



Operating instructions Pump Series

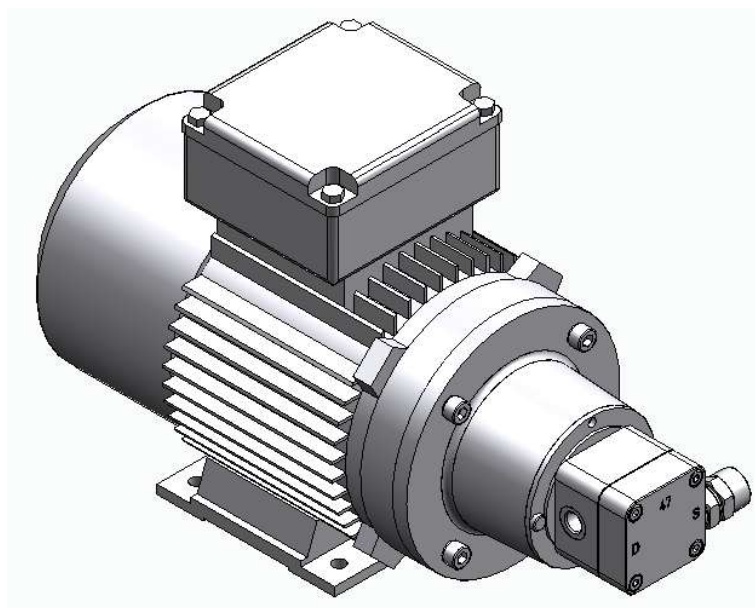
2500/19 ...

2500/23 ...

2500/29 ...

2500/35 ...

2500/47 ...



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Design and product changes that serve to improve the product,
are reserved.

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1 Introduction

1.1. Foreword

This operating manual from **Scherzinger Pumpen GmbH & Co. KG** is part of the product (pump).

The operating instructions are intended for all persons who carry out assembly, installation, commissioning and service work on the product (pump).

Please read these operating instructions carefully and pay particular attention to the safety instructions!

If you have any questions regarding the product (pump), its area of application or any other questions, our staff will be happy to assist you.

1.2. Product Identification / Product Information

Validity

The descriptions in this operating manual refer exclusively to the product (pump) as described in the technical data ([Technical Data](#)) and as developed and built by the manufacturer.

Product Information

The pump from Scherzinger Pumpen GmbH & Co. KG is suitable for pumping liquids that [do not have a corrosive or aggressive effect](#) on the materials used (wetted parts).

Applicable documents

Documents that are not included in the operating instructions but are included are considered to be co-valid documents. If any of the documents listed below are missing, please contact the manufacturer. Applicable documents are:

- Technical documentation/operating instructions of the engine manufacturer,
- PTB (Physikalisch-Technische Bundesanstalt) certificate from the engine manufacturer,
- Optional: Technical documentation of the accessories.

If you are a fitter or you operate/operate the machine, you must read and understand the applicable documents before installing and commissioning the machine. Ensure that these documents are kept at all times at the point of use of the machine, or in a generally accessible manner.

1.3. Storage

This **operating manual** must always be kept close to the product (pump) in order to be quickly accessible when needed.

1.4. Definition of the term

In the following, any liquid to be pumped will only be called "**medium**". This operating manual is valid for the pump series

2500/19 ...
2500/23 ...
2500/29 ...
2500/35 ...
2500/47 ...

For a better overview, the **2500/19 ...**, **2500/23 ...**, **2500/29 ...**, **2500/35 ...** and **2500/47 ...** called **2500**.

The 2500 **pump series** are available [in the following versions](#) (pump body).

- Motor design consisting of: pump head, magnetic coupling or positive coupling, motor flange and motor.
- ZK version consisting of: pump head, magnetic coupling or positive coupling and motor flange.
- MK version consisting of: pump head and magnetic coupling or positive coupling.
- PK version consisting of: pump head.

You can find the exact design of your pump in the respective order documentation.

1.5. Representations abroad

A list of our worldwide representatives with respective addresses can be requested from the manufacturer's factory, or on the Internet at www.scherzinger.de.

Most of the agencies are sales branches, some of which also carry out repair and maintenance work. However, these are preferably carried out at the main plant in Furtwangen.

1.6. *Symbolism in this manual*

1.6.1. *Hazard warning levels*

Marking of instructions in the operating instructions. The safety instructions contained in these operating instructions, which may cause a hazard if not observed, are specially marked:



If disregarded, there is a danger to people.



If disregarded, there is a risk of electrical voltage.



These instructions must be taken into account for explosion protection in accordance with Directive 2014/34/EU ("ATEX Directive").

ATTENTION

If disregarded, there is a danger to the machine.

Instructions attached directly to the pump such as

- Nameplate
- Direction of rotation arrow
- Marking of the connections

must be observed and kept in legible condition.



Texts marked with this symbol contain very important hints!

Be sure to pay attention to these texts!



This icon indicates texts that contain important hints/comments or tips.

1.6.2. Specific Hazard Symbols



Warning of dangerously hot surfaces!



Warning against mechanical movements or hand injuries!

1.6.3. Common Symbols

- This item indicates the description of the activities you are supposed to perform.
- This line indicates bulleted lists.
If cross-references to other chapters are required within the text, the spelling is shortened for clarity, e.g.: [\(Representations abroad\)](#)

(3) Figures in brackets refer to items in figures.

1.7. *Personal protective equipment*

The requirements for personal protective equipment resulting from the environmental conditions at the place of use, the pumped medium, from other products or from the combination with other products are not described in this operating manual and must be carried out by the operator according to the actual risks.

1.8. *Definition of skilled workers / authorized personnel*

Unqualified interventions in the product (pump) can result in physical damage or property damage. Only qualified personnel are therefore allowed to operate, put into and take out of operation, clean and maintain the product (pump).

Qualified personnel in this sense are persons who:

- are familiar with the safety concepts of the product (pump).
- are instructed as operating personnel in the handling of the product (pump) and are familiar with the content of the operating instructions relating to operation and operation.
- have received appropriate instruction from qualified personnel.
- on the basis of their training, experience and instruction as well as their knowledge of relevant standards, regulations, accident prevention regulations, explosion protection and operating conditions, have been authorised by the person responsible for the safety of the product (pump) to carry out the necessary activities in each case and to be able to identify and avoid possible hazards.

1.9. *Obligation of the operator*

The operator undertakes to only allow skilled workers to work with this product (pump) who:

- have been sufficiently trained in accordance with the activities to be performed.
- Familiarized with the basic regulations on occupational safety, explosion protection and accident prevention and instructed by qualified personnel in the handling of the product (pump).
- have read and understood the safety and warning instructions in the operating instructions.

In the interest of all parties involved, please follow the following instructions:

- Supplement the operating instructions with generally applicable, statutory and other binding regulations on occupational safety, accident prevention and environmental protection as well as explosion protection and instruct the personnel involved in the product (pump) in it!
- Supplement the operating instructions with instructions on how to take into account operational specifics, e.g. with regard to work organisation, work processes, personnel deployed (including supervision and reporting obligations)!
- Clearly define the responsibilities of the staff for operating, cleaning, maintaining, etc.!
- Check the safety and hazard-conscious work of the staff at regular intervals!
- Take measures to ensure that the product (pump) is only operated in a safe, functional condition!
- Have the product (pump) cleaned and serviced at the specified intervals. [\(Maintenance / Cleaning\)](#)
- Do not have any structural changes (except those described in the operating instructions) carried out without the written permission of the manufacturer !
- Rule that persons who have not been instructed in the residual risks when working on and with the product (pump) with the help of the safety instructions are not allowed to enter the danger area of the product (pump)!
- At surface temperatures above 50 °C (122 °F), a warning sign must be clearly visible on the machine. At surface temperatures above 80° C (176°F), insulation must be installed, or the area must be fenced/demarcated at a sufficient distance from the source of hazard.
- Securing the working environment is the sole responsibility of the operator.

