



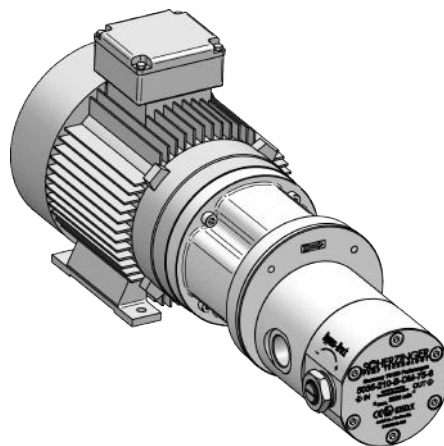
Operating instructions

Pump series

5035

5045

5055



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We reserve the right to make changes to the product and design in the interests of product improvement.

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1 Introduction

1.1 Preface

These operating instructions from **Firma Scherzinger Pumpen GmbH & Co. KG** form part of the pump.

The operating instructions are intended for everyone who undertakes assembly, installation, commissioning, and service work on the pump.

Please read the operating instructions through carefully, taking particular note of the safety instructions!

Should you have any questions with respect to the pump, its application range or in case of any other questions, our employees are always available and will assist you personally.

1.2 Product identification/Product information

Validity

The descriptions in these operating instructions refer exclusively to the pump as described in the technical data (⇒ **Chapter 10 on page 68**) and as it was developed and built by the manufacturer.

Product information

The pump from **Firma Scherzinger Pumpen GmbH & Co. KG** is suited to pumping liquids, which do not have a corrosive or aggressive effect on the materials used (⇒ **Chapter 1.12.3 on page 15**).

Other valid documents

Other valid documents are documents that are not included in the operating instructions but are also supplied with them. If one of the documents mentioned below is missing, please contact the manufacturer. Other valid documents are:

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

If you are a mechanic or use/operate the machine, you must have read and understood the other valid documents prior to installing and commissioning the machine. Make sure that these documents are always available on site near the machine.

1.3 Storage

The **operating instructions** for the pump must always be stored close to it and be within easy reach when needed.

1.4 Definition of terms

In the following section, any fluid to be transported will be called „**fluid**“ whatever its type.

These operating instructions are valid for the pump series:

5035

5045

5055

To make things clearer, the 5035, 5045 and 5055 series are identified below as 50X5.

The 50X5 pump series are available in the following designs:

- Motor design comprising: Pump head, magnetic coupling case, motor flange, and motor.
- ZK design comprising: Pump head, magnetic coupling case, and motor flange.
- MK design comprising: Pump head and magnetic coupling case.
- PK design comprising: Pump head.

⇒ **Chapter 4.2.1 on page 36**

For precise details of your pump, please consult your order documentation.

1.5 Offices abroad

A list of our worldwide offices, including addresses, can be obtained from the manufacturer's factory or found online at **www.scherzinger.de**.

In most instances, these offices are sales branches which, to some extent, also carry out repair and maintenance work. However, this work is preferentially carried out in the main plant in Furtwangen.

1.6 Symbols used in this manual

1.6.1 Danger warning levels



DANGER!

*Texts marked with DANGER! warn of exceptionally great and acute hazards. These hazards will inevitably result in serious (irreversible) injuries or even death if no preventative countermeasures are taken!
It is imperative that these texts are observed and preventative countermeasures taken!*



WARNING!

*Texts marked with WARNING! warn of exceptionally great and acute hazards. These hazards will inevitably result in serious (irreversible) injuries or even death if no preventative countermeasures are taken!
It is imperative that these texts are observed and preventative countermeasures taken!*



CAUTION!

*Texts marked with CAUTION! warn of eventually dangerous situations. These situations will inevitably result in slight to moderate (irreversible) injuries if no preventative countermeasures are taken!
It is imperative that these texts are observed and preventative countermeasures taken!*

ATTENTION!

*Texts labeled with ATTENTION! contain important notes about situations which, if the appropriate preventative countermeasures are not taken, could possibly damage the product and/or its functions or materials located in the immediate vicinity.
It is imperative that these texts are observed and preventative countermeasures taken!*



Texts labeled with this symbol contain very important instructions!
It is imperative that these texts are observed!



This symbol indicates texts which contain important instructions/comments or tips.

1.6.2 Danger symbols

1.6.2.1 General danger symbol



Warning of dangers that result in serious (irreversible) injury or even death!

1.6.2.2 Specific danger symbols



Warning of dangerously hot surfaces!



Warning of mechanical movements or risk of hand injuries!



Warning of explosive substances!



Warning of a potentially explosive atmosphere!



Warning of flammable substances!

1.6.3 Command symbols



Note the documentation and information provided!



Switch off the pump (release)!



Wear ear defenders!



Wear protective gloves for protection against thermal risks as per EN 407!



Wear protection class 1 safety shoes!



Wear respiratory protection!



Wear safety glasses!



The actual definition of personal protective equipment depends on the fluid being transported and the cleaning agent used. It must be specified by the operator!

1.6.4 General symbols

- This dot designates the description of activities to be performed.
- This dash designates numerations.
- ⇒ This arrow designates cross-references.
For purposes of clarity, abbreviations are used if cross-references to other chapters are made in the text.
Example: ⇒ **2 Safety instructions**
This means: Refer to Chapter 2 Safety instructions in this manual.
If the cross-reference refers to a page, figure or item number, this information will be provided at the end of the cross-reference.
Example: ⇒ **Fig. 4 - 4, 1**
This means: refer to item number 1 in Figure 4 (in this manual in Chapter 4).
- (3) Numbers in parentheses refer to items within the figures.

1.7 Personal protective equipment

The personal protective equipment suggested in these operating instructions only applies to this particular pump. The requirements for personal protective equipment arising from local environmental conditions, other products, or the use with other products, are not described in these operating instructions, and must be adapted to the actual risks by the operator.



The actual definition of personal protective equipment depends on the fluid being transported and the cleaning agent used. It must be specified by the operator!

1.8 Definition of qualified/authorized personnel

Bodily injury or material damage may result from unqualified operations of the pump. For this reason, only qualified personnel may operate the pump, commission and decommission it, clean and maintain it.

In this sense, qualified personnel are those persons who:

- are familiar with the safety concepts of the pump.
- are trained as operating personnel with respect to the handling of the pump, and who are familiar with the contents of the operating instructions regarding operation and servicing.
- have received appropriate instruction from qualified personnel.
- because of their education, experience and training as well as knowledge of applicable standards, provisions, accident-prevention regulations, explosion protection and operating conditions, have received authorization from the supervisor responsible for the safety of the pump to perform the necessary activities and to recognize and prevent potential hazards.

1.9 Obligations of the operator

The operator undertakes to let only experts work with this pump who

- have been sufficiently trained to perform the activities in question.
- are acquainted with the fundamental regulations on safety and accident prevention in the workplace and explosion protection, and have received qualified instruction in the handling of the pump.
- have read and understood the safety and warning instructions contained in these operating instructions.

