare part orders.

- Number of the pump/aggregate (→ Nameplate, page 8)
- Type of pump/aggregate (→ Nameplate, page 8)
- Item number of the spare part (→ Order-related cross-sectional drawing)
- Designation of the spare part (→ Order-related cross-sectional drawing)
- Number of spare parts

7.3.3 Pump/aggregate repairs

1. The following must be observed during assembly:
   - Worn parts must be replaced by original spare parts.
   - Replace seals.
   - The required tightening torques must be observed (→ Tightening torques, page 33).
2. Clean all parts.
3. Install the aggregate into the system (→ Set-up and connection, page 13).

7.3.4 Disassembly of ASKM

ⓘ Cross-sectional drawing ASKM → page 37 et seq.

✓ The aggregate has been removed from the system, drained and is stored in a clean, level and non-magnetic assembly area.

1. Motor disassembly
   - Put the aggregate on a level surface plate.
   - If required, support the motor or pump feet with washers.

   Version without intermediate flange (154):
   - Loosen the hexagon head screws (901) on the motor flange and remove them together with the washer (550.1) and the nut (920.4).
   - Pull the motor with the outer magnet off the bracket and deposit the two components in a clean, level and non-magnetic area. Pull the motor straight upwards to avoid any damage to the separating can (816) caused by the outer magnet (847.1).

   Version with intermediate flange (154):
   - Loosen the hexagon head screws (901.1) on the intermediate flange (154) and remove them together with the washers (550.4).
   - Pull the motor with the outer magnet off the bracket and deposit the two components in a clean, level and non-magnetic area. Pull the motor straight upwards to avoid any damage to the separating can (816) caused by the outer magnet (847.1).
2. Disassembly of suction casing
   - Mark the individual components' positions relative to one another (coloured pencil, scriber).
   - Vertically position the pump with the drive side pointing down and make sure it cannot tip over.
   - Loosen the hexagon nuts (920) on the bolts (563) and remove them together with the locking disks (552).
   - Take off the suction casing (106).
3. Disassembly of impellers and stages
   - Loosen the lock washer (931) and the shaft nut (920.2) on the shaft (211) and remove them. **CAUTION: left-hand thread!**
   - Pull the impeller (230.1) off the pump shaft.
   - Remove the fitting key (940.2) from the shaft.
   - Remove the stage N (114.3).
   - Pull the sleeve bearing (310) together with the bearing rings (391) off the shaft.
   - Remove the suction stage (114).
   - Remove the star impeller (230).
   - Remove the fitting key (940) from the pump shaft.
   - Remove the discharge stage I (114.1) (not available for single-stage pumps). **CAUTION**: **Do not damage the sleeve bearings (310.2)!**
   - Repeat all steps from “Remove the suction stage” until you reach discharge stage II (114.2) and remove it.
4. Disassembly of discharge casing
   - Pull the discharge casing (107) off the pump frame (180).
   - Remove the O-ring (412) or the flat gasket (400.1).

5. Disassembly of inner magnet and bearing

Magnetic coupling 60/75 (ASKM20 / ASKM32 / ASKM33)

ⓘ Sleeve bearing for magnetic coupling 60/75 in ASKM20/32/33 → Fig. 14, page 25

- Horizontally position the aggregate and fix it.
- Loosen the hexagon socket head screws (914.1) on the separating can (816) and remove both components. (Possibly provide for a reservoir to collect medium gathered in the separating can.)
- Remove the flat gasket (400).
- Loosen the hexagon nut (920.3) and remove it together with the locking disk (552.1).
- Pull the inner magnet (847) off the shaft.
- Do not remove the fitting key (940.1).
- Loosen the hexagon socket head screws (914) and remove them.
- Pull the sleeve bearing (310.3) together with the shaft (211) out off the pump frame. Vertically clamp the shaft with a bench vice using a protective jaws (sleeve bearing side pointing upwards).
- Remove the fitting key (940.1).
- Pull off the axial sleeve bearing (3).
- Pull off the bearing bracket (1).
- Pull off the radial sleeve bearing (2).
- Pull off the axial sleeve bearing (3).
- Remove all flat gaskets (5).

Magnetic coupling 75 (ASKM40 / ASKM50 / ASKM65)

ⓘ Sleeve bearing for magnetic coupling 75 in ASKM40/50/65 → Fig. 15, page 25

- Horizontally position the aggregate and fix it.
- Loosen the hexagon socket head screws (914.1) on the separating can (816) and remove both components. (Possibly provide for a reservoir to collect medium gathered in the separating can.).
- Remove the flat gasket (400).
- Loosen the hexagon nut (920.3) and remove it together with the locking disk (552.1).
- Pull off the inner magnet (847).
- Do not remove the fitting key (940.1).
- Loosen the hexagon socket head screws (914) and remove them.
- Pull the sleeve bearing (310.3) together with the shaft (211) out off the pump frame. Vertically clamp the shaft with a bench vice (sleeve bearing side pointing upwards).
- Remove the fitting key (940.1).
- Pull off the axial sleeve bearing (3).
- Pull off the bearing bracket (1).
- Pull off the radial sleeve bearing (2), the tolerance ring (7) and the shaft bush (8) from the shaft.
- Pull off the radial sleeve bearing (2) and the tolerance ring (7) from the shaft.
- Remove the axial sleeve bearing (3).
- Remove all flat gaskets (5).

Magnetic coupling 110/135

ⓘ Sleeve bearing for magnetic coupling 110/135 → Fig. 16, page 26

- Horizontally position the aggregate and fix it.
- Loosen the hexagon socket head screws (914.1) on the separating can (816) and remove both components. (Possibly provide for a reservoir to collect medium gathered in the separating can.).
- Remove the flat gasket (400).
- Loosen the hexagon socket head screws (914.2) on the inner magnet (847) and remove them.
- Pull off the inner magnet (847) from the shaft.
- Loosen the hexagon socket head screws (914) and remove them.
- Pull the sleeve bearing (310.3) together with the shaft (211) out off the pump frame. Vertically clamp the shaft with a bench vice (sleeve bearing side pointing upwards).
- Loosen the hexagon nut (920.3) and remove it together with the locking disk (552.1).
- Pull off the axial sleeve bearing (3) vertically from the shaft
- Remove the fitting key (940.1).
- Pull off the bearing bracket (1).
- Pull off the radial sleeve bearing (5) and remove the tolerance ring (10).
- Pull off the shaft bush (6).
- Pull off the radial sleeve bearing (5) and remove the tolerance ring (10).
- Pull off the axial sleeve bearing (2).
- Remove all flat gaskets (9).
- With ASKM32 and ASKM33:
  Loosen the hexagon socket head screws (914.6) and remove them together with thte intermediate flange (154.1).

Magnetic coupling 165

ⓘ Sleeve bearing for magnetic coupling 165 → Fig. 17, page 26

- Horizontally position the aggregate and fix it.
- Loosen the hexagon socket head screws (914.1) on the separating can (816) and remove both components. (Possibly provide for a reservoir to collect medium gathered in the separating can.).
- Loosen the hexagon socket head screws (914.2) on the inner magnet (847) and remove them.
- Loosen the hexagon socket head screws (914) and remove them.
- Pull off the compelte bearing (310.3) together with the shaft.
- Loosen the hexagon nut (920.3) and remove it together with the locking disk (552.1).
- Pull off the axial sleeve bearing (3) vertically from the shaft.
- Remove the fitting key (940.1).
- Slide the axial sleeve bearing (3) back onto the shaft.
- Remove the complete bearing carefully from the shaft and place it securely.

7.4 Assembly

7.4.1 Preparations for assembly

CAUTION

Improper assembly results in pump/aggregate damage!

► Assemble the pump/aggregate in accordance with the principal rules of mechanical engineering.

► Use original spare parts only.

► For pump/aggregate assembly, consult the corresponding cross-sectional drawing.

► Assemble the pump/aggregate in a clean, level and non-magnetic assembly area.

The following must be observed during assembly:

- Replace seals.
- Install only clean parts.
- Install only inspected and flawless parts.
- Apply an anti-seize lubricant to all threads and fits (except for sealing fits).
- When sealing the stages with Teflon® thread (Ø 1 mm), insert the thread into the sealary grooves and allow for approx. 10 mm of overlap at the ends. To fix the Teflon® thread, silicone grease may be used.
- Apply oil or Molykote® lubricating paste to the sliding surfaces of the impellers.
- Make sure not to enter foreign bodies or excessive sealing compound into the pump.
- All marks must be aligned with each other.
- For connections with several fasteners, tighten lightly over the cross first. Then tighten with the prescribed tightening torques (→ Tightening torques, page 33).

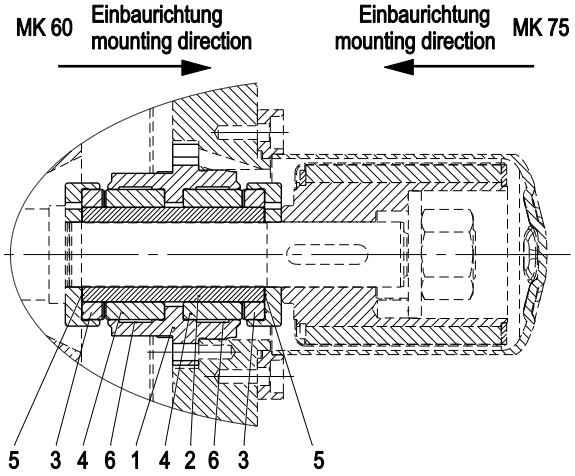
7.4.2 Assembly of ASKM

ⓘ Cross-sectional drawing ASKM → page 37 et seq.

1. Installation of shaft with bearing

✓ Sliding surfaces of the bearing components are wetted with grease before assembly.

Magnetic coupling 60 and 75 (ASKM20 / ASKM32 / ASKM33)



1 Bearing bracket
2 Radial sleeve bearing
3 Axial sleeve bearing
4 Axial & radial sleeve bearing
5 Flat gasket
6 Tolerance ring

Fig. 14 Sleeve bearing for magnetic coupling 60/75 at ASKM20/32/33

- Insert both tolerance rings (6) into the bearing bracket (1) and press-fit both axial & radial sleeve bearings (4) one after another.
- Vertically clamp the shaft (211) between the protective jaws of a bench vice.
- Slide the axial bearing (3) onto the shaft until it hits the limit stop.
- Insert the flat gasket (5).
- Slide the radial sleeve bearing (2) onto the shaft until it hits the limit stop. Centre it in the sleeve bearing (3).
- Centre the bearing bracket (1) on the radial sleeve bearing (2) and slide it on the bearing.
- Insert the flat gasket (5) into the axial sleeve bearing (3).
- Slide the axial sleeve bearing (3) onto the shaft and centre it on the raial sleeve bearing (2).
- Insert the fitting key (940.1).