1.10. Obligation of the staff

All persons who are tasked with working on the product (pump) are obliged to

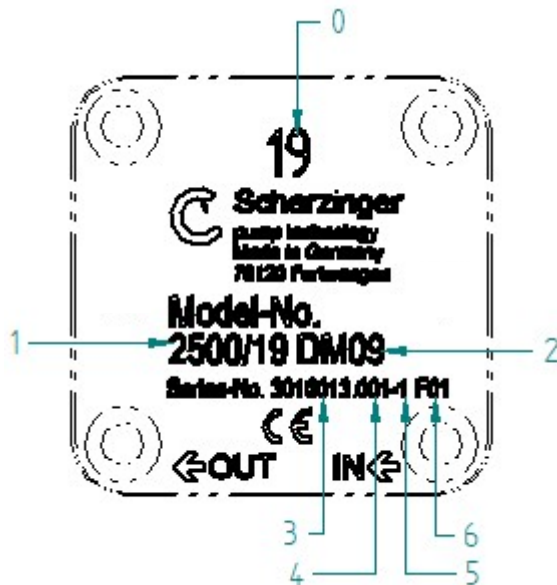
- Observe the basic regulations on occupational safety and accident prevention.
- Read the safety and warning statements in this documentation.

In the interest of all parties involved, please follow the following instructions:

- Refrain from any safety-questioning way of working!
- Observe all hazards and warnings in this operating manual!
- In addition to these operating instructions, please observe generally applicable, statutory and other binding regulations on occupational safety and accident prevention, explosion protection and environmental protection!
- Take note of the fire detection and firefighting options and find out about the location and operation of fire extinguishers!
- Wear appropriate protective equipment according to the work to be done!
- Don't wear loose long hair, loose clothing, or jewelry (including rings)!
- Only carry out work for which you have been sufficiently trained!
- Do not carry out any repair work without prior consultation with the manufacturer and the operator!
- Do not carry out any structural changes without the written permission of the manufacturer (except those described in this operating manual)!
- Make sure that other people who are not working on the pump (and therefore not aware of the risks that can arise when handling the pump) cannot enter the hazardous areas.
- If a safety hazard occurs, put the pump out of operation! Secure them against recommissioning and inform the operator immediately!



1.11. Marking using the example of the pump type 2500/19 DM09



- 0: Size
- 1: Series
- 2: Type designation
- 3: Operating order
- 4: Positions
- 5: Number of units
- 6: Year / Month

1.12. Intended use / normal operation

The product (pump) defined in the technical data is only suitable for pumping low-to medium-viscosity, particle-free, well-lubricating media that have no corrosive or aggressive influence on the material of the product (pump).

The product (pump) is exclusively

- for commercial use,
- for the promotion of media,
- intended for use by authorized personnel, from a minimum age of 16 years .

Sufficient knowledge of an official language is required for the operator, the operating personnel as well as the maintenance and repair personnel.

The product (pump) has not been designed for use in radioactive or biologically contaminated atmospheres and corresponding media!

Only spare / wear parts that have been approved by the manufacturer may be used

1.12.1. *Limit values*

The intended use can be ensured by complying with the following limit values:

Description	Value
Max. differential pressure increase	20 Bar
Max. system pressure (pressure side)	100 Bar
Max. suction vacuum	0.7 bar (filled with medium)
Max. pressure bypass valve (optional)	20 Bar
Operating Temperature	-20 to 130 °C
Ambient temperature	-40 to 60 °C
Viscosity range	2.0 to 2,000 mm ² /s
Max. speed	2800 rpm
Sound pressure level	< 80 dB(A) measured at: Speed: 1500 rpm Operating pressure: 10 bar Operating temperature: 20 °C Pumped medium: 2 mm ² /s, lubricating (Sound pressure level)
Dimensions	please refer to the corresponding data sheets (Technical data)
Add-on parts	see applicable/supplied documents (engine, PT100, etc.)
Electrical parameters	see applicable/supplied documents (engine, etc.)
Max. torque of the clutch	0.9 Nm

The listed limit values are only guideline values. The actual limits depend on the use case. Influencing factors are, for example, the viscosity and the type of medium to be pumped.

Due to the versatile combination possibilities, with regard to the different sizes, gears, motor speeds and electrical parameters, a clear and clear representation of normal operation for all pumps is not possible in the respective variants. In this case, reference is made to the respective order documentation.

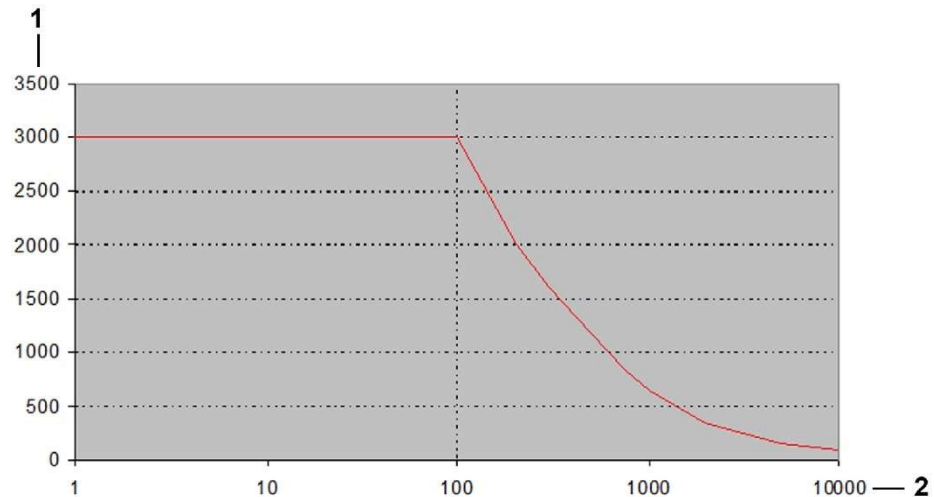
Any other use/use that goes beyond this, as described in the operating instructions, is considered not to be in accordance with its intended purpose.

1.12.2. *Painting*

All pumps are delivered with a paint/coating at the factory.

1.12.3. *Maximum possible speed*

The maximum possible speed depends on the pump size and the media viscosity:



- 1 Max. pump speed (1/min)
- 2 Media viscosity (mm²/s)

Fig. 2: Viscosity range



If one or more of the limit values described in this section are exceeded, it is imperative to ask the manufacturer's factory whether these operating conditions have been approved by the manufacturer. Otherwise, a modification of the pump must be carried out to your use case, otherwise the pump or the system in which the pump is integrated can be damaged or destroyed, posing a risk to personnel.

1.13. *The complaint*

Claims for damages relating to transport damage can only be asserted if the manufacturer and the delivery company are notified immediately.

For returns (due to transport damage / repairs), prepare a damage report immediately and return the parts, if possible in the original packaging, to the manufacturer's factory.

- When accepting the goods, note any transport damage on the freight documents!
- Enclose the following information with the return:
 - the name and address of the sender and the recipient,
 - type and serial number of the product (pump),
 - Description of the defect,
 - In the event of transport damage: name of the delivery company and, if possible, delivery time, name of the driver and police registration number of the delivery vehicle,
 - Declaration of non-objection. See under 1.16.