In the interests of all involved, please take note of the following instructions:

- In addition to these operating instructions, please make available all generally valid statutory and other relevant binding regulations regarding safety and accident prevention in the workplace, environmental protection and explosion protection, and instruct the personnel who will be working with the pump regarding these regulations!
- Amend these operating instructions with instructions regarding operational particularities such as those related to work organization, process flows, authorized personnel (including obligatory supervision and registration)!
- Clearly establish the specific responsibilities of the personnel for operation, cleaning, maintenance, etc.!
- Check at regular intervals that the personnel are working in a safety and risk-conscious manner!
- Implement measures that ensure that the pump is only operated in a safe and fully functional condition!
- Ensure the pump is cleaned and maintained within the specified intervals (⇒ **Chapter 7.3 on page 58**)!
- Do not make any structural changes (with the exception of those described in the operating instructions) without prior written consent from the manufacturer!
- Implement stringent provisions, to ensure that personnel who have not been instructed on the basis of the safety instructions and the residual risks which may arise when working on or with the pump, do not enter the hazard area of the pump!
- At surface temperatures above 50 °C, a warning sign must be placed on the machine in a clearly visible position. When surface temperatures exceed 80 °C, insulation will be required, or the area must be enclosed/demarcated at an adequate distance from the source of danger.
- Securing the working environment is solely the operator's responsibility.

1.10 Obligations of the Personnel

All persons authorized to work with the pump are obliged, before commencing work

- to observe the fundamental regulations on safety and accident prevention at the workplace.
- to read the safety and warning instructions in this documentation.

In the interests of all involved, please take note of the following instructions:

- Do not use any working methods that are questionable in terms of safety!
- Observe all hazard and warning signs in these operating instructions!
- In addition to these operating instructions, comply with the generally valid statutory and other relevant binding regulations regarding safety and accident prevention in the workplace, explosion protection and environmental protection!
- Be aware of potential fire detection and fire-fighting equipment, locate fire extinguishers and find out how to operate them!
- Wear adequate personal protective equipment suitable for the work you have to carry out!
- Tie back and secure any long hair. Do not wear loose clothing or jewelry (including rings)!
- Only perform tasks for which you have received the appropriate training!
- Do not allow any repair work to be carried out, without first contacting the manufacturer and an authorized representative of the operating company!
- Do not make any structural changes (with the exception of those described in the operating instructions) without prior written consent from the manufacturer!
- Take steps to ensure that other people, who are not working on the pump and therefore do not know the potential risks of the pump, cannot access the hazard areas of the machine.
- In the event of a safety hazard, decommission the pump! Secure the pump against being accidentally switched back on and notify the operator immediately!



1.11 Identification based on the example of the pump type 5035-210-B-DM-75-6

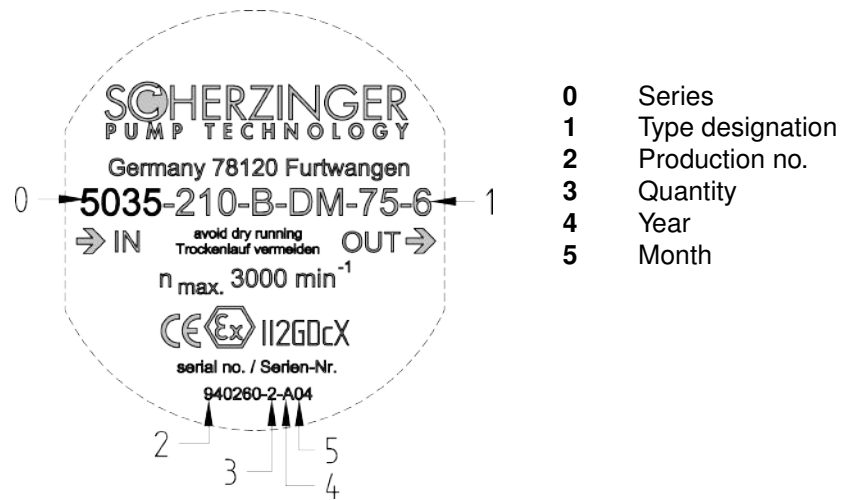


Figure 1.11-1: Type plate for pump with motor

Equipment group	II	Above ground working
Category	2 / 3	High degree of safety
Zones	1 and 21 2 and 22	Occasional danger of explosion Rare danger of explosion
Atmosphere	G	Gas
	D	Dust
Ignition protection category	c	Constructional safety
Explosion group Temperature class	X	Not applicable. Observe the notes within the operating instructions.*

*Specify the temperature class(es) in the device only if the resulting surface temperature is of the device itself is determined (according to DIN EN 80079-36). This means that the temperature of pump surfaces is determined by the fluid in the case of normal operation.

1.12 Intended use/normal operation

The sole use of the pump defined in the technical data is for the transportation of low to medium viscous particle-free media that have degreasing to well-lubricating characteristics, that do not have a corrosive or aggressive effect on the materials fed into the pump. They are suitable for the transport of alkaline as well as acid fluids.

The resistance of the materials stated below should be noted!

The pump is only:

- for use within permanent buildings,
- for commercial use,
- for transporting fluids,
- for use by authorized personnel,
- for use by persons with a minimum age of 16 years.

The operator as well as the operating and maintenance and repair personnel are required to have an adequate understanding of one official language.

The pump is not designed for use in a radioactive or biologically contaminated atmosphere!

The components/wear parts to be used must have been approved by the manufacturer for this purpose.

1.12.1 Limit values

Intended use can be ensured by observing the following limit values:

Description	Value
Max. differential pressure rise	Max. 20 bar, depending on material combination and medium
Max. system pressure (pressure side)	40 bar with 50X5-130-... and variant in accordance with EN 1092 100 bar with other types
Max. suction vacuum	0.9 bar (filled with fluid)
Operating temperature	-20 to 120 °C -20 to 70 °C with PTFE gears/bearings
Ambient temperature	-40 to 60 °C depending on the materials and attachments
Viscosity range	0.5 to 10,000 ² /s
Speed range	0 to 3000 rpm (Dependent on the gear material)
Sound pressure level	< 80 dB(A) determined at: Rotation speed: 1500 rpm Operating pressure: 10 bar Operating temperature: 20 °C Fluid: 1 mm ² /s, non-lubricating ⇒ Chapter 10.3 on page 72
Dimensions	observe the respective data sheets ⇒ Chapter 10 on page 68ff
Attachments	observe applicable/supplied documents (motor, PT100, etc.)
Electrical properties	observe applicable/supplied documents (motor, PT100, etc.)
Max. torque of coupling	14 Nm

Due to the versatile combination possibilities in terms of the different sizes, gears, motor speeds and electrical properties, an illustrative and clear representation of the normal operation of all pumps in the respective variants is not possible. In this case, please refer to the respective order documentation.

Any other use beyond the intended use described in the operating constructions is deemed improper.