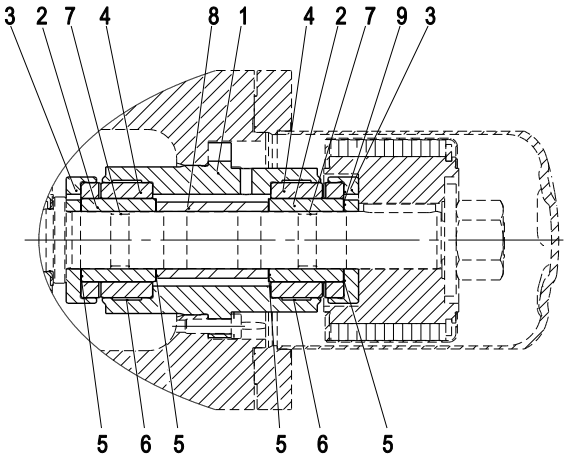
Further steps only with magnetic coupling 60:

- Centre the shaft (211) together with the sleeve bearing (310.3) from the pump side into the pump frame and tighten them with hexagon socket head screws (914).
- Radially adjust the inner magnet (847) on the shaft and slide it completey onto the shaft, Place the locking disk (552.1) and screw the nut (920.3) onto it and tighten the nut (→ Tightening torques, page 33, Tab. 17).
- It must be possible to easily turn the sleeve bearing cartridge by hand.
- Make sure that the bearing clearance ranges between 0.3 and 0.4 mm. If it is necessary, disassemble the inner magnet (847) and insert adjusting washers between axial sleeve bearing (3) and radial sleeve bearing (2) to obtain the correct clearance. ATTENTION: check the axial bearing clearance only if the hexagon nut (920.3) is tightened with the prescribed tightening torque!

Further steps only with magnetic coupling 75:

- Radially adjust the inner magnet (847) on the shaft and slide it completely onto the shaft. Place the locking disk (552.1) and screw the nut (920.3) onto it and tighten the nut (→ Tightening torques, page 33, Tab. 17).
- It must be possible to easily turn the sleeve bearing cartridge by hand.
- Make sure that the bearing clearance ranges between 0.3 and 0.4 mm. If it is necessary, disassemble the inner magnet (847) and insert adjusting washers between axial sleeve bearing (3) and radial sleeve bearing (2) to obtain the correct clearance. ATTENTION: check the axial bearing clearance only if the hexagon nut (920.3) is tightened with the prescribed tightening torque!
- Centre the sleeve bearing (310.3) together with the shaft (211) from the drive-side in the pump frame (180). Tighten it with hexagon socket head screws (914).

Magnetic coupling 75 (ASKM40 / ASKM50 / ASKM65)



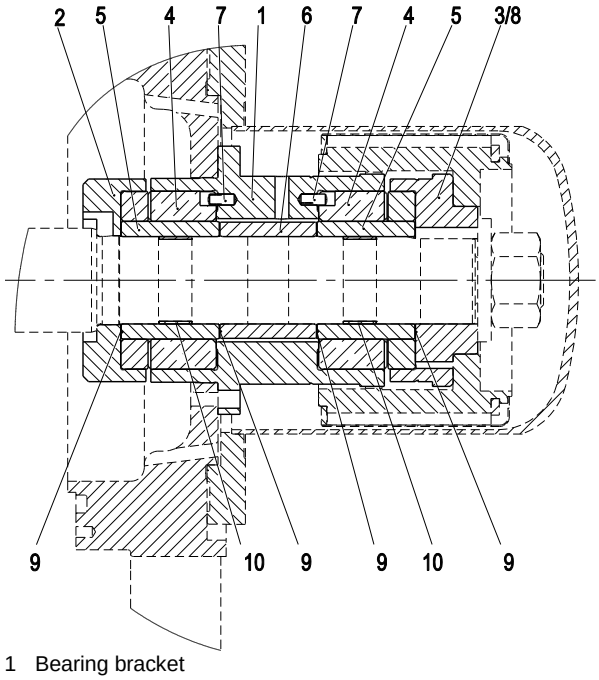
1 Bearing bracket
2 Radial sleeve bearing
3 Axial sleeve bearing
4 Axial & radial sleeve bearing
5 Flat gasket
6 Tolerance ring
7 Tolerance ring
8 Shaft sleeve
9 Adjusting washer

Fig. 15 Sleeve bearing for magnetic coupling 75 at ASKM40/50/65

- Insert both tolerance rings (6) in the relevant grooves in the bearing bracket (1) and press-fit both axial & radial sleeve bearings (4) one after another.

- Vertically clamp the shaft (211) between the protective jaws of a bench vice.
- Slide the axial bearing (3) onto the shaft until it hits the limit stop.
- Insert the flat gasket (5).
- Slide the tolerance ring (7) onto the shaft.
- Slide the radial sleeve bearing (2) onto the shaft until it hits the limit stop. Centre it in the sleeve bearing (3).
- Slide the flat gasket (5) onto the shaft.
- Slide the shaft sleeve (8) onto the shaft.
- Slide the flat gasket (5) onto the shaft.
- Slide the tolerance ring (7) onto the shaft.
- Slide the radial sleeve bearing (2) onto the shaft.
- Centre the bearing bracket (1) on the radial sleeve bearing (2) and slide it on the bearing.
- Insert the flat gasket (5) into the axial sleeve bearing (3).
- Slide the axial sleeve bearing (3) onto the shaft and centre it on the raial sleeve bearing (2).
- Insert the fitting key (940.1).
- Radially adjust the inner magnet (847) on the shaft and slide it completey onto the shaft. Place the locking disk (552.1) and screw the nut (920.3) onto it and tighten the nut (→ Tightening torques, page 33, Tab. 17).
- It must be possible to easily turn the sleeve bearing cartridge by hand.
- Make sure that the bearing clearance ranges between 0.3 and 0.4 mm. ATTENTION: check the axial bearing clearance only if the hexagon nut (920.3) is tightened with the prescribed tightening torque!
- Centre the shaft (211) together with the sleeve bearing (310.3) into the pump frame and tighten them with hexagon socket head screws (914).

Magnetic coupling 110/135

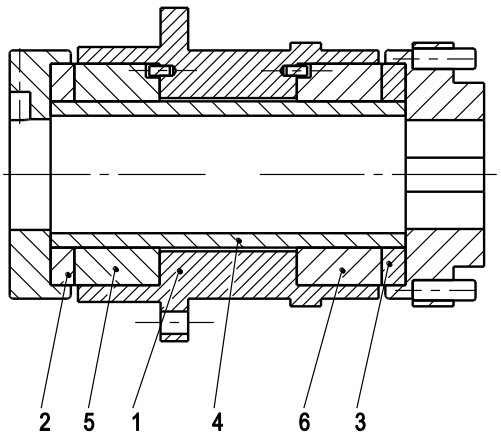


1 Bearing bracket
2 Axial sleeve bearing impeller-side
3 Axial sleeve bearing magnet-side
4 Axial & radial sleeve bearing
5 Radial sleeve bearing
6 Shaft sleeve
7 Grooved pin
8 Grooved pin
9 Flat gasket
10 Tolerance ring

Fig. 16 Sleeve bearing for magnetic coupling 110/135

- Force the cylindrical pin (562) into the shaft (211).
- Force the grooved pins (7) into the bearing bracket (1).
- Vertically clamp the shaft (211) between the protective jaws of a bench vice.
- Slide the axial bearing (2) onto the shaft until it hits the limit stop. Force the groove of the axial sleeve bearing onto the cylindrical pin.
- Insert the flat gasket (9) into the axial sleeve bearing (2).
- Slide the tolerance ring (10) onto the shaft.
- Slide the radial sleeve bearing (5) onto the shaft until it hits the limit stop. (Centre it in the sleeve bearing (2)).
- Slide the flat gasket (9) onto the shaft unitl it hits the radial sleeve bearing (5).
- Slide the shaft sleeve (6) onto the shaft.
- Slide the flat gasket (9) onto the shaft unitl it hits the shaft sleeve.
- Slide the tolerance ring (10) onto the shaft.
- Slide the radial sleeve bearing (5) onto the shaft.
- Slide the bearing bracket (1) together with inserted axial & radial sleeve bearings (4) onto the shaft.
- Slide the flat gasket (9) onto the shaft.
- Slide the axial sleeve bearing (3) onto the shaft.
- Slide the locking disk (552.1) onto the shaft.
- Screw the hexagon nut (920.3) onto the shaft (left-hand thread) and tighten it with the prescribed tightening torque (→Tightening torques, page 33, Tab. 17). Clamp the bearing axially. It must be possible to easily turn the sleeve bearing cartridge by hand.
- Make sure that the bearing clearance ranges between 0.3 and 0.4 mm. If necessary use adjusting washers. ATTENTION: check the axial bearing clearance only if the hexagon nut (920.3) is tightened with the prescribed tightening torque!
- Screw the inner magnet (847) and the axial sleeve bearing (3) with hexagon socket head srews (914.2).
- Centre the shaft (211) together with the sleeve bearing (310.3) from the pump side into the pump frame (180) (or with ASKM32 and ASKM33 into the intermedialte flange (154.1) which has been already inserted and tightened to the pump frame with hexagon socket head screws (914.6)) and tighten them with hexagon socket head screws (914).

Magnetic coupling 165



1 Bearing casing
2 Axial sleeve bearing impeller side
3 Axial sleeve bearing magnet side
4 Shaft sleeve
5 Bearing bushing impeller side
6 Bearing bushing magnet side

Fig. 17 Sleeve bearing for magnetic coupling 165

- Force the cylindrical pin (562) into the shaft (211).
- Vertically clamp the shaft between the protective jaws of a bench vice.

- Slide the axial sleeve bearing (2) onto the shaft until it hits the limit stop. Force the groove of the axial bearing into the cylindrical pin.
- Slide the shaft sleeve (4) onto the shaft until it hits the limit stop in the axial sleeve bearing. It is centred in the axial sleeve bearing.
- Slide the bearing casing (1) with the inserted bearing bushings (5 & 6) onto the shaft sleeve.
- Insert the fitting key (940.1) into the shaft groove.
- Slide the axial sleeve bearing (3) onto the shaft until it hits the limit stop. It is centred by the shaft sleeve (4).
- Slide the locking disc (552.1) onto the shaft.
- Screw the hexagon nut (920.3) onto the shaft and tighten it. It must be possible to easily turn the sleeve bearing cartridge by hand: The bearing has a clearance of approx. 0.4 mm.
- Centre the sleeve bearing (310.3) with the shaft (211) in the casing cover (161) and fix it using hexagon socket head screws (914).
- Slide the inner magnet (847) on the axial bearing (3) and adjust it radially.
- The cylindrical pins must engage into the provided bores.
- Screw the inner magnet to the axial sleeve bearing (3) using hexagon socket head screws (914.2).
- Centre the sleeve bearing (310.3) with the shaft (211) in the pump frame (180) and tighten it using hexagon socket head screws (914).