1.14. *Warranty and liability*

For the use of the product (pump), our **General Terms and Conditions of Sale and Delivery apply**.

Deviating agreements must be recorded in writing and confirmed by us !

The General Terms and Conditions of Sale and Delivery are handed over to the Operator with the offer.

Warranty and liability claims for personal injury and property damage are excluded if they are due to one or more of the following causes:

- improper use of the product (pump).
- Operation of the product (pump) in the event of defective safety devices or improperly installed or non-functional protective devices and / or safety devices.
- Failure to observe the instructions in this operating manual regarding safety, transport, storage, assembly, commissioning, operation, maintenance and repair of the product (pump).
- improper assembly, commissioning, operation, maintenance and repair of the product (pump).
- Poor monitoring and maintenance of parts that are subject to wear and tear.
- unauthorized structural change, or unauthorized repair, to the product (pump).
- Catastrophes due to the impact of foreign bodies and force majeure.

Only original spare parts from the manufacturer may be used so that functional reliability can be guaranteed.

1.15. Declaration of Conformity

1.15.1. Declaration of conformity according to Directive 2006/42/EC (Machinery Directives)

Declaration of Conformity in accordance with Directive 2006/42/EC

Within the meaning of EC Directive 2006/42/EC, Annex II A, of 17 May 2006, the manufacturer declares :

**Scherzinger Pumpen GmbH & Co. KG
Bregstraße 23 - 25
78120 Furtwangen / Deutschland**

that the product:

**Pump
2500/19 ...
2500/23 ...
2500/29 ...
2500/35 ...
2500/47 ...**

is supplied with an electric propulsion machine and thus complies with the provisions of Directive 2006/42/EC, Annex I, No. 1.

The harmonized standards applied below:

**EN ISO 12100:2011
EN ISO 13857:2020
EN ISO 13732-1:2008
EN 809:1998+A1:2009 +
AC:2010 EN 60204-1:2019**

Guidelines applied below:

**2006/42/EC Machinery Directive
2014/30/EU Electromagnetic Compatibility (EMC Directive)**

Applied national technical standards and specifications:

Accident prevention regulations

The person responsible for documentation: Matthias Derse Furtwangen,
Monday, April 20, 2022



Dipl.-Ing., MBA Matthias
Derse Managing Director

1.15.2. Notes on CE conformity regarding the installation of a motor / drive

Note on CE conformity according to 2006/42/EC (Machinery Directive) of pumps/motor units when the motor/drive is installed by the customer (dealer/operator)

We hereby confirm the CE conformity of our pump unit, provided that the following criteria are met with regard to the intended use, as described in the operating instructions:

- The drive meets sufficient performance and design data in relation to the required flow rate and pressure
- The engine is only mounted with the corresponding intermediate flange supplied by Scherzinger and the matching coupling. These parts must not be reworked.
- The flange and motor shaft dimension required for the specified motor size is fulfilled
- The installation must have been carried out professionally, in accordance with the Scherzinger operating instructions
- The correct use of an explosion-proof drive with regard to the required ignition protection, dust and water protection class (IP), speed (number of poles) and connected loads. Operation with a frequency converter is only permitted within the scope of the possibilities described in the operating instructions.
- Engine conformity according to machine guidelines of the current state of the art
- Ensuring grounding
- Pump must be painted in compliance with [\(painting\)](#) .

Anyone who, as a reseller or dealer, connects the pump to a motor unit and places it on the market together as a single unit, must fully comply with the requirements of 2014/34/EU, in particular Article 13 (Conformity assessment procedure). In this case, the reseller or dealer himself becomes the manufacturer.

The company (operator) is responsible for the overall conformity of the pump/motor unit, within the meaning of the Industrial Safety Ordinance (BetrSichV), which carries out the assembly or assembly itself and commissions the device.

Furtwangen, Montag, 20. April 2022



Dipl.-Ing., MBA Matthias
Derse Managing Director

1.16. Declaration of Non-Objection

The pump and its accessories submitted by us for inspection or repair together with this clearance certificate,

Type	Pump Number	Delivery date	
Operating data:			
(°C)	(mm²/s)	(Bar)	
Temperature:	Viscosity:	Printing:	Medium:
Reason for the repair order			
Reason (continued)			
☐ has not been used with fluids that are hazardous to health ☐ came into contact with fluids subject to labelling or containing pollutants.			
Specify the last production medium			

The pump has been carefully emptied and cleaned outside and inside before shipping/provision. The cleaning steps were carried out according to the corresponding operating instructions.

- ☐ Special safety precautions are not required for further handling.
☐ The following safety precautions are required with regard to flushing media and disposal:

We assure that the above information is correct and complete and that the shipment is carried out in accordance with the legal provisions.

Company	Name
Road	Position
City	Phone
Country	Fax
Date	Company stamp / signature

Pumps delivered without this completed safety data sheet cannot be inspected or repaired for safety reasons.

2. Safety instructions

The pump is a quality product manufactured according to the recognized rules of technology and has left the manufacturer's factory in perfect condition in terms of safety!

Nevertheless, there are:

- during assembly / disassembly,
- during commissioning / decommissioning,
- during operation and
- during maintenance / cleaning

Residual risks.

In the case of

- ignorance of these residual risks,
- Failure to comply with the warnings in these operating instructions,
- improperly performed work,
- improper use of the pump

these residual risks can lead to death, serious injuries to persons or property damage!

Due to these latent residual risks, the manufacturer is obliged to inform the operator and the user about these risks!

We - the manufacturer - comply with this obligation to instruct with the descriptions in this operating manual in general and with this chapter in particular.

2.1. *Hazard from hot components*



If the pump is operated in a closed housing, it must be ensured that it does not overheat!

- For automatic monitoring, we recommend installing a temperature sensor.
- If there is a danger from hot components, you must secure them with on-site protection against contact.

2.2. *Danger from electric shock*



If live components are touched, there is a risk of life-threatening electric shock!

Work on electrical equipment parts or equipment may only be carried out by an authorised electrician in accordance with the electrotechnical rules!

Access to the electrical control cabinet is only permitted to authorized qualified personnel. Covers of live parts must not be removed!

In the event of faults in the electrical power supply, switch off the pump immediately or disconnect the pump from the power supply!

- Check the electrical equipment of the pump regularly! In case of damage to the electrical equipment, switch off the pump immediately! Have loose connections or scorched / damaged cables replaced immediately!

- If there is an imminent risk of electric shock, switch off the pump!
- Secure the pump against recommissioning.

Five safety rules before starting work:

- Unlock
- Secure against re-switching
- Determine the absence of voltage
- Grounding and shorting
- Cover or block off adjacent live parts

2.3. Hazard from magnetic fields

The magnetic coupling contains permanent magnets. The magnetic field can pose a risk to people with active or passive implants!



People with pacemakers, active or passive implants must not be in the area of the magnetic field. A safety distance of 25 cm from unassembled individual parts of the couplings must be maintained. For mounted couplings with axially aligned magnetic rotors and surrounding coupling housing (pump carrier), a minimum safety distance of 10 cm applies.

- When working on the pump, it is forbidden to wear ferromagnetic jewellery (such as rings, chains, etc.) or other magnetizable objects!
- Do not bring electronic data carriers or devices into the area of influence of the magnetic field.
- Do not place ferromagnetic tools on the axes or near the permanent magnetic field.
- Make sure that no ferromagnetic objects are attracted to the magnetic coupling and that they have a safety distance of at least 15 cm.