1.12.2 Temperature classes and approved temperatures

Temperature class		Switch-off temperature when T_{\max} of magnetic coupling is reached	Switch-off temperature when T_{\max} of fluid is reached	Switch-off temperature when T_{\max} of pump surface on containment can is reached
T3*	200°C	150°C*	150°C*	150°C*
T4	135°C	85°C	85°C	85°C
T5	100°C	50°C	50°C	50°C
T6	85°C	35°C	35°C	35°C

* Due to the magnetic material NdFeB, the design-related switch-off temperature is +150°C

1.12.3 Overview of series/wetted parts

The 5035, 5045 and 5055 series only differ in terms of the different combinations of materials.

	5035	5045	5055
Casing [1], [2], [11], [12], [31]	1.4404	Hastelloy C4	Titanium
Shafts [3], [4]	1.4571	Hastelloy C4	Titanium
	1.4571/Cr ₂ O ₃	Hastelloy C4/Cr ₂ O ₃	
Gears [5], [6]	Nitronic 60 (N6), Waukesha 88 (W8), 1.4528 hardened (SS)		
Bearing [20]	SSiC		
Magnetic coupling hub [8]	1.4571	Hastelloy C4	Titanium
Clamp screw [38]	1.4571	Hastelloy C4	Titanium ^{*3}
Valve piston [35]	1.4571	Hastelloy C4	Titanium ^{*3}
Adjustment screw [39]	1.4404	Hastelloy C4	Titanium ^{*3}
Seals [29], [30], [34], [37]	PTFE		
Compression spring [36]	1.4310	Hastelloy C4	Titanium ^{*3}
Fluid	Note the resistance of the materials mentioned above.		

^{*3} Not available for design with pressure relief valve!

1.12.4 Paint

All pumps are delivered from the plant without external painting/coating. However, if a surface coating is desired, attention should be paid to the following note.



DANGER!

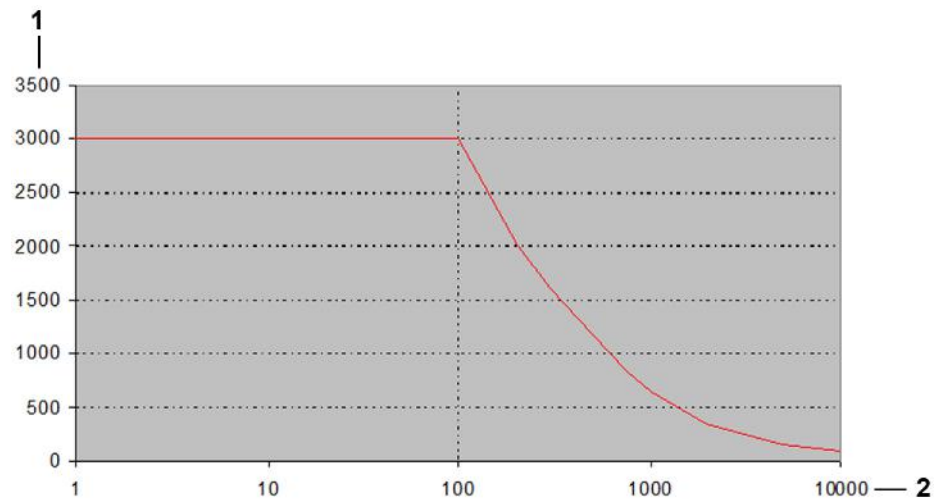
If it is necessary to use an external surface coating, ensure the following to prevent dissemination of brush discharges: the total thickness of the paints used does not exceed 2 mm in conjunction with the intended classification in explosion class IIA and IIB and 0.2 mm with IIC.

1.12.5 Maximum possible speed

The maximum possible speed depends on the gear materials,

PEEK mod. 2800 rpm PTFE 2500 rpm

as well as the fluid viscosity:



- 1 Max. pump speed (rpm)
- 2 Fluid viscosity (mm²/s)

Figure 1.12-1: Viscosity range

DANGER!



If one or more limit values described in this section are exceeded, you have to ask the manufacturer's plant if these operating conditions are released by the manufacturer. Otherwise, a modification of the pump must be carried out in your case, because the pump or the system in which the pump is integrated can be damaged or destroyed and present a danger for personnel.

1.13 Improper use/fault

Deviations from normal operation are to be defined as faults.
Predictable faults can be defined as follows:

- Partial or complete dry running (caused by e.g. closed fittings, clogged filters...)
- Large impurities in the fluid ($>50\mu\text{m}$) (such as beads of sweat, deposits from tanks, sediments ...)
- Incorrect direction of rotation
- Pressure overload (caused by e.g. closed fittings, faulty components ...)

The partly listed faults refer to the potential ignition sources in accordance with the ATEX directive as well as EN1127-1. The most relevant types of ignition sources for gear pumps from Scherzinger are "hot surfaces", "mechanically generated sparks" and "static electricity".

There must not be any ferritic components in the fluid when operating the pump (with magnetic coupling).

ATTENTION!

If improper use cannot be ruled out with certainty, the operator must put appropriate monitoring measures in place!

1.13.1 Danger from dust

DANGER!

When operating the pump in a dusty environment, the danger of overheating and spontaneous ignition arises.



- **Protect the pump from dust using appropriate measures. Take care that the air circulation is sufficient in order to avoid overheating of the pump.**
- **Remove dust deposits from the pump surface, the drive and the connection pipes on a regular basis in order to avoid the creation of ignition sources. The cleaning interval is determined by the amount of dustfall.**
- **Clean the pump as described \Rightarrow Chapter 7.4 on page 58. Observe the manufacturer's specifications!**

1.13.2 Danger from dry running of the pump



DANGER!

Without fluid, the pump runs dry. As the sliding surfaces are not lubricated the gears and bearing bushes become hot and are thermally and mechanically destroyed.

If there is no fluid in the containment can, the heat induced by eddy current losses can also not be dissipated, resulting in the overheating of the pump.

On the suction side, the fluid to be distributed must always be present in order to avoid temperature rises above the maximum permissible temperature (⇒ Chapter 1.12.1 on page 14).



Dry running protection

When the pump is operated, the interior of the pump must always be filled with fluid. In this way, no explosive atmosphere can develop. If this cannot be ensured by the operator, we recommend monitoring measures for this purpose:

- Level switch in the container or the feed pipe,
- Flow monitor at the pump inlet,
- Monitoring of the drive performance,
- TARGET/ACTUAL comparison at the pump output.

1.13.3 Danger from overheating of the pump



DANGER!

Overload, overheating or non-observance of normal operation can lead to an inadmissibly high temperature rise. This only serves as short-term overload protection for designs with a pressure relief valve. When opened for longer, there is the danger of the pump head being damaged or destroyed by overheating. The surface temperature can exceed critical values.



Temperature monitoring

We recommend monitoring measures for this purpose:

- With resistance thermometers at critical pump components such as depositories in the cover.
- With resistance thermometers at critical pump components such as the surfaces of the magnetic coupling case.

1.13.4 Danger from overpressure in the pump



DANGER!

An operation with closed shut-off devices suction/pressure pipe is not permitted! Due to closed shut-off devices or closed pipes, there is the risk of very high surface temperatures, after even a short period of time, caused by fluid overheating in the interior of the pump.