2. Installation of separating can and bracket

- Insert the flat gasket (400) into the groove in the pump frame (180) or, if available, into the grrove in the intermediate flange (154.1).
- Slide the separating can (816) onto the inner magnet (847), and force it into the pump frame (180) or, ifa available, into the intermediate flange (154.1). Tighten them with hexagon socket head screws (914.1).
- Force the bracket (341) onto the pump frame (180) or, if available, onto the intermediate flange (154.1), adjust it and tighten it using washers (550) and hexagon nuts (920.1) onto the stud bolts (902).

3. Installation of discharge casing

- Clamp in the pump frame (180) with the shaft (drive side pointing down) and fix it.
- Insert the O-ring (412) or the flat gasket (400.1) into the pump frame.
- Check the location of the grooved pin (561) and insert it if necessary.
- Slide the discharge casing (107) over the shaft, adjust it (grooved pin) and force it onto the frame.

4. Installation of stages and impellers

ⓘ Observe the stage arrangement, Fig.18 page 28

- Insert the sleeve bearing (310.2) into the discharge stages (114.1).
- Before installling the suction and discharge stages, the sealing surface must be sealed with the prescribed sealant.
- Install the discharge stage II (114.2).
- Install the star impeller (230).
- The stages have to be arranged in accordance with the stage arrangement drawing → Fig.18.

ⓘ Following the 3rd stage, slightly pull or push the stage packet together. Otherwise, the last impeller (230) cannot move freely.

- After the installation of the last suction stage, slide the sleeve bearing (310) together with the bearing rings (391) onto the shaft (211).
- Insert the tolerance ring (515) into stage N (114.3) and press-fit the sleeve bearing (310.1).
- Install the stage N (114.3). Make sure that the bearing is not damaged during this process.
- Insert the fitting key (940.2) in the pump shaft.
- Centre the impeller (230.1) onto the shaft. Slide it carefully until it hits the sleeve bearing and fix it with locking disk (931) and hexagont nut (920.2). **Attention: left-hand thread!**

5. Installation of suction casing

- Insert the tolerance ring (515) into the suction casing (106) and force in the sleeve bearing (310.1).
- Adjust the suction casing (106) and force it into the stage N (114.3).
- Guide the bolts (563) through the suction casing (106) and screw them into the pump frame (180).
- Slide the lock washers (552) onto the bolts (563). Screw the hexagon nuts (920) onto the bolts and slightly tighten them.
- Horizontally position the pump and adjust it.
- Tighten the hexagon nuts (920) on the bolts (563).

6. Installation of the outer magnet

ASKM 20/32/33 with magnetic coupling 60:

- Slide the centrifugal mass (616) onto the outer magnet (847.1) and tighten it using hexagon socket head screws (914.2).

ASKM 20/32/33 with magnetic coupling 75:

- Press the grooved pins (561.1) into the coupling insert (843).
- Adjust the outer magnet (847.1) and press it onto the coupling insert (843).

ASKM 32/33 with magnetic coupling 110:

- Press the grooved pins (561 and 561.1) into the coupling insert (843).
- Adjust the spacer sleeve (525) and press it onto the grooved pins (561.1) in the coupling insert (843).
- Adjust the outer magnet (847.1) and press it onto the coupling insert (843).

ASKM 40/50/65 with magnetic coupling 75 or 110/135:

- Press the grooved pins (561 and 561.1) into the coupling insert (843).
- Adjust the spacer sleeve (525) and press it onto the grooved pins (561.1) in the coupling insert (843).
- Adjust the outer magnet (847.1) and press it onto the coupling insert (843).

7. Installation of motor

- **If available:** Force the intermediate flange (154) into the motor (800), adjuste it and tighten them with washers (550.5) and hexagon head screws (901.3).
- Adjust the outer magnet (847.1), slide it onto the motor shaft (800) in accordance with the adjustment dimension and fix it onto the motor shaft by means of a set screw (904).
- Position the pump and the motor on a surface plate.
- Adjust the pump shaft and the motor shaft. (Put washers below the motor or pump feet if required).
- Push the motor (800) with the outer magnet (847.1) into the bracket (341).
- **With intermediate flange (154):** Screw the bracket (341) with the intermediate flange using hexagon head screws (901.1) and washers (550.4).
- **Without intermediate flange (154):** Screw the bracket (341) with the motor (800) using hexagon head scrws (901), washers (550.1) and hexagon nuts (920.4).
- Check the tightness of the pump.
  The test pressure should not exceed 1.5 x pressure rating.

7.5 ASKM stage marking and stage arrangement

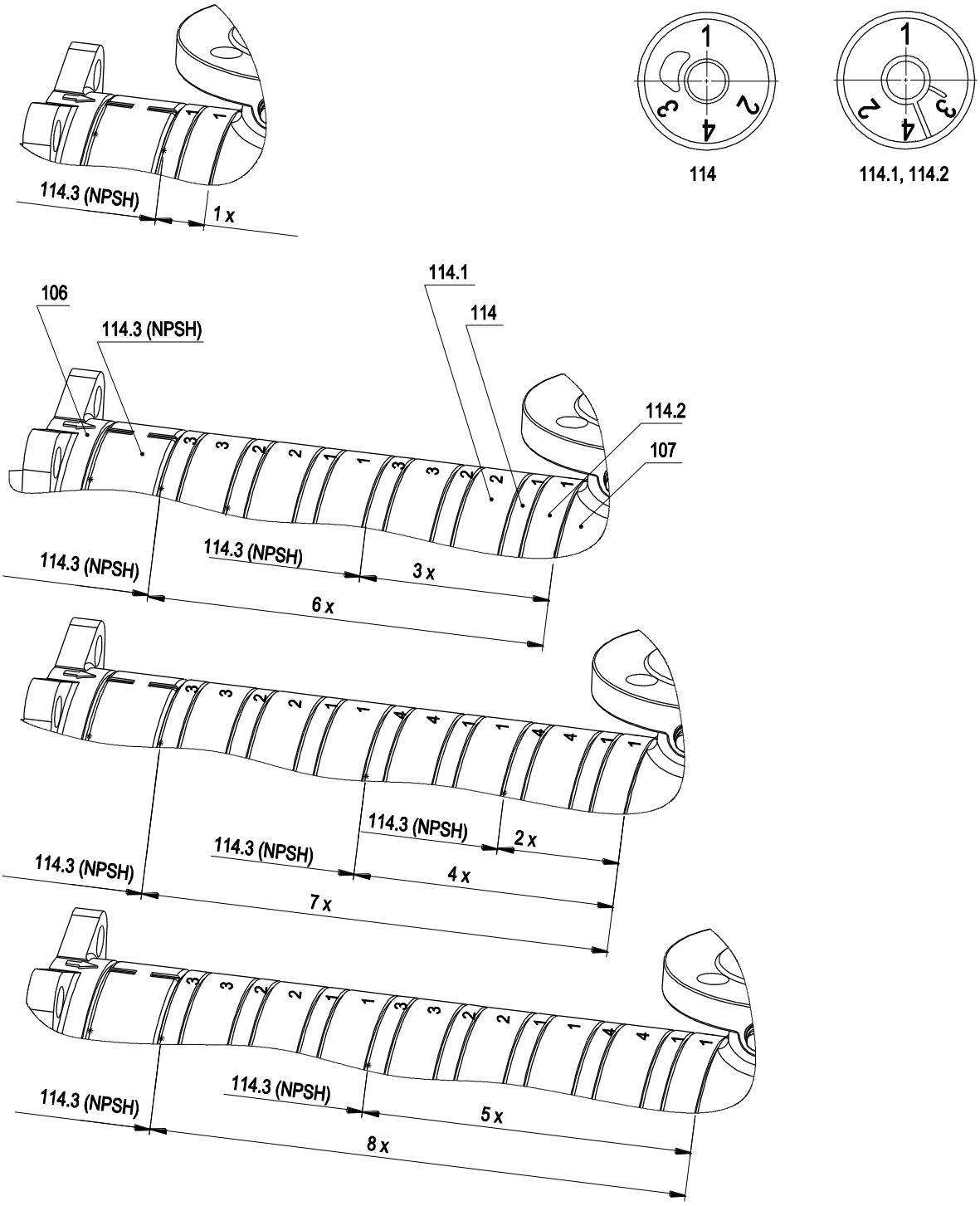


Fig. 18 ASKM stage marking and stage arrangement

Pos.	Designation
106	Suction casing
107	Discharge casing
114	Suction stage
114.1	Discharge stage
114.2	Discharge stage
114.3	NPSH discharge stage (stage N)

Tab. 9 ASKM stage marking and stage arrangement

8 Troubleshooting

⚠ DANGER

Risk of injuries caused by running aggregate!

- ► Do not touch the running aggregate.
- ► Do not carry out any works on the running aggregate.
- ► Prior to carrying out any assembly or maintenance works, de-energize the motor and protect it against restart.

⚠ RISK OF ELECTRIC SHOCK

Risk of death from electric shock!

- ► Qualified electricians must carry out any electrical works only.
- ► Observe the IEC 60364 and for potentially explosive areas the IEC 60079 standard.

⚠ WARNING

Risk of injuries caused by hot pump parts or hot media to be pumped!

- ► Use protective equipment when carrying out any works on the pump/aggregate.
- ► Make sure the aggregate is depressurized.

If the machine operator is not able to rectify occurring defects himself, he has to call the person responsible for machine maintenance.

If the maintenance staff is not able to rectify the defect, the manufacturer has to be informed accordingly. The manufacturer will provide troubleshooting support if he gets a detailed description of the defect.