2.4. Exposure to pumped media



When handling hazardous media (e.g. hot, flammable, explosive, toxic, hazardous to health), observe safety regulations for handling hazardous substances

- Personal protective equipment must be worn when working on the pump.

2.5. Hazard due to pump weight



- Risk of crushing and bumping during lifting and transport!
- Due to the weight of the pump, there is an increased risk of injury during transport.
- Transport may only be carried out by trained personnel.
- The minimum load capacity of the lifting equipment must always be greater than the weight of the component to be lifted. Weight see data sheet for the pump.

3 *Transport and interim storage*

3.1 *Shipment of the pump and protective measures*

The pump is shipped at the factory in such a way that it is protected against shocks and shocks . Furthermore, inlets and outlets are closed with protective plugs.

This measure is necessary to prevent the leakage of residual liquid that is still in the pump head as a residue as a result of a test run.

This also protects the connection threads. Penetration of foreign bodies into the interior is reliably prevented.

After receiving the pump, you must immediately check the pump for damage in transit . If you notice any damage, it must be reported immediately to the responsible freight forwarder and Scherzinger Pumpen GmbH & Co. KG, 78120 Furtwangen / Germany.

3.2 *Interim storage*

When storing the pump, consider the following points:

- Do not store the pump in wet or damp rooms.
- Leave the protective plugs in or insert them.
- If the storage period is stored for more than six months, take corrosion protection measures for shiny metallic parts.
- The storage rooms must not contain any ozone-generating equipment, such as fluorescent light sources, mercury vapour lamps, high-voltage electrical equipment.
- Make sure that there is no condensation. The relative humidity must be below 65%.
- When storing the pump, make sure that the storage temperature does not fall below 5°C or does not exceed 50°C.

3.3 *Preservation for storage after operation / flushing of the pump*

Depending on the medium pumped, the pump must be prepared differently for storage . If no toxic or aggressive media has been pumped, rinse the pump briefly with cold cleaner at low speed without increasing the differential pressure.

- When pumping hazardous or aggressive media, clean the pump in such a way that any subsequent maintenance work can be carried out without endangering the health of the personnel.
- Flush the pump at medium speed with a neutralizing medium. Disassemble and clean parts that are not completely cleaned during the rinsing process by hand.
- If hardening media (e.g. paints) have been conveyed, complete disassembly and cleaning of the individual pump parts is necessary to ensure proper function when recommissioning.
- Carry out the cleaning with conventional detergent [\(technical data\)](#).
- However, after installation, flush the pump again with a neutralizing medium at medium pump speed.
- Observe the regulations when handling substances that are hazardous to health!



There is a risk of chemical burns, explosion hazards in the event of reactions of the pumped medium with the detergent used. When rinsing the pump, the detergent must be adapted to the last medium pumped in order to rule out a dangerous chemical reaction between the pumped medium and the detergent.

3.4 *Return to the factory*

If you return the pump to the manufacturer's factory for repair or maintenance, you must complete and enclose the Declaration of Non-Objection . Repair processing is otherwise not possible!

4 *Functionality / Description*

4.1 *Function of the pump*

The pumping effect of an internally toothed gear pump is carried out by means of a driven externally toothed pinion and a concurrent internally toothed gear ring.

The externally toothed pinion is attached to a shaft, which in turn is mounted in the pump housing and cover.

The opening gaps create a vacuum that sucks the medium into the pump and transports it further between the gears in the teeth and the sickle.

In the area where the gears interlock again, the medium is pressed out of the tooth gaps and into the outlet. In this way, the medium can also be pumped against overpressure.

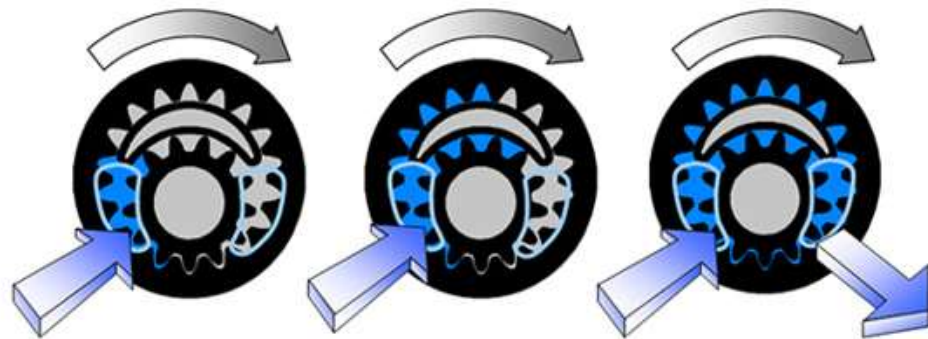
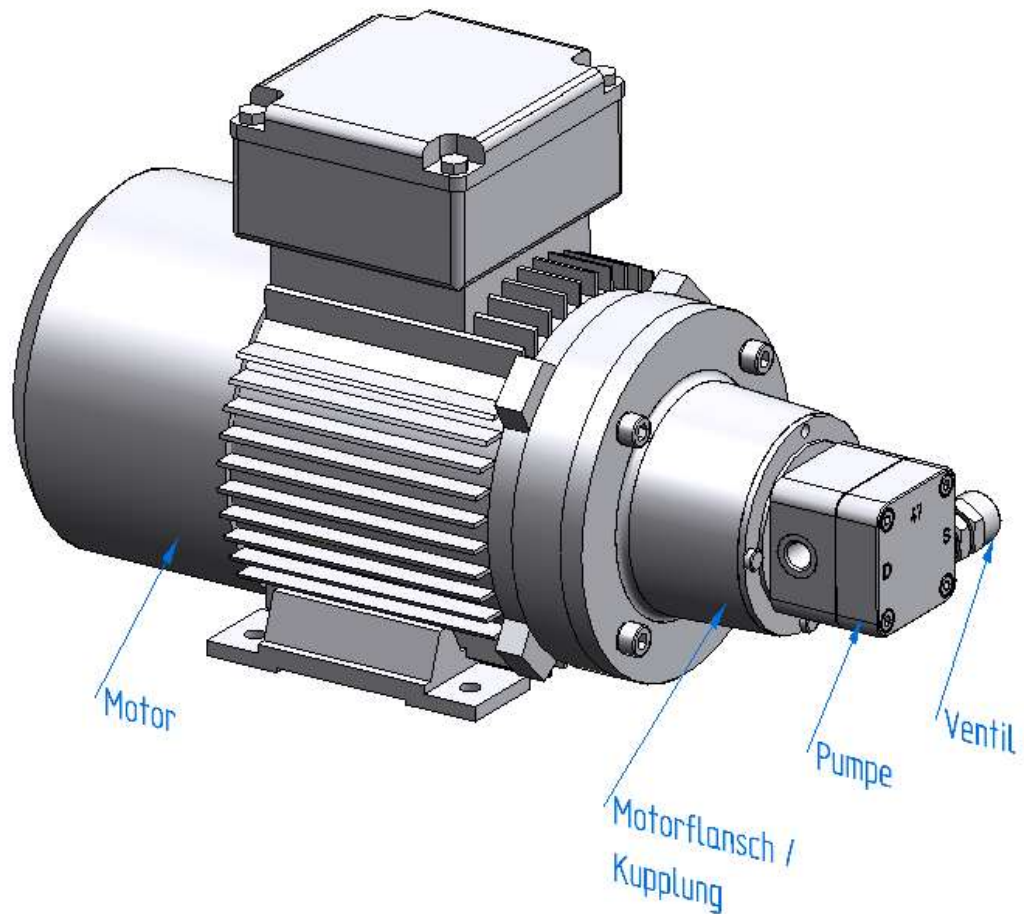


Fig. 4: Principle of operation of the gear pump

4.2 Structural design of the pump

- Pump body



Scherzinger pumps of the 2500 series are available in different sizes (size /19 to size /47).