Overpressure protection

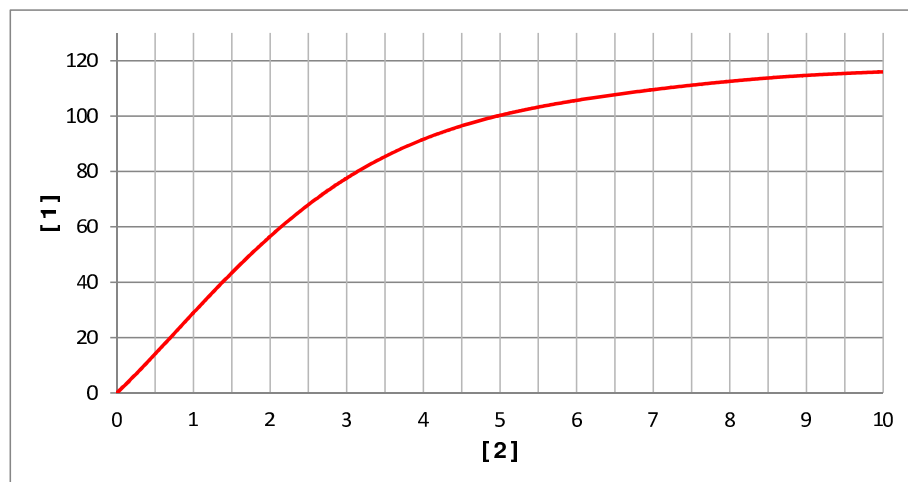
If the pump is not equipped with an integrated pressure relief valve, we recommend monitoring measures for this purpose:

- Overflow valve,
- Pressure switch,
- Monitoring of the drive performance,
- Temperature monitoring.

If the pump is operated against a closed system, the pump will heat up. Measurements have shown a temperature input of 80°K within 4 minutes (2500 rpm, opening pressure 7 bar, closed pressure pipe).

Under these operating conditions, the surface temperature must be monitored. You must switch the pump off at least at 50°K below the maximum permissible surface temperature as the surface temperature can still rise in a time-delayed manner after being switched off.

The following diagram shows the increase of the pump surface temperature at a closed pressure pipe and permanent circulation via the internal pressure relief valve. The fluid temperature at the beginning of the measurement was ambient temperature (20°C).



- 1 Surface temperature rise (K)
- 2 Time (min)

Figure 1.13-1: Temperature rise

If the ambient temperature is higher than the fluid temperature, the surface temperature rise can be even higher!

1.13.5 Danger from particles/foreign matter in the fluid



DANGER!

Inadmissible operating conditions can arise from foreign matters in the fluid and result in the premature wear of pump components, so that very high surface temperatures can develop after a short time.



Prefilter

We recommend the following monitoring measures:

- Filter with contamination indicator.
- Filter with depression and differential pressure monitoring.

1.13.6 Danger from incorrect direction of rotation



DANGER!

Operating the pump in the opposite direction of rotation can result in the increase of the resistance on the suction side.

The counter-pressure cannot be relieved. The pump performance is therefore converted to heat. Furthermore, the fluid on the pressure side can be emptied, resulting in the danger of dry running (⇒ Chapter 1.13.2 on page 18).



This can lead to an inadmissible increase of the surface temperature and fire risk.

In both cases, there is a danger of an inadmissible heating of the pump. On the back of the pump, the direction of rotation as well as the connections are marked.



Rotation direction control

If the explosive atmosphere is also present during the installation phase, the rotation direction cannot be controlled by shortly switching on the unfilled pump in order to avoid an inadmissible temperature rise. We recommend the following monitoring measures:

- Rotation direction control only at filled pump.
- Rotation direction control with rotary field instrument.

1.13.7 Danger from operation with too high of a speed



DANGER!

By exceeding the given speed, the danger of inadmissible heating above the maximum permissible surface temperature occurs as well as a fire risk in the presence of an explosive atmosphere.

The pump must only be operated with the speed specified in the technical data!

1.13.8 Danger from potential difference



DANGER!

The non-earthed pump can present an ignition source. The pump must be earthed via a suitable point provided on the motor.

The earthing cable must have a diameter of 16 mm²!

Static charge

Dry running can cause static charges that lead to potential differences. Dry running occurs in the case of an unfilled pump housing and presents a danger when filling, in conjunction with an existing explosive atmosphere and when disassembling in an explosive atmosphere. Relevant for fluids and substances of the explosion group II C. We recommend the following monitoring measures:

- See dry running protection.
- See warning sign on the type plate.

1.13.9 Danger from exceeding the maximum torque



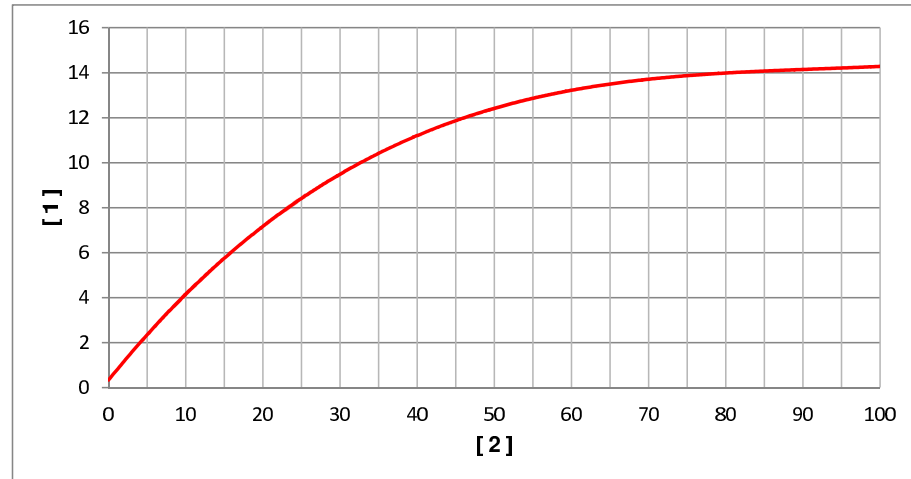
DANGER!

If the maximum torque (⇒ Chapter 1.12 on page 13) is exceeded, the magnetic coupling is not being used as intended. Operating times exceeding 2 minutes in an uncoupled state result in the excessive heating of the coupling. The magnets can be demagnetized. The torque to be transferred and the relating achievable pressure rise decrease. Avoid operating in this state.



Operation in the uncoupled state of the magnetic coupling

If you operate the pump for a longer time in an uncoupled state, the surface temperature of the pump rises and can exceed critical values. The following graph shows the temperature rise of a blocked pump:



- 1 Surface temperature rise (K)
2 Time (min)

Figure 1.13-2: Surface temperature rise when pump is blocked

1.13.10 Danger from mechanically produced sparks



DANGER!

Mechanically produced sparks may arise in operating statuses other than normal operation.



(a) Running noise

Monitor the operating noise of the magnetic coupling. If a grinding noise occurs, immediately decommission the pump. Check the pump for wear and tear. Grinding metallic parts can lead to overheating or to sparking. We recommend the following monitoring measures:

- Manual continuous monitoring.
- Bearing temperature monitoring.