Technical support address

Speck Pumpen Systemtechnik GmbH apply

Regensburger Ring 6 – 8, 91154 Roth / Germany
PO Box 1453, 91142 Roth / Germany

Phone: +49 (0) 9171 809 0
Fax: +49 (0) 9171 809 10
E-mail: info@speck.de
Internet: www.speck.de

Defect	Cause	Rectification
Motor does not start	**Motor**	
	One phase of the power supply is interrupted	► Check the power supply, check the motor
	Two phases of the power supply are interrupted	► Check the power supply, check the motor
	The motor protection switch has tripped	► Switch on the motor protection switch
	The motor is blocked	► Check motor, replace motor
	Defective motor bearing	► Replace motor bearing
Pump does not start	**Pump is blocked**	
	Magnetic coupling torn off	► Switch off the motor, re-start after shut-down
	Contaminations or foreign bodies inside the pump	► Flush or disassemble and clean the pump
	Defective pump bearing	► Disassemble the pump, replace defective components
Motor protection triggered	Motor overload	► The specified operating point has not been complied with
	Motor or pump blocked	► Take measures to overcome the blockage, see above
	Short-circuit in the motor winding	► Check the motor winding, replace the motor
	Motor protection switch has not been correctly set or is defective	► Check the setting, re-set if required or replace the motor protection switch
	Counter pressure of the pump is smaller than indicated	► Observe the operating point, reduce the impeller diameter by grinding

Defect	Cause	Rectification
Excessive power consumption of the motor	Pump contamination or calcification	► Flush, descale or disassemble and clean the pump
	Density/viscosity of the medium to be pumped is too high	► Use media to be pumped complying with the density recommended in the data sheet Contact the manufacturer
	Excessive speed	► Reduce the speed.
Pump does not deliver medium to be pumped	Suction-side/pressure-side fitting is closed	► Open the suction-side/pressure-side fitting
	Suction pipe blocked	► Check and, if required, clean suction pipe and filters
	Wrong direction of rotation of the motor	► Check direction of rotation and swap the 2 phases if need be
	Magnetic coupling torn off	► Shut down, re-start, check start-up
	Casting jet in the volute casing at the pressure side	► Replace casing
	Heat transfer medium contaminated with low boiling oil	► Replace the heat transfer medium
	Pump not vented	► Vent the pump, fill the pump and suction pipe
Flow rate too low	Contaminations in the suction opening	► Clean the suction opening
	Internal components are subject to wear	► Replace the affected components
	Leaking system	► Check the system, seal leaking spots
	Air / gas inside the system	► Vent.
	Air pocket formation in the pipe	► Change the pipe, install a vent valve.
	Pump has not been correctly dimensioned	► Replace the pump
	Pump cavitation	► Check the temperature of the medium to be pumped and cool down the medium to be pumped if need be.
	Excessive backpressure	► Extend impeller diameter, increase speed (with frequency converter)
	Wrong direction of rotation	► Reverse the polarity of the motor
	Speed too low	► Operation with frequency converter (FC): increase frequency. Without FC: check voltage
	Pump runs in 2 phases	► Replace defective fuse, check el. connections
	Magnetic coupling torn off	► Shut down, re-start, check start-up
	Wrong operating point	► Set the operating point, check planning data, impeller diameter and speed
	The suction height is too high or the inlet height too low	► Increase the filling level in the tank. Open the suction-side fitting, clean the suction filter
Excessive flow rate	System pump pressure too low	► Install a throttle valve at the pressure side
Strange noise	Pump cavitation	► Reduce the temperature of the medium to be pumped, check NPSH
	Excessive share of steam in the suction flow	► Reduce the temperature of the medium to be pumped, check NPSH
	Aggregate improperly adjusted	► Re-adjust
	Magnetic coupling torn off	► Shut down, re-start, check start-up
	Shaft bearing defective	► Replace shaft bearing
	Suction-side fitting closed	► Open the suction-side fitting

Defect	Cause	Rectification
Total head too low	Motor speed too low	► Increase speed, contact the manufacturer
	Wrong direction of rotation	► Reverse the polarity of the motor
	Excessive pressure loss	► Use larger pipe cross-sections, install components with lower pressure loss
	Internal components are subject to wear	► Replace the affected components
	Cavitation	► Check supply conditions, gate valve at the suction side, filter
	Air / gas inside the system	► Vent
	Stall caused by light ends	► Boil out ► Continuously separate the light ends
	Wrong operating point	► Set the operating point, check planning data, impeller diameter and speed
	System head loss lower than indicated	► Adjust the head loss by throttling the pressure pipe or installing gate/nozzle
	Excessive backpressure	► Check the operating point. Clean the pipe.
Overheating of the pump	Excessive outlet pressure	► Reduce the pressure loss/increase the pipe cross-section
	Magnetic coupling torn off	► Shut down, re-start, check start-up
	Insufficient cooling stream from the motor to the rolling bearings	► Change setting of the motor fan, additionally provide for separately driven fans
	Casing cover insulated	► Remove insulation
	Pump substantially shrouded or encased	► Provide for proper ventilation
	Viscosity of the medium to be pumped is too high	► Observe the limit values
	Pressure-side fitting is closed	► Comply with the minimum flow rate / install a bypass at the pressure side
	Temperature of the medium to be pumped is too high	► Cool down the medium to be pumped
Leaking pump	Pump distorted	► Check the pipe connections and pump fixation
	Defective casing sealing	► Provide the pump with new sealing
	Increased porosity of casing components due to expansion under heat	► Replace casing components
	Defective separating can	► Replace separating can
	Wrong compression of the flat gasket	► Check material quality and torques
	Wrong sealing material supplied by the customer	► Check chemical and thermal resistance
	Flange seal between pump and pipe	► Check installation and resistance
	Loosened connecting screws/screw plugs	► Tighten the screws, replace the seal
High vibrations	Imbalance	► Check balancing quality
	Distorted aggregate	► Check piping forces
	Maladjustment	► Checking coupling adjustment
	Resonance	► Change mass / stiffness
	Motor	► Check motor bearing

Tab. 10 Troubleshooting

9 Technical data

9.1 Operating limit values

ⓘ For further technical data, refer to the technical data sheet, which is included in the scope of supply.

ASKM			
Max. casing pressure		40	[bar]
Media to be pumped			
Temperature	min.	- 100	[°C]
	max.	350	[°C]
depending on the medium to be pumped and the material version			
Pump bearing			
Temperature	max.	50/80 above AT	[°C]
Speed	max.	1800	[min^{-1}]

AT = ambient temperature

Tab. 11 Operating limit values ASKM

9.1.1 Media to be pumped

Liquids

- aqueous
- free of abrasive contaminations
- without solid content
- near boiling point
- matched to the casing materials

9.1.2 Flow rates

→ Characteristic curves

The aggregate must not be operated beyond the size-dependent power ranges (min./ max. flow rate).

9.1.3 Switching frequency

The max.switching frequency of 15 switching cycles per hour should not be exceeded.

9.2 General technical data

The following data refer to standard values. For deviating data, please consult the manufacturer.

9.2.1 Weight

→ Order documents

9.2.2 Sound level

Type	1m measured surface sound pressure level L [dB (A)] *	
	50 Hz	60 Hz
ASKM20	72	75
ASKM32	74	77
ASKM33	74	77
ASKM40	78	81
ASKM50	83	85
ASKM65	84	85
* Measured surface sound pressure level in acc. with EN ISO 3744, at 1 m distance with average throttling (cavitation-free operation) and connected pipes, tolerance ± 3 dB (A)		

Tab. 12 Sound pressure level

9.2.3 Drive power

→ Technical data sheet

9.2.4 Direction of rotation of the pump

Type	Direction of rotation view from drive to pump
ASKM	counter-clockwise

9.2.5 Hydrostatic pressure test

Test pressure = 1.5 x pressure rating ($P_{max.}$ 52 bar)

9.2.6 Shaft sealing

All pumps are fitted with magnetic couplings. For detailed data, refer to the nameplate.

9.2.7 Ambient conditions

ⓘ Operation under other ambient conditions has to be agreed with the manufacturer.

ⓘ Unless otherwise specified in the technical data sheet, the following values apply.

Temperature [°C]	Relative humidity [%]		Set-up altitude above sea level [m]
	long-term	short-term	
+ 5 to + 40	≤ 55	≤ 80	≤ 1000

Tab. 13 Ambient conditions

9.2.8 Clearances for heat dissipation

Motor size	Min. clearance between fan hood and adjacent surface [mm]
71 – 90L	35
100 - 180	55
200 - 225	75
250	100

Tab. 14 Min. clearances for heat dissipation

9.2.9 Tightening torques

9.2.9.1 Screws and nuts

► Tighten the screws by means of a torque wrench.

ⓘ The following values apply to new steel screws and nuts (non-lubricated to slightly oiled). When using molybdenum S_2 lubricant, all values are reduced by 10 %!

Size	Property class	Tightening torques [Nm]
M 5	8.8	6.0
M 6	8.8	10.0
M 8	8.8	26.0
M 10	8.8	51.0
M 12	8.8	90.0

Tab. 15 Tightening torques for steel screws and nuts

9.2.9.2 Stainless steel screws

► Tighten the screws by means of a torque wrench.

ⓘ The following values apply to new stainless steel screws and nuts (non-lubricated to slightly oiled). When using molybdenum S_2 lubricant, all values are reduced by 10 %!

Size	Property class	Tightening torques [Nm]
M 5	A 2/A 4-70	4.2
M 6	A 2/A 4-70	7.4
M 8	A 2/A 4-70	17.8
M 10	A 2/A 4-70	36.0
M 12	A 2/A 4-70	62.0

Tab. 16 Tightening torques for stainless steel screws

9.2.9.3 Nuts (items no. 920.2 and 920.3)

Item no.	Usage	Size	Tightening torque [Nm]
920.2	Impeller	M 16 x 1.5 left	25
920.3	Magnetic coupling 60/75	M 16 x 1.5	90
920.3	Magnetic coupling 110/135	M 20 x 1.5	140
920.3	Magnetic coupling 165	M 24 x 1.5	180

Tab. 17 Tightening torques for nuts, items no. 920.2 and 920.3

9.2.9.4 Screw plugs

Size	Tightening torques [Nm]	
	Sealing ring Europil®	Sealing ring copper
G 1/8	15	20
G 1/4		35
G 3/8		50

Tab. 18 Tightening torques for screw plugs

9.2.9.5 Bolts

Pump size	Bolt	M_A [Nm]	
		Sealing: Epple Teflon®	Graphite flat gasket
ASKM20	M 12	40	73
ASKM32/ ASKM33	M 12	80	91
ASKM40	M 16	100	135
ASKM50 ASKM65	M 20	120	193

Tab. 19 Tightening torques for bolts

9.3 Permissible forces/torques acting on the pump nozzles

ⓘ Flanges in acc. with EN 1092-1 / EN 1092-2, PN 40
ⓘ Forces and torques in acc. with EN ISO 5199

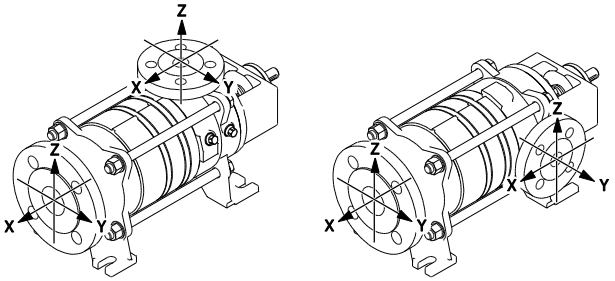


Fig. 19 Designation of the axes

Framework conditions

The following equation is valid for the actual forces and torques action on each flange

$$\left(\frac{\Sigma\left|F\right|_{actual}}{\Sigma\left|F\right|_{\max.permissible}}\right)^2+\left(\frac{\Sigma\left|M\right|_{actual}}{\Sigma M_{\max.permissible}}\right)^2\le 2$$