The theoretical funding data are:

Pump head	V _{g_{th}} swallowing volume	Q _{th} at 1400 rpm	Q _{th} at 2800 rpm
2500/19 and /19B	0.19 cm ³ /rev	0.27 l/min	0.53 l/min
2500/23 and /23B	0.23 cm ³ /rev	0.32 l/min	0.64 l/min
2500/29 and /29B	0.29 cm ³ /rev	0.40 l/min	0.80 l/min
2500/35 and /35B	0.35 cm ³ /rev	0.49 l/min	0.98 l/min
2500/47 and /47B	0.47 cm ³ /rev	0.66 l/min	1.30 l/min

It should be noted that during all maintenance work during which the pump is disassembled, all O-rings and radial shaft seals must be replaced during reassembly. Otherwise, absolute leakage safety is not guaranteed.

It is also important to keep the workplace absolutely clean, as dirt can jeopardize the proper functioning of the pump.

- **Pressure relief valve installation and commissioning (only for valve version)**

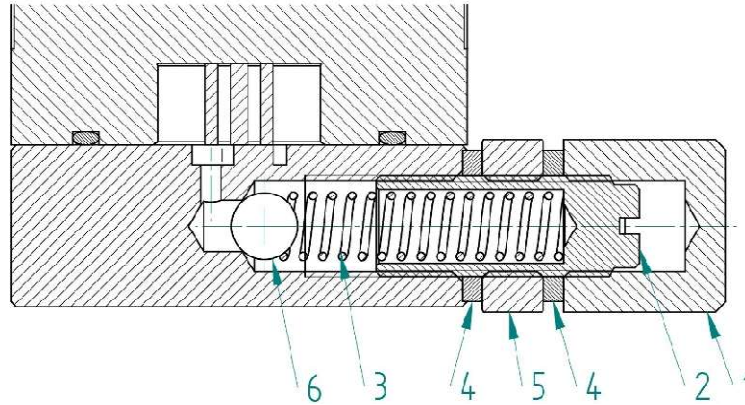


Fig. 6: Pressure relief valve

The Pressure Relief Valve (Bypass Valve) is a safety valve and serves as an overpressure relief valve to protect the pump and the system. When the valve is activated, the medium is returned internally from the pressure side to the suction side or from the pressure side to the outside, thus avoiding any damage to the system or the pump head.

The adjustment range is between 0.5 and 20 bar. If you need accurate pressure adjustment, you need to use a precise, external pressure adjustment valve. If you use the safety valve as a pressure relief valve, the pump outlet pressure may vibrate.

With the integrated pressure relief valve, you can set a relative pressure increase to a desired target value.

At the factory, the pressure relief valves are tested for proper function during the test run of the pump. A defined pressure setting of the valve at the factory is only carried out if it is specifically requested by you as the operator.

- Adjust the pressure relief valve while the pump is running. To do this, tap the pressure booster on the pressure side of the piping system. Make sure that the right framework conditions (later operating conditions) are in place when hiring:
 - Pumped medium
 - Temperature
 - System Pressure
 - Speed

To adjust the pressure relief valve, proceed as follows:

- Unscrew cap nut (1)
- Loosen lock nut (5)
- By turning the regulating screw (2) with a screwdriver, adjust the valve to the desired pressure.
 - Turning to the right (clockwise) increases the opening pressure

- Rotation to the left (counterclockwise) reduction of the opening pressure
- As a guideline for the pressure setting, a value of approx. 10% to 20% above the working pressure of the system has proven to be effective.
- After the valve adjustment has been completed, fix the position of the regulating screw (2) with lock nut (5)
- Screw on cap nut (1)
- Make sure that the sealing rings (4) are correctly rearranged after installation.

With the cap (1) unscrewed, there is a possibility that small amounts of leakage fluid may leak out of the pressure relief valve.

The pressure relief valve only serves as short-term overload protection. With longer opening hours, there is a risk that the pump head will be damaged or destroyed by overheating. The surface temperature can exceed critical values.

- **Magnetic coupling**

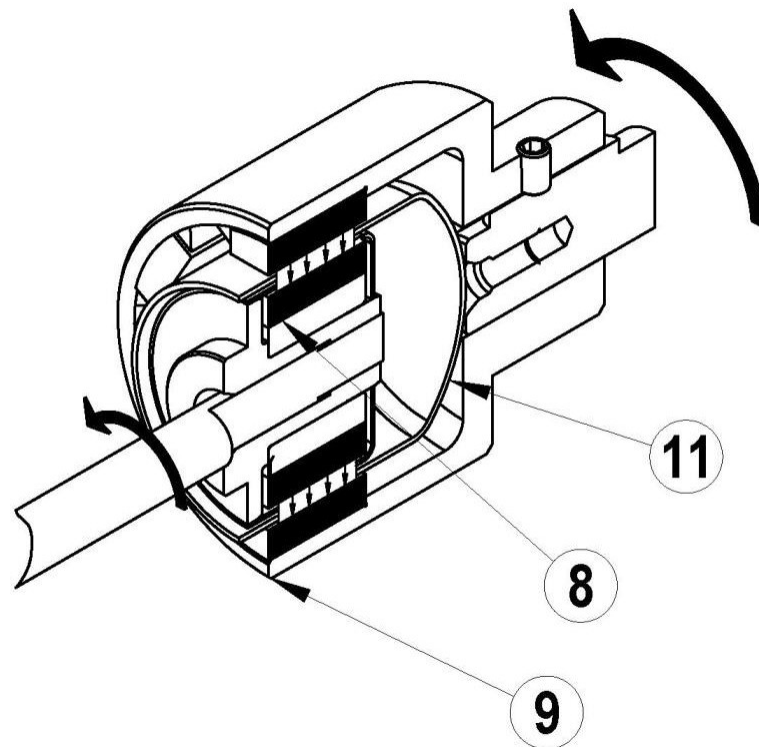


Fig. 8: Magnetic coupling

(The vertical arrows indicate the direction of the magnetic field. The curved arrows show the direction of rotation.)

With the magnetic coupling, the pump head is hermetically sealed, i.e. there is no need to guide a rotating shaft end to the outside. Leakage due to wear is therefore no longer possible, as only static sealing is done with O-rings.

The torque is transmitted to the magnetic clutch hub (8) by magnets in the magnetic clutch bell (9), which are magnetized alternately on the inner circumference, through a partition wall (containment shell (11)). Magnets, alternately polarized on the outer circumference, are also arranged there.

As soon as the maximum transmittable torque is exceeded, the magnetic field breaks off and the drive continues to run; the system begins to rattle uniformly and the medium is no longer conveyed.

To re-engage the clutch, the pump must be stopped completely and restarted .

Operating times of more than 2 minutes when disengaged lead to a strong heating of the clutch. The magnets can be demagnetized: The torque to be transmitted and thus the achievable pressure increase are reduced. Avoid operating in this condition.

5 *Installation / Assembly / Disassembly*

5.1 *Information on the location*

- First, carry out a visual inspection of the pump supplied by us for transport damage ([complaints](#))
- Then check whether a suitable pump type is available according to the following points:
 - Model type and design
 - Direction of rotation or position of the suction / pressure side
 - Temperature range

If you notice any differences between the pump design required in your system and the one we supply, please contact us immediately.