(b) External impact

Danger of spark generation in conjunction with aluminum (aluminothermic reaction) caused by external impact. When hitting on aluminum with rusted surfaces at an impact speed of > 1 m/s or an impact energy > 500J, a fire risk occurs. We recommend the following monitoring measures:

- Monitoring/avoidance of external impacts on the aluminum flange.

1.14 Complaints

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

- In case of returns (due to transport damages/repairs) please immediately write a damage protocol and send the parts back to the manufacturer's factory, in the original packaging if possible.
- Note down any transport damage on the shipping documents upon receipt of the goods!
- Include the following information with the return:
 - name and address of the sender and recipient,
 - type and serial no. of the pump (⇒ **Chapter 1.11 on page 13**),
 - description of the fault,
 - in case of transport damage: name of the delivery company and, if possible, the delivery date, name of the driver and registration number of the delivery vehicle.
 - certificate of non-objection

1.15 Warranty and liability

Our **General Terms and Conditions** generally apply for the use of our pump.

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

Our General Terms and Conditions and Delivery Terms and Conditions are sent to the operator with the offer.

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

- improper use of the pump.
- operation of the pump despite faulty safety devices or improperly installed or non-functioning protection and/or safety equipment.
- failure to observe the instructions in these operating instructions with respect to security, transport, storage, installation, commissioning, operation, maintenance and repair of the pump.
- incorrect installation, commissioning, operation, maintenance and repair of the pump.
- inadequate monitoring of parts subject to wear.
- unauthorized modifications to the pump.
- major emergencies caused by the effect of foreign bodies or force majeure.

Only the manufacturer's original spare parts may be used to ensure functional reliability.

1.16 Declaration of conformity**1.16.1 Declaration of conformity as per Directive 2014/34/EU****Declaration of conformity
as per Directive 2014/34/EU (ATEX)**

In accordance with EC Directive 2014/34/EU dated Wednesday, February 26, 2014 and the legislation arising from its implementation, the manufacturer declares:

Scherzinger Pumpen GmbH & Co. KG
Bregstrasse 23 - 25
78120 Furtwangen / Germany

that the explosion protected product, described in the operating and safety instructions:

Pump**50X5-130... 50X5-130-B...****50X5-210... 50X5-210-B...****50X5-350... 50X5-350-B...**

is a device in the sense of Article 1, (1) a) of Directive 2014/34/EU, and complies with the essential health and safety requirements as per Appendix II of Directive 2014/34/EU and the following harmonized standards:

DIN EN ISO 80079-36:2016-12**DIN EN ISO 80079-37:2016-12****DIN EN 1127-1:2011**

The pump type mentioned corresponds to the ignition protection type constructional safety "c". An ignition hazard assessment is included. The pump has the identification:

CE  II 2GD c X

As per Article 13, (1) b) ii) of the Directive 2014/34/EU in conjunction with Appendix VIII, the technical documentation is filed at a body notified by the European Commission.

Person responsible for documentation: Matthias Derse

Furtwangen, September 26, 2018



(Dipl.-Ing., MBA Matthias Derse)
Managing Director

1.16.2 Declaration of conformity as per Directive 2006/42/EC (Machinery Directive)

Declaration of conformity as per Directive 2006/42/EC

In accordance with EC Directive 2006/42/EC, Appendix II A, dated 17 May, 2006,
the manufacturer :

Scherzinger Pumpen GmbH & Co. KG
Bregstrasse 23 - 25
78120 Furtwangen / Germany

declares that the product:

Pump Type

50X5-130... 50X5-130-B...

50X5-210... 50X5-210-B...

50X5-350... 50X5-350-B...

is supplied with an electric drive unit and therefore complies with the provisions of
Directive 2006/42/EC, Appendix I, No.1.

The following harmonized standards were applied:

EN ISO 12100:2010

EN ISO 13857:2008

EN ISO 13732-1:2008

EN 809:1998+A1:2009 + AC:2010

FprEN 60204-1:2014

The following directives were applied:

2006/42/EC Machinery Directive

2014/30/EU Electromagnetic compatibility (EMC Directive)

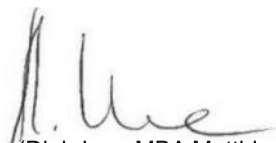
2014/34/EU Explosion-protection directive (ATEX)

Applied national technical standards and specifications:

Accident prevention regulations

Person responsible for documentation: Matthias Derse

Furtwangen, September 26, 2018



(Dipl.-Ing., MBA Matthias Derse)
Managing Director

1.16.3 CE conformity notes relating to fitting a motor/drive

Information on CE conformity in accordance with 2014/34/EU (ATEX Directive) and 2006/42/EC (Machinery Directive) of pumps/motor units when the motor/drive is fitted by the customer (dealer/operator)

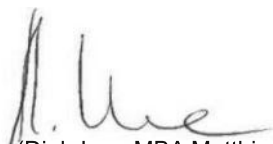
We hereby confirm the CE conformity of our pump unit provided that the following criteria relating to intended use are satisfied as described in the operating instructions:

- The drive delivers sufficient performance and design data in terms of the required delivery volume and pressure
- The motor is only fitted with the appropriate interim flange (motor lantern) provided by Scherzinger and a suitable coupling. These parts must not be reworked.
- The required flange and motor shaft dimension must match the specified motor size
- The motor must have been fitted correctly in accordance with the Scherzinger operating instructions
- Correct use of an explosion-protective drive in terms of the necessary type of ignition, dust and water protection (IP), speed (number of pins) and connected loads. Operation with a frequency converter is only permitted in the scenarios described in the operating instructions.
- Motor conformity in accordance with currently valid CE/Machinery Directives
- Guaranteed grounding
- The pump may be painted in compliance with ⇒ **Chapter 1.12.4 on page 16**

Any reseller or dealer who connects the pump with a motor unit and markets it as a complete unit must meet all the requirements of 2014/34/EU, especially Article 13 (conformity assessment procedure). In such cases, the reseller or dealer then becomes the manufacturer.

The company (operator) which undertakes installation/assembly and starts up the device is responsible for the overall conformity of the pump/motor unit in the sense of German Health and Safety at Work Regulations (BetrSichV).

Furtwangen, September 26, 2018



(Dipl.-Ing., MBA Matthias Derse)
Managing Director

1.17 Certificate of non-objection

The pump and its accessories sent by us for inspection or repair, together with this certificate of non-objection

Type Pump number Delivery date

Operating data:

Temperatur Viscosity Pressure Medium

Reason for the repair order

Reason (continued)

- was not operated with hazardous fluids
- came into contact with fluids subject to labeling requirements or fluids containing harmful substance

Specify the last fluid used

The pump has been carefully drained before shipment/hand-over and cleaned inside and outside.
The cleaning was performed in line with the relevant operating instructions.

- Special safety precautions are not required for subsequent handling.
- The following safety precautions are necessary concerning flushing fluids and disposal:

We guarantee that the above indications are correct and complete and that the pump has been shipped according to the statutory requirements.