	Spheroidal graphite cast iron										
	Flange	Outlet nozzle pointing upwards, 20°C					Outlet nozzle pointing upwards, 350°C				
Type	Ø	F_Y	F_Z	F_X	Σ F	Σ M	F_Y	F_Z	F_X	Σ F	Σ M
ASK…20	DN 20	241	302	262	483	329	209	261	226	417	284
ASK…32 / 33	DN 32	342	423	362	664	516	295	365	313	574	446
ASK…40	DN 40	402	503	443	785	657	348	435	382	678	568
ASK…50	DN 50	543	664	604	1046	728	469	574	521	904	629
ASK…65	DN 65	684	845	744	1328	798	591	730	643	1147	689
	Flange	Outlet nozzle pointing sideways, 20°C					Outlet nozzle pointing sideways, 350°C				
Type	Ø	F_Y	F_Z	F_X	Σ F	Σ M	F_Y	F_Z	F_X	Σ F	Σ M
ASK…20	DN 20	302	241	262	483	329	261	209	226	417	284
ASK…32 / 33	DN 32	423	342	362	664	516	365	295	313	574	446
ASK…40	DN 40	503	402	443	785	657	435	348	382	678	568
ASK…50	DN 50	664	543	604	1046	728	574	469	521	904	629
ASK…65	DN 65	845	684	744	1328	798	730	591	643	1147	689
	Flange	Inlet nozzle, 20°C					Inlet nozzle, 350°C				
Type	Ø	F_Y	F_Z	F_X	Σ F	Σ M	F_Y	F_Z	F_X	Σ F	Σ M
ASK…20	DN 40	516	469	587	915	892	446	406	507	791	771
ASK…32 / 33	DN 65	868	798	986	1549	1033	750	689	852	1338	892
ASK…40	DN 80	1056	962	1174	1854	1103	913	831	1014	1602	953
ASK…50 / 60	DN 100	1408	1268	1573	2465	1221	1217	1095	1359	2129	1054

Tab. 20 Permissible forces F [N] & torques M [Nm] acting on the pump nozzles made of spheroidal graphite cast iron (EN-GJS-400-15)

	Stainless steel										
	Flange	Outlet nozzle pointing upwards, 20°C					Outlet nozzle pointing upwards, 250°C				
Type	Ø	F_Y	F_Z	F_X	Σ F	Σ M	F_Y	F_Z	F_X	Σ F	Σ M
ASK…20	DN 20	279	348	302	557	379	264	330	286	529	360
ASK…32 / 33	DN 32	395	488	418	766	596	374	463	396	727	565
ASK…40	DN 40	464	580	511	905	758	440	551	485	859	719
ASK…50	DN 50	627	766	696	1207	840	595	727	661	1145	797
ASK…65	DN 65	789	975	859	1532	921	749	925	815	1454	874
	Flange	Outlet nozzle pointing sideways, 20°C					Outlet nozzle pointing sideways, 250°C				
Type	Ø	F_Y	F_Z	F_X	Σ F	Σ M	F_Y	F_Z	F_X	Σ F	Σ M
ASK…20	DN 20	348	279	302	557	379	330	264	286	529	360
ASK…32 / 33	DN 32	488	395	418	766	596	463	374	396	727	565
ASK…40	DN 40	580	464	511	905	758	551	440	485	859	719
ASK…50	DN 50	766	627	696	1207	840	727	595	661	1145	797
ASK…65	DN 65	975	789	859	1532	921	925	749	815	1454	874
	Flange	Inlet nozzle, 20°C					Inlet nozzle, 250°C				
Type	Ø	F_Y	F_Z	F_X	Σ F	Σ M	F_Y	F_Z	F_X	Σ F	Σ M
ASK…20	DN 40	596	542	677	1056	1029	565	514	642	1002	976
ASK…32 / 33	DN 65	1002	921	1138	1788	1192	951	874	1079	1696	1131
ASK…40	DN 80	1219	1110	1354	2140	1273	1156	1053	1285	2030	1208
ASK…50 / 60	DN 100	1625	1463	1815	2844	1408	1542	1388	1722	2698	1336

Tab. 21 Permissible forces F [N] & torques M [Nm] acting on the pump nozzles made of stainless steel (1.4581)

	Bronze										
	Flange	Outlet nozzle pointing upwards, 20°C					Outlet nozzle pointing upwards, 180°C				
Type	Ø	F_Y	F_Z	F_X	Σ F	Σ M	F_Y	F_Z	F_X	Σ F	Σ M
ASK…20	DN 20	164	205	178	329	224	143	179	155	286	194
ASK…32 / 33	DN 32	233	288	246	452	351	202	250	214	393	306
ASK…40	DN 40	274	342	301	534	447	238	298	262	464	389
ASK…50	DN 50	370	452	411	712	495	321	393	357	619	431
ASK…65	DN 65	465	575	507	904	543	405	500	440	786	472
	Flange	Outlet nozzle pointing sideways, 20°C					Outlet nozzle pointing sideways, 180°C				
Type	Ø	F_Y	F_Z	F_X	Σ F	Σ M	F_Y	F_Z	F_X	Σ F	Σ M
ASK…20	DN 20	164	205	178	329	224	179	143	155	286	194
ASK…32 / 33	DN 32	233	288	246	452	351	250	202	214	393	306
ASK…40	DN 40	274	342	301	534	447	298	238	262	464	389
ASK…50	DN 50	370	452	411	712	495	393	321	357	619	431
ASK…65	DN 65	465	575	507	904	543	500	405	440	786	472
	Flange	Inlet nozzle, 20°C					Inlet nozzle, 180°C				
Type	Ø	F_Y	F_Z	F_X	Σ F	Σ M	F_Y	F_Z	F_X	Σ F	Σ M
ASK…20	DN 40	596	542	677	1056	1029	581	528	660	1029	1003
ASK…32 / 33	DN 65	1002	921	1138	1788	1192	976	897	1108	1742	1161
ASK…40	DN 80	1219	1110	1354	2140	1273	1188	1082	1319	2085	1240
ASK…50 / 60	DN 100	1625	1463	1815	2844	1408	1583	1425	1768	2771	1372

Tab. 22 Permissible forces F [N] & torques M [Nm] acting on the pump nozzles made of bronze (GBz)

9.4 Magnetic couplings

9.4.1 Designation

	135	-70
Magnetic coupling nominal diameter [mm]		
Magnetic length [mm]		

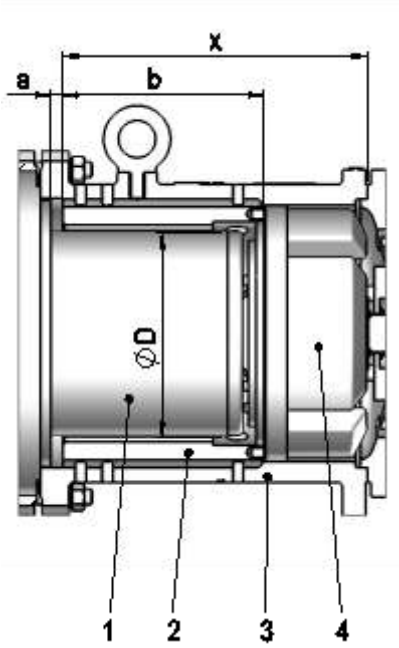
Tab. 23 Designation of magnetic couplings

9.4.2 Used magnetic couplings

Magnetic coupling nominal diameter [mm]	Magnetic length [mm]								
60	40	-	60	-	-	-	-	-	-
75	40	50	60	-	-	-	-	-	-
110	40	50	60	70	80	-	-	-	-
135	-	50	60	70	80	90		-	-
165	-	-	-	-	80	90	100	110	120

Tab. 24 Used magnetic couplings

9.5 Adjustment dimensions of outer rotor



1 Separating can
2 Outer rotor
3 Bracket
4 Coupling insert

Fig. 20 Adjustment dimensions of outer rotor

Bearing bracket 360					
Magnetic coupling	Size	Clearance X	Reference dimension		
			a	b	Ø D
60	ASKM20	150	5,9	- [1]	61.6
	ASKM32 ASKM33	158			
75	ASKM20	146	13	104	75.8
	ASKM32 ASKM33				
	ASKM40	178	12	103	
	ASKM50		13		
110	ASKM32 ASKM33	205	8,5	130	112.4
	ASKM40				
	ASKM50				
	ASKM65		8		
135	ASKM40	205	8	135	136.9
	ASKM50	206	7	136	135.6
	ASKM65				
165	ASKM65	264	17	163	167.2

[1] No dimension “b“ with magnetic coupling 60 because a one-piece outer rotor is used

Tab. 25 Adjustment dimensions of outer rotor

9.6 Preserving agents

ⓘ Rivolta preserving agent (recommended) or comparable products

Type of storage	Period of storage [months]	Inside/ outside preserva-tion	Repeat in-side/outside treatment [months]
in closed, dry and dust-free rooms	1–3	Rivolta K.S.P.130	3
	> 3		every 3 months

Tab. 26 Preserving agents

9.7 Accessories

Accessories included in the scope of supply are listed on the delivery note.