5.2 *Installation position*

Note that the pump unit is designed for horizontal installation only. In exceptional cases, the pump unit can also be installed vertically. It should be noted that the drive unit is located above the pump. In this case, increased noise emissions must be expected.

Screw the pump/pump units only to the foot provided for this purpose. The installation space must be level. Level out unevenness near the mounting points with suitable underlays so that a level is created over these four support points. If strong oscillations / vibrations occur during the operation of the pump, please note the points listed in the fault table (chapter "Fault").

5.3 Mounting the magnetic coupling

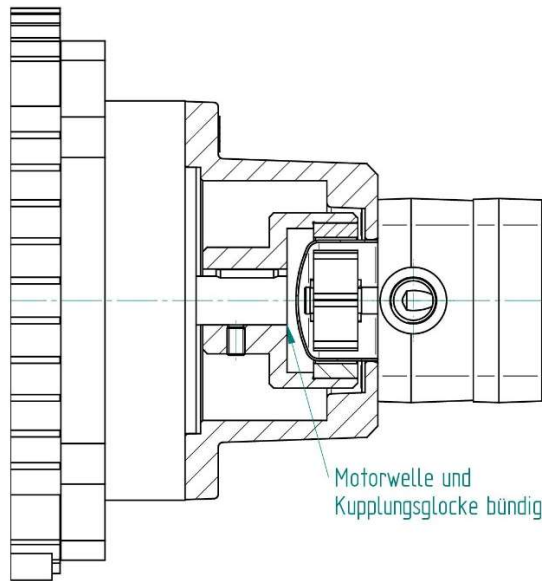


Fig. 10: Mounting the magnetic coupling

Repairs as well as maintenance of the magnetic coupling may only be carried out by the manufacturer.

Slide the magnetic clutch bell flush onto the motor shaft.

Then screw the magnetic clutch bell with the threaded pin with a hexagonal screwdriver SW 3 mm with 9.5 Nm. Then attach the motor to the motor flange. (No tilting or impacting the magnets.)

5.4 Installation of backlash-free, elastic couplings

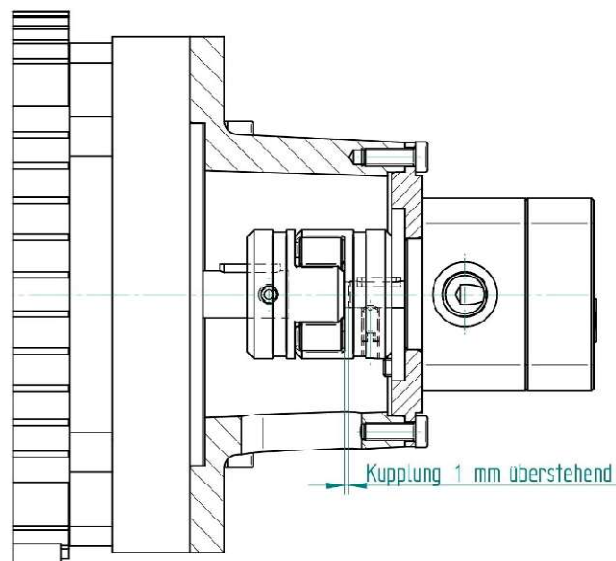


Fig. 10.1: Installation of the Rotex AI coupling

Slide part of the Rotex coupling onto the pump shaft so that the coupling part

protrudes 1mm above the pump shaft. Screw the coupling part with the threaded pin with a hexagon screwdriver SW 3 mm with 9.5 Nm. Then put the plastic sprocket and the second part on the first clutch part.

Then screw the magnetic clutch bell with the threaded pin with a hexagonal screwdriver SW 3 mm with 9.5 Nm. Then attach the motor to the motor flange.

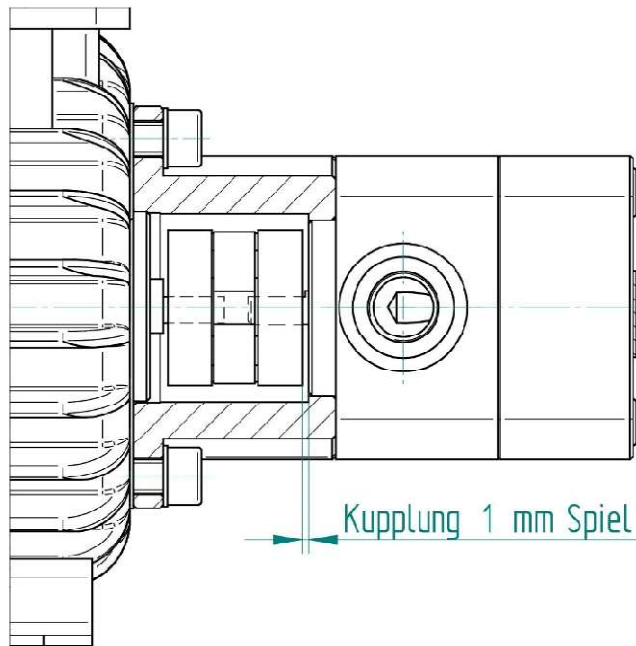


Fig. 10.2: Installation of the PA6 coupling

Repairs as well as maintenance on the coupling can only be carried out by the manufacturer. (This plastic coupling is pressed onto the pump and motor.)

5.5 Assembly / disassembly of motor flange and drive unit

First, attach the magnetic coupling bell or the elastic coupling as described in [\(Mounting the magnetic coupling\)](#). Pay attention to the installation dimensions of the magnetic coupling or the flexible coupling.

The pump head with motor flange is attached to the motor by means of the four fastening screws. Avoid attracting foreign objects to the magnetic coupling. Hold the pump head by the suction/discharge connections and insert it straight into the motor flange. Caution: Risk of injury due to entrapment of body parts. (Attention: strong magnetism). The same procedure is followed for the elastic coupling.



WARNING Risk of crushing during pump assembly!

The pump can tip over if you are careless.

Secure the pump against twisting or tilting when mounting.

Furthermore, it should be noted that if a motor/drive is mounted on the pump by the customer, the CE/machine guidelines must be observed. To do this, the mounted motor/drive must meet the following criteria:

- Sufficient performance and design data related to the required flow rate and pressure
- Pump mounting only with the corresponding intermediate flange and flange diameter, as well as the specified motor sizes and the matching motor shaft dimensions
- Correct design for the required protection classes and environmental conditions such as IP and/or Ex
- Engine Conformity Machine Guidelines of the currently required standard

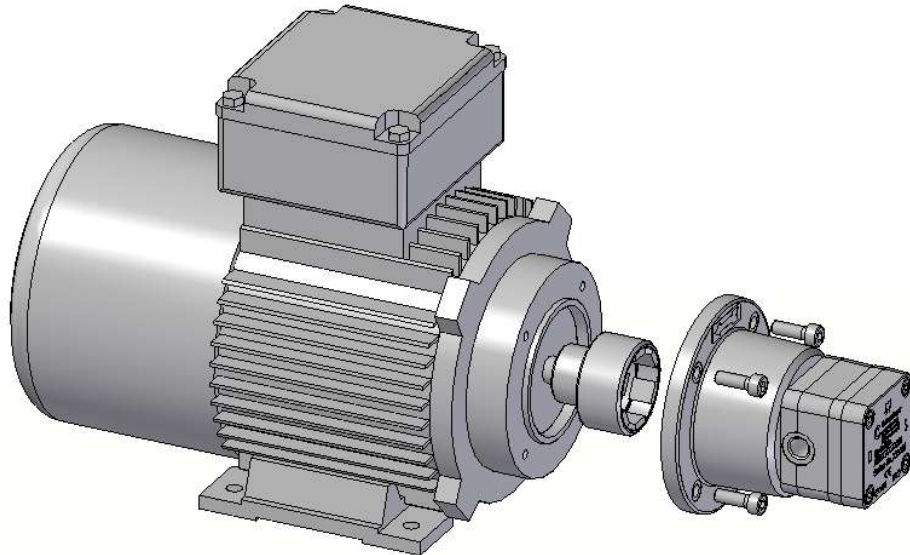


Fig. 11: Disassembly of pump head

Always carry out assembly work with the drive unit switched off.