Company Name

Address Location

Town Telephone

Country Fax

Date Company stamp/signature

For safety reasons, pumps that are delivered without the completed safety data sheet cannot be inspected nor repaired.

2 Safety Instructions

The pump is a quality product manufactured according to the accepted rules of technology. The pump left the manufacturer's factory in a technically and operationally safe condition!

However residual risks are present

- during installation/dismantling,
- during commissioning/decommissioning,
- during operation, and
- during maintenance/cleaning.

If

- you are not aware of these residual risks,
- or if you fail to follow the warning signs in these operating instructions,
- you carry out work incorrectly,
- you use the pump other than for the intended purpose

these residual risks may lead to death, serious personal injury, or damage to property!

Owing to these latent residual risks, the manufacturer is obliged to notify the operator and user of these risks! We, the manufacturer, meet this obligation to instruct by providing the descriptions included in these operating instructions generally, and, in particular, by providing the descriptions included in this chapter.

2.1 Danger from moving machine parts



DANGER!

Danger of serious bodily injury arises from machine parts moving with high kinetic energy when working on the disconnected, operational or operating pump!

- **Do not reach into danger zones!**
- **It is imperative to wear appropriate protective clothing when working in a danger zone!**
- **Do not reach into the danger zones with extensions or other parts!**
- **Wearing jewelry and loose clothing is strictly prohibited when working in the danger zone!**
- **Do not remove the safety parts mounted on the pump to protect moving parts while the pump or the plant is switched on!**

2.2 Danger from hot parts



DANGER!

- If the pump is operated in a closed casing, it must be ensured that this does not overheat!
- We recommend the installation of a temperature sensor for automatic monitoring.
- If danger from hot parts arises, you have to protect these parts from being touched by means of a protective construction.

2.3 Danger from electric shock



DANGER!

There is a danger of receiving a life-threatening electrical shock caused by coming into contact with live components!

Work on electrical device components or equipment should only be carried out by an authorized electrical specialist, in line with the corresponding regulations!

Access to the electrical cabinet should only be granted to authorized specialist personnel. Do not remove the cover of live parts!

- In case of faults in the electrical power supply, immediately switch off the pump or disconnect the pump from the power supply!
- Check the electrical equipment of the pump on a regular basis! In the case of faults in the electrical equipment, immediately switch off the pump! Have loose connections and burned/damaged cables replaced immediately!
- Switch off the pump when the risk of electric shock arises!
- Secure the pump against re-commissioning.

Five safety rules prior to starting work:

- Releasing
- Securing against restarting
- Determining voltage-free state
- Earthing and shorting out
- Covering or locking adjoining live parts.

2.4 Danger from magnetic fields



DANGER!

The magnetic coupling contains permanent magnets. Danger for people with active or passive implants can arise from the magnetic field!

- People with pacemakers as well as those with active or passive implants may not enter into the area of the magnetic field. A safety distance of 25 cm should be observed from unfitted individual clutch parts. A minimum safety distance of 10 cm applies to fitted clutches with magnetic rotors aligned axially to one another and the surrounding clutch housing (pump carrier).
- The wearing of ferromagnetic jewelry (e.g. rings, necklaces, etc.) or other magnetizable objects is forbidden when working on the pump!
- Do not enter into the sphere of the magnetic field with electronic data storage devices.
- Do not place any ferromagnetic tools onto the axes or in the area of the permanent magnetic field.
- Make sure that no ferromagnetic parts are attracted by the magnetic coupling and that they maintain a safety distance of at least 15 cm.

2.5 Danger from fluids

DANGER!

The fluids can evoke risks of injury and poisoning.

- When working on the pump, personal protective equipment must be worn.

The definition of protective equipment is, amongst other things, dependent on the fluid and must therefore be newly determined for every application by the operator and made available for the personnel.

Dangerous fluids are:



- Explosive fluids
 - Flammable fluids
 - Corrosive fluids
 - Toxic fluids
 - Radioactive fluids
 - Irritating fluids
 - Fluids hazardous to health
 - Carcinogenic fluids
 - Hot fluids
 - Cold fluids
-

3 Transport and interim storage

3.1 Shipping of the pump and protective measures

The pump is shipped out of the factory with adequate protection against knocks and impacts. The inlet and outlet ports are sealed with protective plugs.

This measure is required in order to avoid the leakage of residual fluids that still remain in the pump head as result of a test run.

This also provides protection to the connecting threads. This is reliable protection against the ingress of foreign matter into the interior of the machine.

After having received the pump, you must immediately check the pump for transport damages. If you detect any damage, you must inform the responsible forwarder of this and Scherzinger Pumpen GmbH & Co. KG 78120 Furtwangen / Germany immediately.

3.2 Interim storage

Follow these instructions when storing the pump:

- Do not store the pump in wet or damp rooms.
- Leave the protective plugs in, or place them in position.
- When storing for longer than six months, take anti-corrosion measures for the metallic blank parts.
- The storage rooms must not contain any ozone-producing equipment, e.g. fluorescent light sources, mercury vapor lamps or electrical high-voltage equipment.
- Make sure that no condensation can occur. Relative humidity must be less than 65 %.
- When storing the pump, make sure that the storage temperature is not below 5 °C and does not exceed 50 °C.

3.3 Conserving the machine for storage after operating/flushing the pump

Depending on the fluid transported, the pump must be prepared differently for storage. If no toxic or aggressive fluids were transported, flush the pump briefly with water without a differential pressure rise at a low speed.

ATTENTION!

- When transporting toxic or aggressive fluids, clean the pump in a way that any possible subsequent maintenance work can be carried out without endangering the health of the personnel.
- Flush the pump at middle speed with a neutralizing medium. Disassemble and manually clean those parts that were not completely cleaned by rinsing.

If curing mediums (e.g. varnishes) were transported, the total dismantling and cleaning of the single pump components is necessary in order to ensure an error-free function when re-commissioning.

- Carry out the cleaning with conventional cleaning agents (⇒ Chapter 10 on page 68).
- Flush the pump once again with water at middle pump speed after re-installation.
- Observe the regulations when dealing with substances hazardous to health!

3.4 Return to the factory

If you choose to return the pump to the manufacturer's factory for repair or maintenance, please fill in the certificate of non-objection (⇒ Chapter 1.17 on page 28) completely, and enclose it. The repair cannot be carried out without this certificate!



DANGER!

Danger of acid burns and explosion in case of reactions between the transported fluid and the flushing/cleaning agent used. When flushing the pump, the flushing/cleaning agent must be adapted to the fluid last transported by the machine to rule out a potentially hazardous chemical reaction between the transported fluid and the flushing/cleaning agent.

4 Mode of operation/Functional description

4.1 Pump function

The pump performance of a gear pump is generated by the opposed rotation of two gears in a pump casing.

The gears are fixed to two shafts that are positioned in the pump casing and on the pump cover. One of the two gears is driven by a shaft, the second gear is picked up via the gear meshing.

The spaces opening between the gears create a vacuum that sucks the fluid into the pump and transports it between the spaces between the gears and the casing wall.