10 Appendix

10.1 Cross-sectional drawings

10.1.1 ASKM20 / 32 / 33 with magnetic coupling 60 or 75

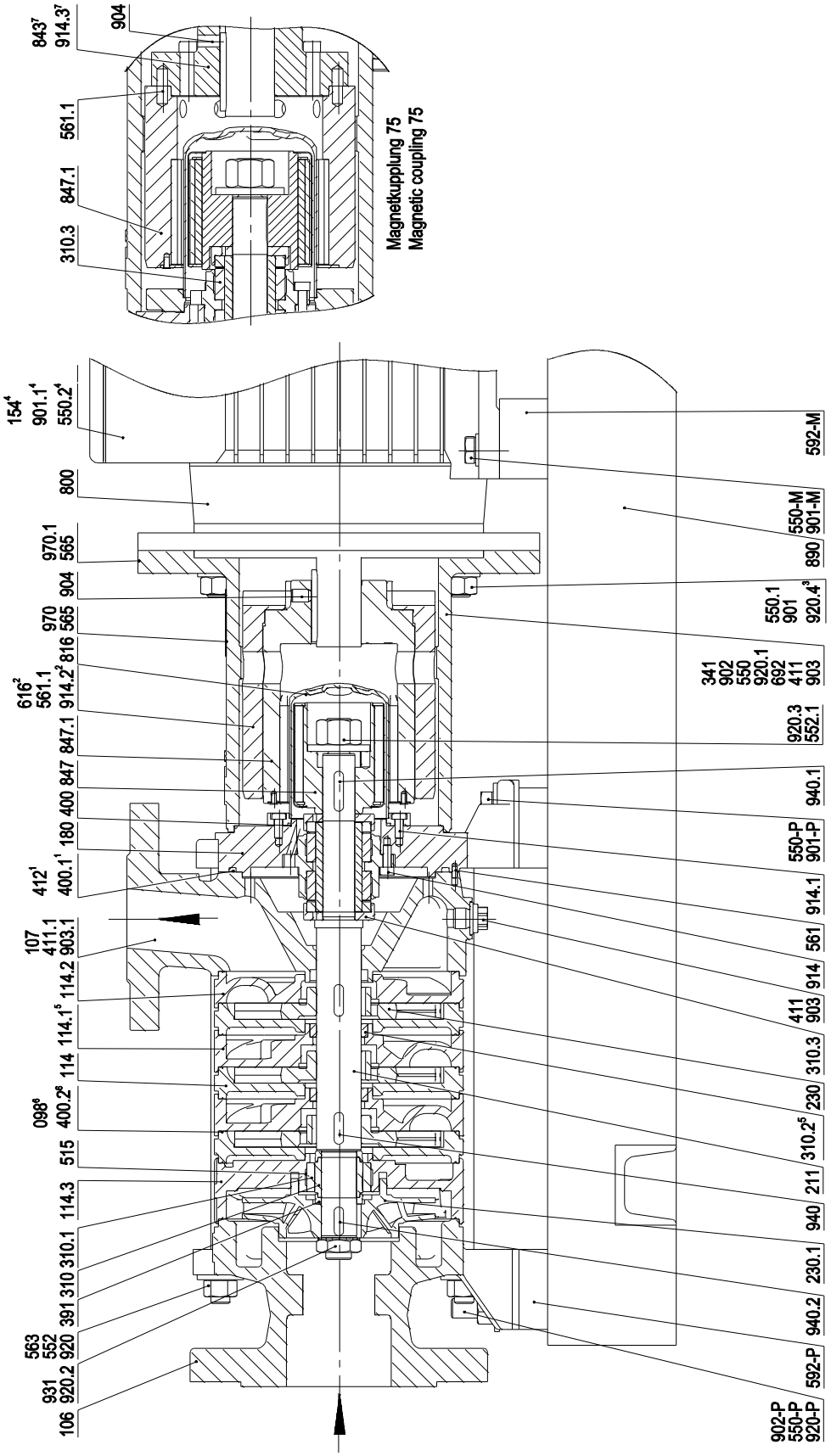


Fig. 21 Cross-sectional drawing ASKM20/32/33 with magnetic coupling 60 or 75

No.	Designation
098[6]	Sealing cord / sealing compund
106	Suction casing
107	Discharge casing
114	Suction stage
114.1[5]	Discharge stage I
114.2	Discharge stage II
114.3	Stage N
154[4]	Intermediate flange
180	Pump frame
211	Shaft
230	Star impeller
230.1	Impeller
310-310.1, 310.2[5]	Sleeve bearing
310.3	Bearing complete
341	Bracket
391	Bearing ring carrier
400, 400.1[1], 400.2[6]	Flat gasket
411-411.1	Joint ring
412[1]	O-ring
515	Tolerance ring
550-550.1, 550.2[4]	Washer
550-M	Washer - motor
550-P	Washer - pump
552-552.1	Locking disk
561-561.1	Grooved pin
563	Bolt
565	Rivet
592-M	Spacer – motor
592-P	Spacer – pump
616[2]	Centrifugal mass
692	Temperature sensor
800	Motor
816	Separating can
843[7]	Coupling insert
847	Inner magnet
847.1	Outer magnet
890	Base plate
901, 901.1[4]	Hexagon head screw
901-M	Hexagon head screw – motor
901-P	Hexagon head screw – pump
902	Stud bolt
902-P	Stud bolt - pump
903-.903.1	Screw plug
904	Set screw
914-914.1, 914.2[2], 914.3[7]	Hexagon socket head screw
920-920.3, 920.4[3]	Hexagon nut
920-P	Hexagon nut - pump
931	Lock washer
940-940.2	Fitting key
970-970.1	Plate

[1] Optional O-ring (412) or graphite flat gasket (400.1)

[2] For magnetic coupling 60 only

[3] For motor flange ø 250 mm only

[4] For motor flange ø 300 mm only

[5] Not applicable for ASKM2001, ASKM3201, ASKM3301

[6] Optional sealing cord / sealing material (098) or graphite flat gasket (400.2)

[7] For magnetic coupling 75 only

Tab. 27 Parts list ASKM20 / ASKM32 / ASKM33 with magnetic coupling 60 or 75

10.1.2 ASKM32 / 33 with magnetic coupling 110 or 135

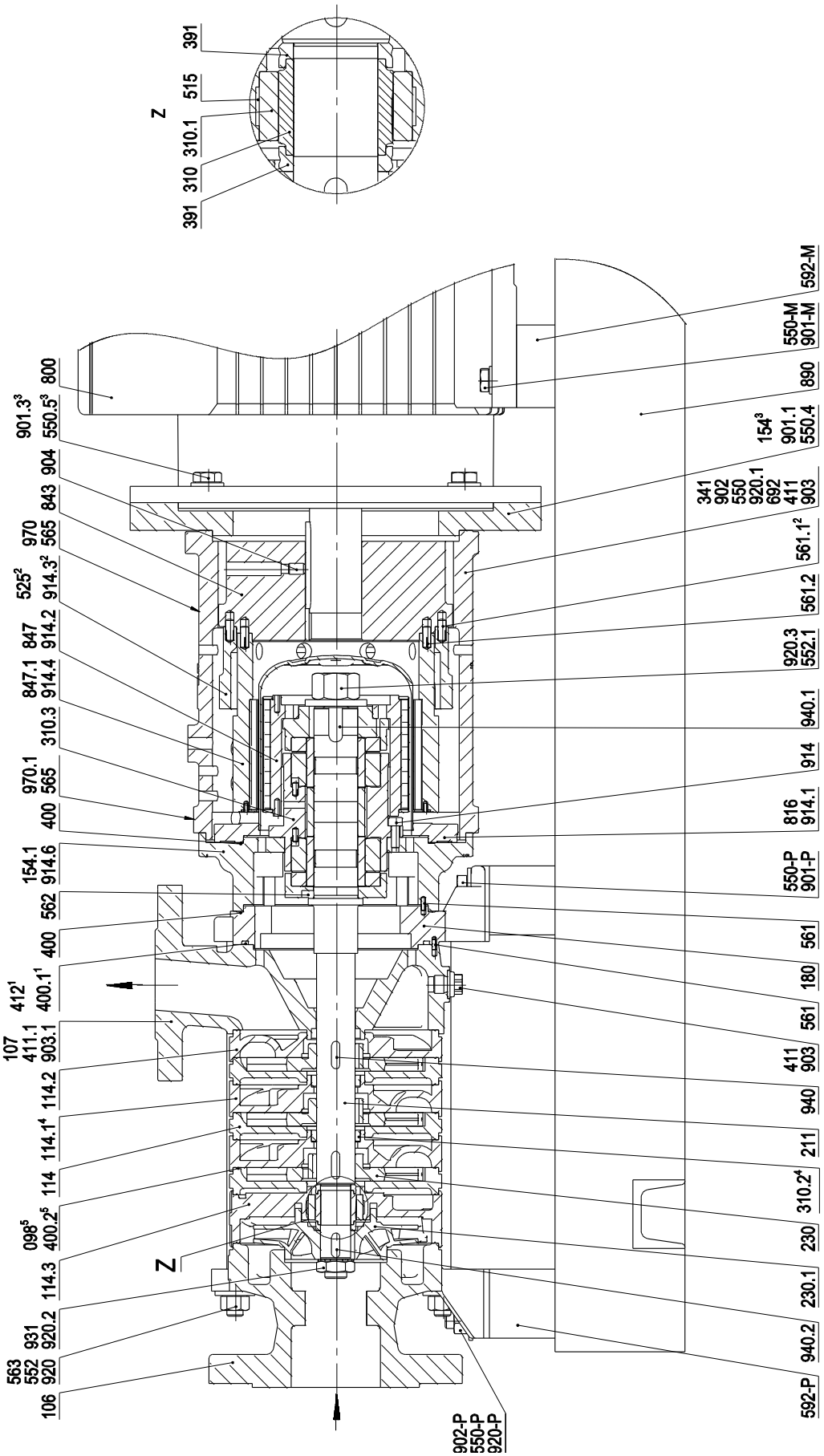


Fig. 22 Cross-sectional drawing ASKM32 / ASKM33 with magnetic coupling 110 or 135

No.	Designation
098[5]	Sealing cord / sealing compund
106	Suction casing
107	Discharge casing
114	Suction stage
114.1[4]	Discharge stage I
114.2	Discharge stage II
114.3	Stage N
154[3] -154.1	Intermediate flange
180	Pump frame
211	Shaft
230	Star impeller
230.1	Impeller
310-310.1, 310.2[4]	Sleeve bearing
310.3	Bearing complete
341	Bracket
391	Bearing ring carrier
400, 400.1[1], 400.2[5]	Flat gasket
411-411.1	Joint ring
412[1]	O-ring
515	Tolerance ring
525[2]	Spacer sleeve
550, 550.4, 550.5[3]	Washer
550-M	Washer - motor
550-P	Washer - pump
552-552.1	Locking disk
561-561.1[2], 561.2	Grooved pin
563	Bolt
565	Rivet
592-M	Spacer – motor
592-P	Spacer – pump
692	Temperature sensor
800	Motor
816	Separating can
843	Coupling insert
847	Inner magnet
847.1	Outer magnet
890	Base plate
901.1, 901.3[3]	Hexagon head screw
901-M	Hexagon head screw – motor
901-P	Hexagon head screw – pump
902	Stud bolt
902-P	Stud bolt - pump
903-.903.1	Screw plug
904	Set screw
914-914.2, 914.3[2], 914.4, 914.6	Hexagon socket head screw
920-920.3	Hexagon nut
920-P	Hexagon nut - pump
931	Lock washer
940-940.2	Fitting key
970-970.1	Plate

[1] Optional O-ring (412) or graphite flat gasket (400.1)

[2] Not applicable for magnetic coupling 135

[3] For motor flange ø 300 mm only

[4] Not applicable for ASKM3201, ASKM3301

[5] Optional sealing cord / sealing material (098) or graphite flat gasket (400.2)