Never install motor pumps in confined installation situations without sufficient ventilation, otherwise the motor will be poorly cooled and can overheat.

- Please also note the supplied engine operating instructions.
- Due to the variety of engines available, the drive will not be discussed in more detail at this point. Please note the enclosed engine documentation.
- Do not exceed the maximum permitted limit speed and the maximum permitted speed depending on the media viscosity.

5.6 Connecting cables



Before connecting the suction and discharge lines, check whether the connection flanges of the piping match those of the pump.

No forces or torques may be exerted on the pump via the connecting cables, and it may be necessary to support the connecting cables in front of the pump. Likewise, no forces caused by thermal expansion must act on the pump.

The connecting cables must be sufficiently dimensioned. They must not be smaller than the nominal diameter of the pump connections. On the suction side, we recommend a nominal diameter that is one step larger than the nominal diameter of the pump's suction connection.

The following are the following as a guideline for the maximum flow velocities in the pipes: Recommended flow velocities see table.

	up to 200 mPas	up to 600 mPas	up to 2000 mPas
Suction line	1.5 m/s	0.5 m/s	0.2 m/s
Pressure pipe	3.0 m/s	1.0 m/s	0.5 m/s



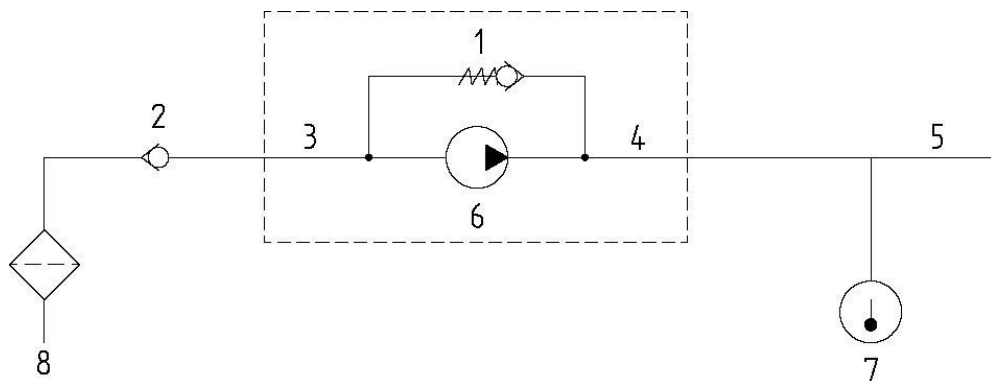
- Pre-connect a suction filter with at least 50µm filter fineness to avoid premature wear or destruction due to the ingress of foreign bodies that can lead to the destruction of the pump. Size it sufficiently large because of its internal resistance, otherwise it will affect the pump's absorbency.
- Make the necessary bends in the line with as large a radius as possible. Avoid pipe manifolds that bend as sharply as possible.
- Lay the suction line upwards towards the pump. If pipes have to be laid rising and falling, provide ventilation at the highest points.
- After laying the pipes, check that the pipes are free of deposits, chips or similar contaminants, otherwise the pump may be damaged during commissioning.

Make sure that all pipes, fittings and screw connections are perfectly tight, otherwise gas may enter the pump on the suction side. The pump no longer primes. Medium can flow out on the print side.

If a suction height of 3 m is reached, we recommend installing a foot valve in the suction line. When the pump is switched off, the valve ensures that there is no media backflow through the pump or emptying of the suction line.

Please note that in this installation situation during the pump standstill, the pressure in the inlet becomes equal to the pressure in the outlet. For this purpose, please note the maximum system pressures ([limit values](#)).

Exemplary installation



- 1: Pressure relief valve internal (only for valve version -B)
- 2: Check valve
- 3: Admission
- 4: Outlet
- 5: Pressure pipe
- 6: Pump
- 7: Temperature sensor

8: Filter

Fig. 12: Pipeline installation

6 *Commissioning / Decommissioning*

6.1 *Prerequisite for commissioning*

Once fully assembled, check the pump and peripherals again using the following points:

- Can you turn the pump by hand (e.g. on the fan wheel of the motor)?
- Have you connected the suction and discharge side correctly?
- Does the direction of rotation of the drive match the direction of rotation of the pump?
- Are the gate valves, flaps and valves in the system in the correct position?
- Has the piping system been checked for leak points?
- Can the pump be shut down in an emergency if a malfunction occurs during the first start that was not detected or was not foreseeable?
- Is there enough and the right pumped medium in the storage tank?
- Temper the pump before commissioning if the temperature difference between the pump and the pumped medium is greater than 50 °C!
- Is the pump grounded?



Assembly work may only be carried out when the drive unit is switched off.

6.2 *Commissioning*

Carry out any necessary disinfection of the pump head and the piping system.

- In order not to contaminate the medium to be pumped, a rinsing process lasting at least five minutes with the desired pumped medium and the appropriate speed is recommended in order to remove all residues of the test medium from the pump head.

NOTE Fitters must always wear personal protective equipment (goggles, safety shoes, hand protection).

During commissioning, attention must be paid to leaks. If medium leaks, the inflow to the pump must be stopped immediately and the leak must be repaired.

6.3 *Monitoring*

The operator is solely responsible for carrying out monitoring measures .

When checking for leakage in the magnetic coupling area or in the area of the radial

shaft seals, make sure that the following points are met:

- Immobilizing the drive unit
- Cooling of the pump unit to room temperature
- Carrying out the inspection only outside of an Ex atmosphere.



Make sure that in the event of a leak, the pump is not put back into operation until the leak has been eliminated.

Risk of injury:

In the event of a leak, hot, toxic or corrosive liquid may leak. Wear appropriate protective equipment.

6.4 *Decommissioning*



- If hazardous media has been pumped, rinse the pump head with a suitable cleaning or neutralizing solution for several minutes.
- Finally, the pump head must be rinsed again with cold cleaner.
- Close the gate valves (if equipped) before and after the pump. Close the shut-off devices only when the pump is stationary for a longer period of time (in the case of automatic systems, only when the entire system is taken out of service).

7 *Maintenance / Cleaning*

7.1 *Safety instructions for maintenance, inspection and assembly work*

As the operator, you are responsible for ensuring that all maintenance and installation work is carried out by authorised and qualified specialist personnel who have been sufficiently informed by studying the operating instructions in detail.



As a matter of principle, work on the pump must only be carried out at a standstill.

- Before all assembly and maintenance work, the motor must be de-energized or locked.
- Pumps or units that convey hazardous media must be decontaminated.
- Personal protective equipment must be worn ([personal protective equipment](#))
- Immediately after completion of the work, all safety and protective equipment must be reinstalled and put into operation.
- Before commissioning, the points listed in ([Commissioning / Decommissioning](#)) must be observed.