In the area where the gears mesh, the fluid is pressed out of the spaces into the outlet. By this means, the fluid can also be transported against overpressure.

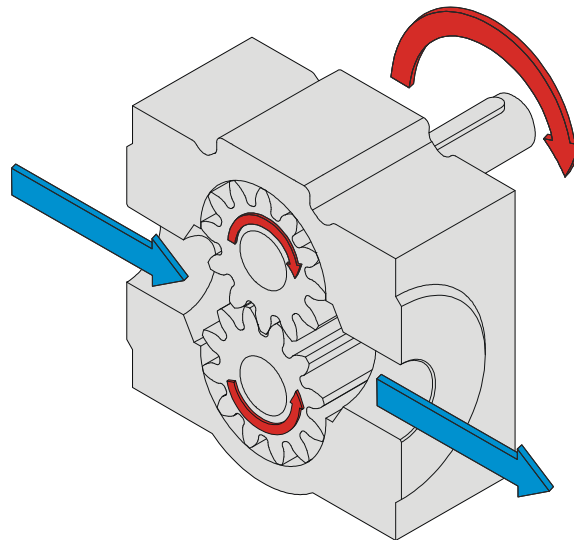


Figure 4.1-1: Functional principle of the gear pump

4.2 Constructive design of the pump

4.2.1 Pump body

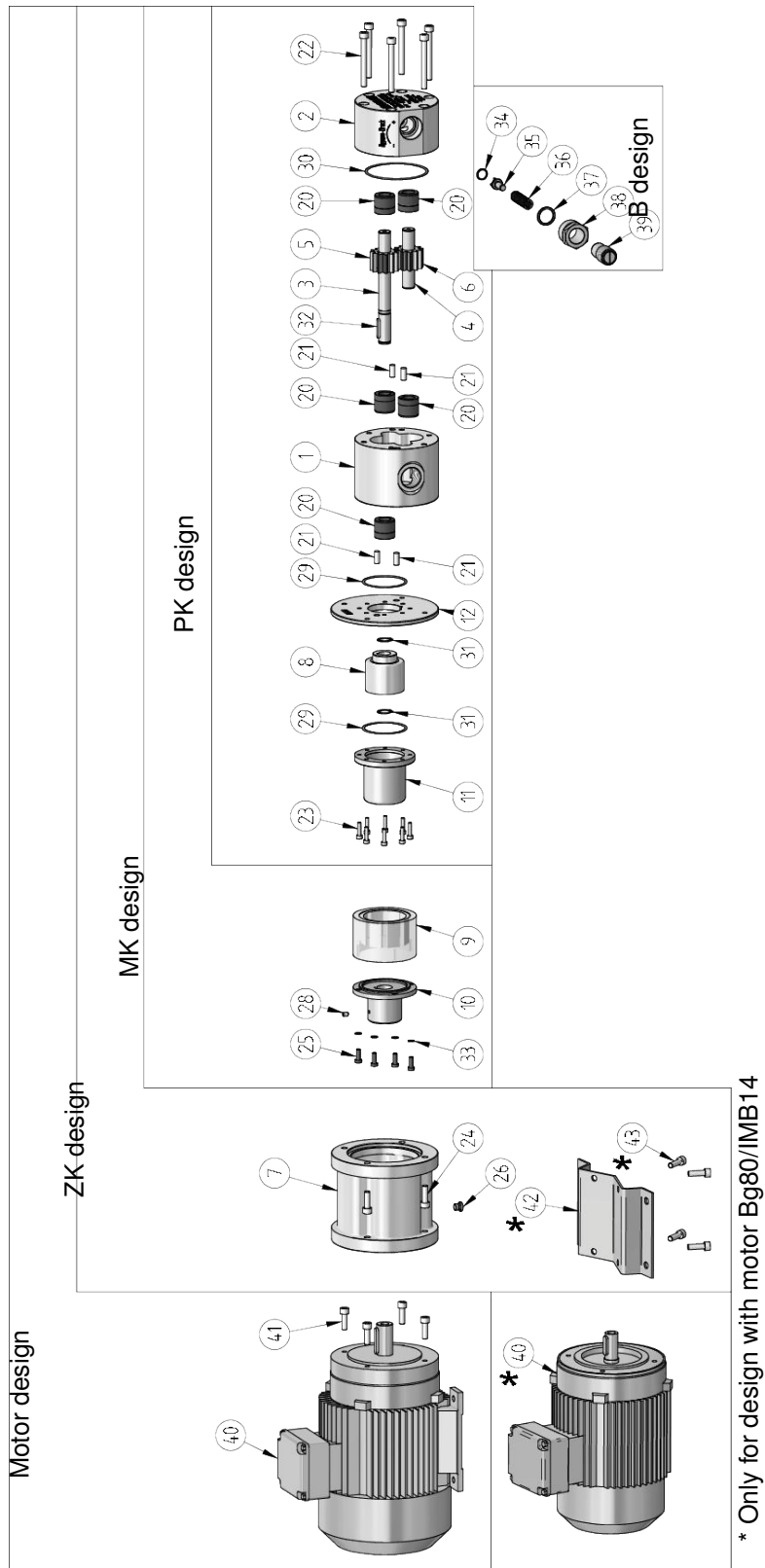


Figure 4.2-1: Pumpenkörper

The pump head design consisting of two elements, a casing (1) and a cover (2), enables easy, quick and economical maintenance and repair.

The casing (1) and the cover (2) are connected with six screws (22). The exact distance is determined by two cylinder pins (21).

A sealing ring (30) is mounted between the casing and the cover.

The gears (5) and (6) are put on and fixed to the shafts (3) and (4) and axially mounted to the casing and the cover. The shafts are stored in the casing and the cover via plain bearings (20). (⇒ **Chapter 4.2.4 on page 43**)

The rotation from the drive unit to the pump is transferred via magnetic couplings (8) and (9) to the drive shaft (3) with drive gear (5).

Scherzinger stainless steel pump heads of the 50X5 series are available in three different sizes (size -130 bis size -350).

The theoretical pumping rate data include:

Pump head	$V_{g_{th}}$ Displacement	Q_{th} at 1400 rpm	Q_{th} at 2000 rpm
-130 and -130-B	13,00 cm ³ /cycle	18,20 l/min	26,00 l/min
-210 and -210-B	21,00 cm ³ /cycle	29,40 l/min	42,00 l/min
-350 and -350-B	35,00 cm ³ /cycle	49,00 l/min	70,00 l/min

ATTENTION!

Observe that all O-rings must be replaced during re-assembly in case of any maintenance work including the dismantling of the pump. Otherwise, complete leakage safety cannot be guaranteed.