Tab. 28 Parts list ASKM32 / ASKM33 with magnetic coupling 110 oder 135

10.1.3 ASKM40 with magnetic coupling 75, 110 or 135

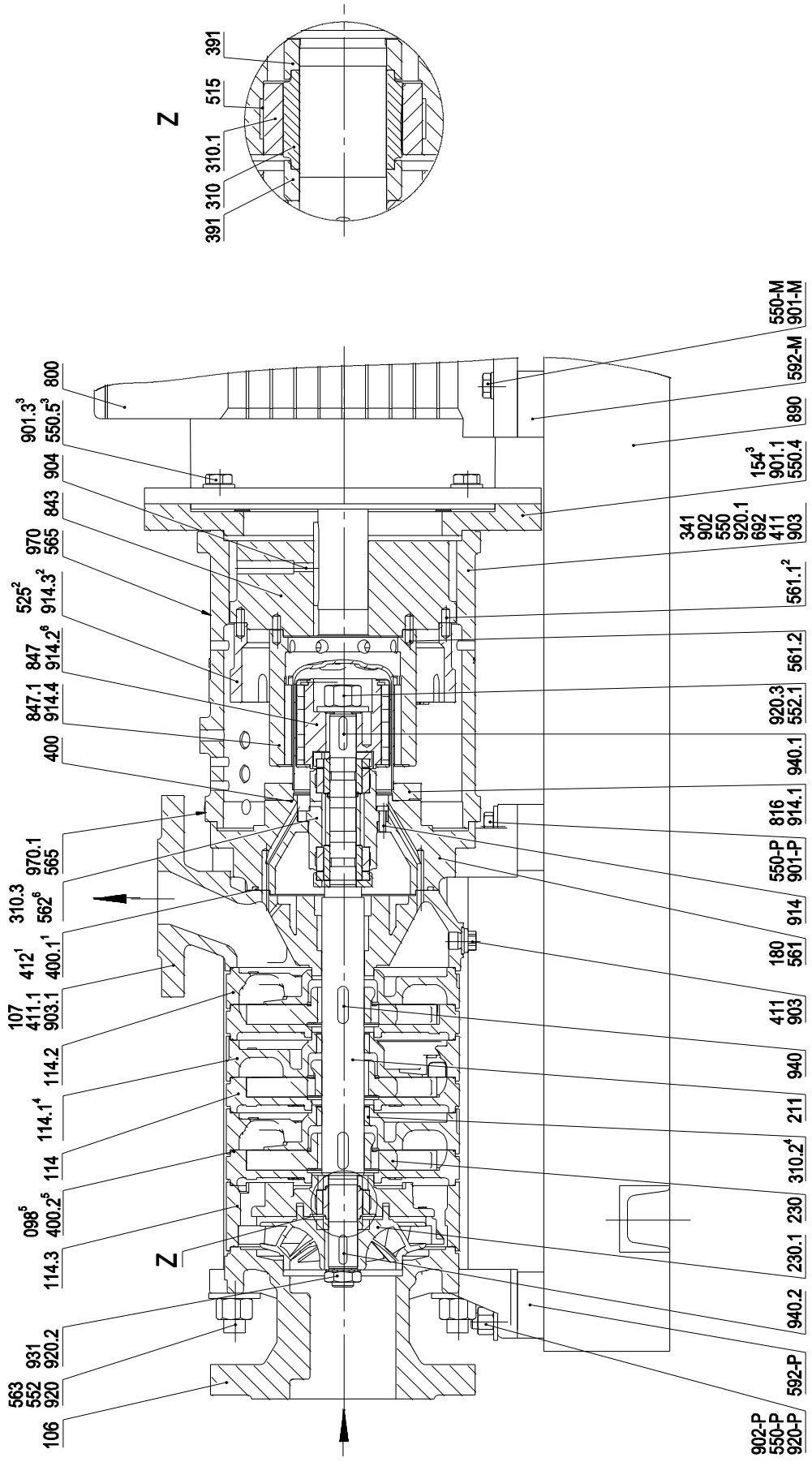


Fig. 23 Cross-sectional drawing ASKM40 with magnetic coupling 75,110 or 135

No.	Designation
098[5]	Sealing cord / sealing compund
106	Suction casing
107	Discharge casing
114	Suction stage
114.1[4]	Discharge stage I
114.2	Discharge stage II
114.3	Stage N
154[3]	Intermediate flange
180	Pump frame
211	Shaft
230	Star impeller
230.1	Impeller
310-310.1, 310.2[4]	Sleeve bearing
310.3	Bearing complete
341	Bracket
391	Bearing ring carrier
400, 400.1[1], 400.2[5]	Flat gasket
411-411.1	Joint ring
412[1]	O-ring
515	Tolerance ring
525[2]	Spacer sleeve
550, 550.4, 550.5[3]	Washer
550-M	Washer - motor
550-P	Washer - pump
552-552.1	Locking disk
561-561.1[2], 561.2	Grooved pin
562[6]	Cylindrical pin
563	Bolt
565	Rivet
592-M	Spacer – motor
592-P	Spacer – pump
692	Temperature sensor
800	Motor
816	Separating can
843[6]	Coupling insert
847	Inner magnet
847.1	Outer magnet
890	Base plate
901.1, 901.3[3]	Hexagon head screw
901-M	Hexagon head screw – motor
901-P	Hexagon head screw – pump
902	Stud bolt
902-P	Stud bolt – pump
903-903.1	Screw plug
904	Set screw
914-914.1, 914.2[6], 914.3[2], 914.4	Hexagon socket head screw
920-920.3	Hexagon nut
920-P	Hexagon nut - pump
931	Lock washer
940-940.2	Fitting key
970-970.1	Plate

[1] Optional O-ring (412) or graphite flat gasket (400.1)

[2] Not applicable for magnetic coupling 135

[3] As of motor flange ø 300 mm only

[4] Not applicable for ASKM4001

[5] Optional sealing cord / sealing material (098) or graphite flat gasket (400.2)

[6] Not applicable for magnetic coupling 75

Tab. 29 Parts list ASKM40
with magnetic coupling 75, 110 or 135

10.1.4 ASKM50 with magnetic coupling 75, 110 or 135

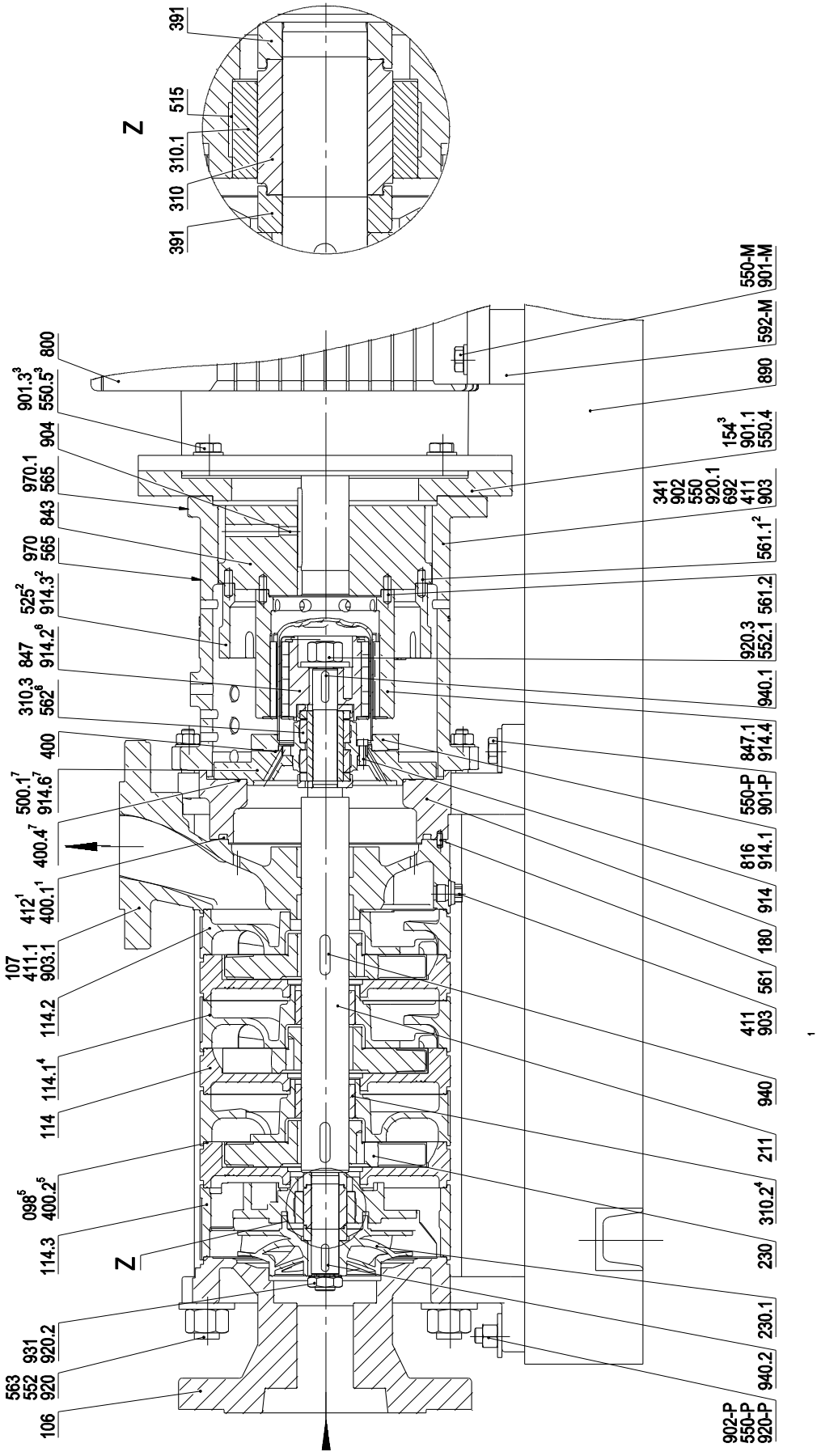


Fig. 24 Cross-sectional drawing ASKM50 with magnetic coupling 75, 110 or 135

No.	Designation
098[5]	Sealing cord / sealing compund
106	Suction casing
107	Discharge casing
114	Suction stage
114.1[4]	Discharge stage I
114.2	Discharge stage II
114.3	Stage N
154[3]	Intermediate flange
180	Pump frame
211	Shaft
230	Star impeller
230.1	Impeller
310-310.1, 310.2[4]	Sleeve bearing
310.3	Bearing complete
341	Bracket
391	Bearing ring carrier
400, 400.1[1], 400.2[5], 400.4	Flat gasket
411-411.1	Joint ring
412[1]	O-ring
500.1[7]	Ring
515	Tolerance ring
525[2]	Spacer sleeve
550, 550.4, 550.5[3]	Washer
550-M	Washer – motor
550-P	Washer – pump
552-552.1	Locking disk
561-561.1[2], 561.2	Grooved pin
562[6]	Cylindrical pin
563	Bolt
565	Rivet
592-M	Spacer – motor
692	Temperature sensor
800	Motor
816	Separating can
843[6]	Coupling insert
847	Inner magnet
847.1	Outer magnet
890	Base plate
901.1, 901.3[3]	Hexagon head screw
901-M	Hexagon head screw – motor
901-P	Hexagon head screw – pump
902	Stud bolt
902-P	Stud bolt – pump
903-903.1	Screw plug
904	Set screw
914-914.1, 914.2[6], 914.3[2], 914.4, 914.6[7]	Hexagon socket head screw
920-920.3	Hexagon nut
920-P	Hexagon nut - pump
931	Lock washer
940-940.2	Fitting key
970-970.1	Plate

[1] Optional O-ring (412) or graphite flat gasket (400.1)

[2] Not applicable for magnetic coupling 135

[3] As of motor flange ø 300 mm only

[4] Not applicable for ASKM5001

[5] Optional sealing cord / sealing material (098) or graphite flat gasket (400.2)