7.2 *Maintenance cycle*

The pump is not subject to fixed maintenance cycles.

Cleaning / maintenance is necessary if:

- the pump is stored,
 - the pump is taken out of service for a longer period of time,
 - The pump no longer meets the key data shown in the Technical Data chapter ,
 - another medium is promoted,
 - Leaks occur at the pump.
- Please also note the information on transport ([transport and interim storage](#)) and the information on troubleshooting ([malfunction](#)).

It should be noted that during all maintenance work during which the pump is disassembled, all O-rings / radial shaft seals should be replaced during reassembly. Otherwise, absolute leakage safety is not guaranteed.

It is also important to keep the workplace absolutely clean, as dirt can jeopardize the proper functioning of the pump.

8 *Fault, causes and elimination*

Quantity	Type of fault
1	The pump does not prime.
2	The pump builds up no or too little pressure.
3	The pump produces noise.
4	The pump heats up.
5	The pump works loudly and/or vibrates/oscillates very strongly.
6	The pump is blocked.

Disruption						Cause and elimination of the disorder
1	2	3	4	5	6	
x			x			The pump runs dry There is no medium on the suction line or the suction height is greater than 3 m. Operation without medium that lasts longer than 30 s can destroy the pump and should therefore be avoided. The pumps of this series are dry up to 3m self-priming. However, the suction behavior can be increased even further if the pump is filled with medium before commissioning.
x						Piping incorrectly designed Incorrectly sized piping can affect the suction behavior of the pump Extremely negative influence. Please note the information in (connecting cables)
x						Pressure / suction line closed If a shut-off valve is integrated on the pressure/suction side, make sure it is open. If there is still air in the pressure line, make sure it can escape.
x	x			x		Pump components worn If the pump no longer primes under the same operating conditions and the suction and discharge line is not closed, the pump will probably need to be repaired.
x						Suction line is leaking Make sure that the suction line is absolutely gas-tight so that no ambient atmosphere can be sucked in.
x						Connecting cable not correct Check whether suction and discharge lines are reversed.
x	x				x	Foreign bodies, dirt and/or deposits may block the pump. As a rule, these can only be analysed / rectified by dismantling the pump (pump body)
x						Check the motor connection The engine may be incorrectly polarized. See the engine manufacturer's owner's manual.
x						Incorrect direction of rotation of the pump See direction of rotation on the type plate of the pump.

Disruption						Cause and elimination of the disorder
1	2	3	4	5	6	

x	x					Internal pressure relief valve incorrectly adjusted only for valve design Make sure that the pressure relief valve integrated into the pump is closed until the medium to be pumped is pumped with sufficient pressure (pressure relief valve construction and commissioning)
x	x					Pipeline closed If there are shut-off valves in the pipeline on the pressure or suction side, make sure they are open.
x	x	x				Magnetic coupling uncoupled The disengagement of the magnetic clutch is accompanied by a rattling sound. The magnetic coupling serves, among other things, as overload protection (mounting of the magnetic coupling). In order to achieve a decoupling of the magnetic coupling, there must be an operating condition that is (at least temporarily) above the pump specification. Stop the drive and start the pump again. If the error recurs, fix the causes. Possible causes can be: - Differential pressure too high - Media viscosity too high - Dirt in the pump
	x					Media viscosity too low The hydraulic efficiency of the pump depends on the viscosity (viscosity of the medium). If the viscosity drops too far (due to the medium or too high temperatures), this can lead to a drop in the flow rate. Compare the current viscosity and temperature with the delivery viscosity and temperature and correct them if necessary (limit values)
		x				Cavitation plant Due to an impermissibly low inlet pressure (abs.) or an impermissibly high suction head, vapour bubbles form in the suction area of the pump depending on the vapour pressure of the medium. These implode on the pressure side and lead to increased wear and tear on the pump. This point of operation is to be avoided by changing the inlet conditions. Audible through the singing noise. Increase inlet pressure by reducing line resistance. Lower the temperature of the medium.
			x			Heating during operation Please first check whether it is not normal heating by the medium to be pumped. The pump surface takes on the temperature of the medium after a short time.
			x			Permanent internal or external overflow only with valve design If the differential pressure between the inlet and outlet sides exceeds the set opening pressure by pressure relief valve exceeds the opens the internal pressure relief valve and the medium is circulated in the pump head (Limit values). This leads to a heating of the pump head.

Disruption						Cause and elimination of the disorder
1	2	3	4	5	6	
			x		x	Temperature range of the medium or permissible pump temperature exceeded

					Check if the temperature range of the medium has been exceeded (temperature classes and permissible temperature)
		x			Component wear If grinding noises are heard, this is an indication of wear in the pump. The pump must not continue to be operated in this way under any circumstances. Stop the drive immediately. Replacing the pump is mandatory.
				x	Unfavorable mounting conditions Significant oscillations and vibrations do not occur in normal operation. In individual cases, depending on installation conditions, oscillations and vibrations can be limited by the following measures: - Underlay the engine with vibration-damping pads. - Fasten the connecting cables with vibration-damping elements.

8.1 Sound pressure level

The measurement of the sound pressure level was carried out under the following conditions :

Distance between the transducer and the pump: 1 m

The sound pressure level of the pump is below 80 dB(A) for all operating points.

Note on sound pressure level:

- The pump is measured with a decoupled structure, on rubber feet and with hose elements to dampen the suction and discharge line.
- In the event of cavitation of the pump (e.g. too small suction line) and/or structure-borne noise due to vibrations of the entire system (pump/system), the above value can be exceeded by up to 10 dB(A).

8.2 Non-ionizing radiation

The pump with magnetic coupling emits non-ionizing radiation in the form of a magnetic field. This can destroy magnetically sensitive products.



These products include, but are not limited to:

- implanted medical devices (e.g. pacemakers),
- Credit cards,
- electrical, electronic, precision mechanical devices (e.g. hard drives).

8.3 Disposal

The pump can be disassembled into its components after correct decommissioning ([decommissioning](#)) and after removing the medium and removing any grease residues that may be present, and these can be recycled according to the materials used.

You must dispose of the pump, pump accessories and pumped media in accordance with valid nationally applicable regulations.



Pump components can be contaminated by toxic or radioactive pumped media. Before disposing of these components, you must clean them with the appropriate detergents. Adapt the detergent to the last medium pumped to rule out a dangerous chemical reaction between the pumped medium and the detergent. Wear the appropriate protective equipment.

The pump manufacturer assumes no responsibility for disposal. (Disposal must be carried out in accordance with the applicable disposal regulations.)

8.4 *Disposal of the pumped medium*

The pumped medium must be disposed of in an environmentally friendly manner and in accordance with regional and national regulations.

- Make sure that the pumped medium does not get into the environment.
- Dispose of the pumped medium in suitable containers that comply with the regulations .

9 *Appendix*

9.1 *Revision List*

Revisions – No.	Description	Date	Author	Approved

9.2 *Signature list*

Procedure / Filling out the signature list

- Copy the list of signatures below.
- Enter the address of your company / authority and confirm it with the company stamp.
- Arrange for each employee who works with the product to sign this signature list to confirm that he/she has read and understood the operating instructions. Persons who do not confirm this with their signature are not authorized to work with the product!
- Then archive this list with your files.

Signature list

of the company / operator:

Address / Stamp

The persons listed below confirm by their signature that they have entered into the

- the function,
- the operation,
- maintenance, cleaning
- the installation

of the product (pump) and that they have read and understood the safety instructions in the operating instructions.

Participant surname, first name	Date of signature	Instructing surname, first name, date, signature



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