[6] Not applicable for magnetic coupling 75

[7] Not applicable for magnetic coupling 110 and 135

Tab. 30 Parts list ASKM50 with magnetic coupling 75, 110 or 135

10.1.5 ASKM65 with magnetic coupling 110, 135 or 165

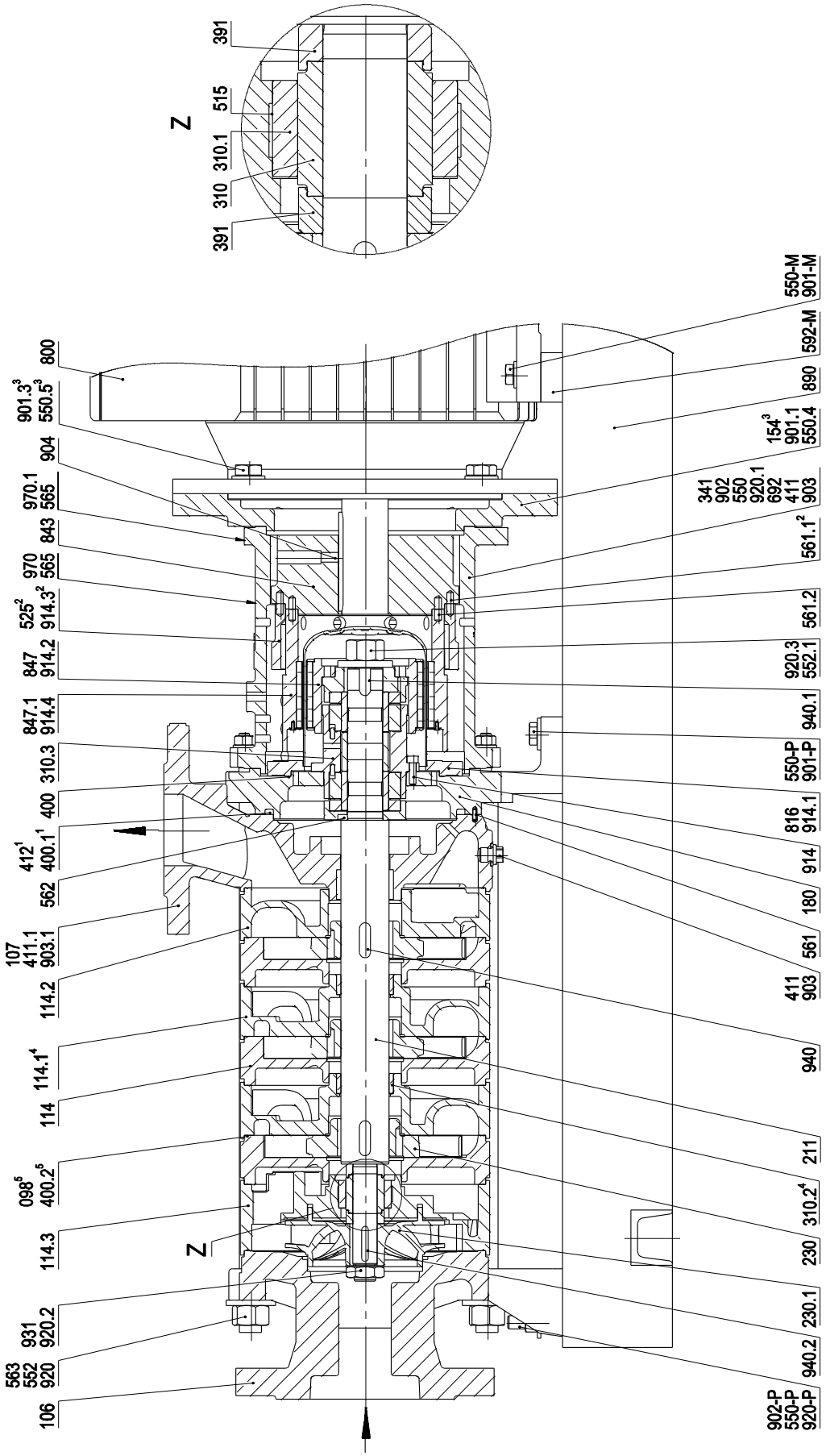


Fig. 25 Cross-sectional drawing ASKM65 with magnetic coupling 110, 135 or 165

No.	Designation
098[5]	Sealing cord / sealing compund
106	Suction casing
107	Discharge casing
114	Suction stage
114.1[4]	Discharge stage I
114.2	Discharge stage II
114.3	Stage N
154[3]	Intermediate flange
180	Pump frame
211	Shaft
230	Star impeller
230.1	Impeller
310-310.1, 310.2[4]	Sleeve bearing
310.3	Bearing complete
341	Bracket
391	Bearing ring carrier
400, 400.1[1], 400.2[5]	Flat gasket
411-411.1	Joint ring
412[1]	O-ring
515	Tolerance ring
525[2]	Spacer sleeve
550, 550.4, 550.5[3]	Washer
550-M	Washer – motor
550-P	Washer – pump
552-552.1	Locking disk
561-561.1[2], 561.2	Grooved pin
562	Cylindrical pin
563	Bolt
565	Rivet
592-M	Spacer – motor
692	Temperature sensor
800	Motor
816	Separating can
843	Coupling insert
847	Inner magnet
847.1	Outer magnet
890	Base plate
901.1, 901.3[3]	Hexagon head screw
901-M	Hexagon head screw – motor
901-P	Hexagon head screw – pump
902	Stud bolt
902-P	Stud bolt – pump
903-903.1	Screw plug
904	Set screw
914-914.2, 914.3[2], 914.4	Hexagon socket head screw
920-920.3	Hexagon nut
920-P	Hexagon nut - pump
931	Lock washer
940-940.2	Fitting key
970-970.1	Plate

[1] Optional O-ring (412) or graphite flat gasket (400.1)

[2] Not applicable for magnetic coupling 135 and 165

[3] As of motor flange ø 300 mm only

[4] Not applicable for ASKM6501

[5] Optional sealing cord / sealing material (098) or graphite flat gasket (400.2)

Tab. 31 Parts list ASKM65
with magnetic coupling 110, 135 or 165

10.2 Certificate of conformity

ⓘ Please copy this form and return it to the manufacturer together with the pump/aggregate.

Certificate of conformity

The pump/pump aggregate including accessories for which we, the undersigned, have placed an inspection/repair order or which has been returned by us together with this certificate of conformity,

Designation: _____

Type: _____

Serial number: _____

☐ has not been in contact with hazardous substances.

☐ has been used in the area of application of: _____

☐ and has been in contact with the following harmful substances or substances subject to mandatory labelling:

Trade name	Chemical designation	Properties (e.g. toxic, inflammable, caustic)

☐ The pump/pump aggregate has been completely drained, flushed and cleaned both inside and outside in accordance with the operating manual.

☐ Further handling of the pump/aggregate does not require special safety precautions.

☐ The following safety precautions must be observed when handling the pump/aggregate:

_____

_____

_____

☐ Safety data sheets in accordance with national regulations are enclosed.

Legally binding statement

We herewith certify that all data given above are correct and complete and that I, the undersigned, am in a position to confirm this.

We acknowledge our liability towards the contractor for any damage arising from incomplete or incorrect data.

We agree to hold harmless the contractor against damage claims of third parties due to incomplete or incorrect data.

We know that, independent of this statement, we have to take direct liability towards third parties, which particularly refers to the staff of the contractor responsible for handling, repair and maintenance.

City, date: _____ **Name:** _____

Company stamp: _____ **Signature:** _____

Tab. 32 Certificate of conformity

10.3 EU declaration of conformity

CE

speck

DE

EU – Konformitätserklärung

gemäß
Beschluss Nr. 768/2008/EG des Europäischen Parlaments und des Rates

Hiermit erklären wir als Hersteller, dass das Pumpenaggregat

EN

EU declaration of conformity

as per
Decision No 768/2008/EC of the European Parliament and of the Council

We herewith declare as the manufacturer that pump aggregate

ACY-...-MK	CY-...-PM-HT	NPY-...-MK
ACY-...-PM	CY-...-PM-TOE	NPY-...-MK-HT
ASKM...	DS-...-MK	NPY-...-MK-TOE
AY-...-MK	EY-...-MK	NPY-...-PM
AY-...-MK-HT	EY-...-PM	NPY-...-PM-HT
AY-...-MK-TOE	KN...	NPY-...-PM-TOE
AY-...-PM	LY-...-MK	PY-...-MK
AY-...-PM-HT	LY-...	SKM...
AY-...-PM-TOE	MLY-05-38/810	TOEG...
CY-4281	MU...MK-PM	TOEM...
CY-...-MK	MY2-...	Y-...-MK
CY-...-MK-HT	MY3-...	Y-...-MM
CY-...-MK-TOE	MY4-...	YS-...-MK
CY-...-PM	MY04-46-MM	ZY-...-MK
	MY-09-72-SR	ZY-...-MM

in der gelieferten Ausführung, folgenden einschlägigen Bestimmungen entspricht:

- EG-Maschinenrichtlinie 2006/42/EG
- Die Schutzziele der Niederspannungsrichtlinie 2014/35/EU werden gemäß Anhang I, Nr. 1.5.1 der Maschinenrichtlinie 2006/42/EG eingehalten.
- Elektromagnetische Verträglichkeit – Richtlinie 2014/30/EU
- Ökodesign-Richtlinie 2009/125/EG
- RoHS-Richtlinie 2011/65/EU (RoHS II)

corresponds to the following relevant provisions:

- *Machinery directive 2006/42/EC*
- *The protection objectives of the low-voltage directive 2014/35/EU are realized according annex I, No. 1.5.1 of the EC Machinery directive 2006/42/EC.*
- *Electromagnetic compatibility – directive 2014/30/EU*
- *Ecodesign directive 2009/125/EC*
- *RoHS directive 2011/65/EU (RoHS II)*

Angewendete harmonisierte Normen, insbesondere

Harmonized standards applied, in particular

EN 809:1998 + A1:2009 + AC:2010	EN ISO 12100:2010	EN 60034-1:2010 + Cor.:2010
EN 50581:2012		

Bei einer mit uns nicht abgestimmten technischen Änderung der oben genannten Bauarten, verliert diese Erklärung ihre Gültigkeit.

If the above mentioned series are technically modified without our approval, this declaration shall no longer be applicable.

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen ist:

Authorized representative for the completion of the technical documentation:

Dr.-Ing. Pierre Hähre
Speck Pumpen Systemtechnik GmbH, Regensburger Ring 6 – 8, 91154 Roth, Germany

Roth, 06.06.2018
Speck Pumpen
Systemtechnik GmbH
Regensburger Ring 6 – 8
91154 Roth / Germany

ppa. Dr.-Ing. Pierre Hähre
Technischer Leiter
Technical Director

Doc.-No: *1096.0194*

(Konformitätsbewertungen: 1096.1395, 1096.1397, 1096.1405, 1096.1406, 1096.1407, 1096.1416, 1096.0237)

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