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

Assembly tools

You need the following tools:

- Hexagon screwdriver
- Slotted screwdriver
- Span ring spanner or open-end spanner
- Interior puller for bearing bushes
- Press-fit stamp
- Torque screwdriver

Dismantling

- Switch off the pump and disconnect the power supply.
- Remove the pump head from the drive unit (⇒ **Chapter 5.5 on page 48**).
- Lay the pump head in front of you with the containment can (11) on top.
- Open and remove the eight cylinder screws (23).
- Pull the containment can (11) out.
- Remove the O-ring (29) without damaging the O-ring seat.
- Remove the retaining ring (31) with the aid of a ring plier.
- Pull up the magnetic coupling hub (8) (**Attention:** highly magnetic).
- Remove the feather key from the drive shaft.
- Remove the second retaining ring (31) with the aid of a ring plier.
- Pull the centering ring (12) out.
- Remove the O-ring (29) without damaging the O-ring seat.
- Lay the pump head in front of you with the pump cover (2) on top.
- Open and remove the six cylinder screws (22).
- Carefully remove the pump cover (2).
- Remove the O-ring (30) without damaging the O-ring seat.
- Now you can remove the drive shaft (3) with gear (5) and shaft (4) with gear (6).

Installation

- Hold the casing (1) with the gear chamber facing upwards.
- Put the drive shaft (3) (longer shaft) into the continuous bearing seat of the casing (1) (longer shaft end down).
- Put the shaft (4) into the second bearing seat.
- Insert the new O-ring (30).
- Carefully put the cover (2) onto the pins (21).
- Put the six cylinder screws (22) into the drilling of the pump cover (2) and tighten them crosswise with 16 Nm.
- Turn the pump. The free shaft end is now facing upwards in front of you.
- Check if the pump can be turned easily.
- Insert the new O-ring (29).
- Carefully put the centering ring (12) onto the pins (21).
- Put the retaining ring (31) with the aid of ring pliers onto the drive shaft (3).
- Insert the feather key (32) into the drive shaft (3).
- Put the magnetic coupling hub (8) onto the drive shaft (3). **Attention:** highly magnetic!
- Put the second retaining ring (31) with the aid of ring pliers onto the drive shaft (3).
- Insert the new O-ring (29).
- Put the containment can (11) onto the center of the centering ring (12).
- Put the eight cylinder screws (23) into the drillings of the containment can (11).
- Screw all eight cylinder screws (23) in and tighten them crosswise with 3.5 Nm.

4.2.2 Design and commissioning of pressure relief valve (only for 50X5-...-B-...)

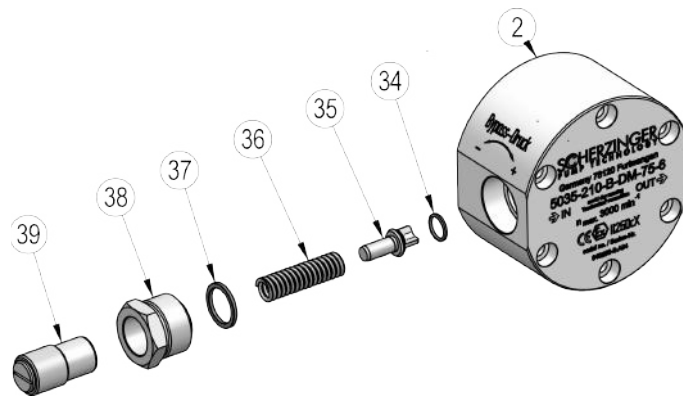


Figure 4.2-2: Pressure relief valve

The pressure relief valve (bypass valve) is a safety valve and serves to limit excess pressure to protect the pump and the system. When addressing the valve, the fluid is internally led back from the pressure to the suction side and potential damages to the system or the pump head are avoided.

The adjustment range lies between 0.5 and 15.0 bar as well as 7.0 and 20.0 bar, depending on the pressure spring used. If you need a more detailed pressure adjustment, you have to use a precise and external pressure adjustment valve. If you use the safety valve as a pressure relief valve, the pump outlet pressure can vary.

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

During a test run, the pressure relief valves are factory-tested for proper function. The pressure is only set to a fix value by the factory, if this is specially demanded by you, the operator.

- Adjust the pressure relief valve while the pump is running. Therefore, measure the pressure rise at the pressure side of the pipe system. Take care that you only adjust in the right framework conditions (later operating conditions):
 - Fluid
 - Temperature
 - System pressure
 - Rotation speed

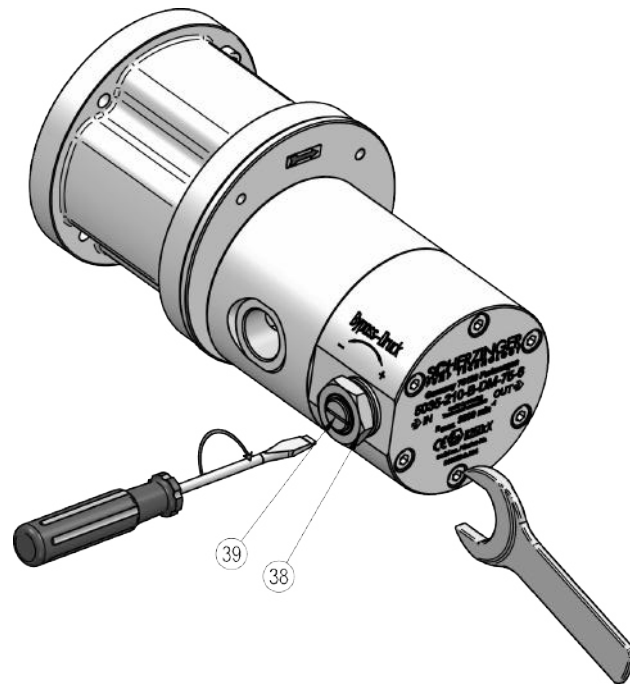


Figure 4.2-3: Adjustment of the pressure relief valve

Proceed as follows for adjusting the pressure relief valve:

- Loosen the clamp screw (38) by a quarter turn (counter-clockwise).
- Adjust the valve by turning the overpressure valve screw (39)
 - to the left (counter-clockwise) = reduce the opening pressure,
 - to the right (clockwise) = increase the opening pressure.
- Re-tighten the clamp screw (38).

ATTENTION!

Take care that the overpressure valve screw (39) does not protrude more than 13 mm over the clamp screw (38). When the clamp screw (38) is loosened a little amount of leakage fluid could escape from the pressure relief valve.



The pressure relief valve only serves as temporary overload protection. When opened for longer, there is the danger of the pump head being damaged or destroyed by overheating. The surface temperature can exceed critical values.

Dismantling

- Take the pump or the already dismantled cover (2).
- Open the clamp screw (38) with a spanner by a quarter turn.
- Unscrew the adjusting screw (39) until it is no longer in the thread engagement, then pull it out by hand.
- Unscrew the clamp screw (38).
- Remove the sealing ring (37), the compression spring (36) and the valve disc (35).
- Remove the sealing ring (34) from the valve disc (35).

Installation

- Press the sealing ring (34) onto the valve disc (35).
- Push the valve disc (35), the compression spring (36) and the sealing ring (37) into the valve drilling.
- Screw the clamp screw (38) in by hand.
- Turn the adjusting screw (39) until it is flush with the clamp screw (38).
- Tighten the clamp screw (38) with an open-end spanner.

4.2.3 Magnetic coupling

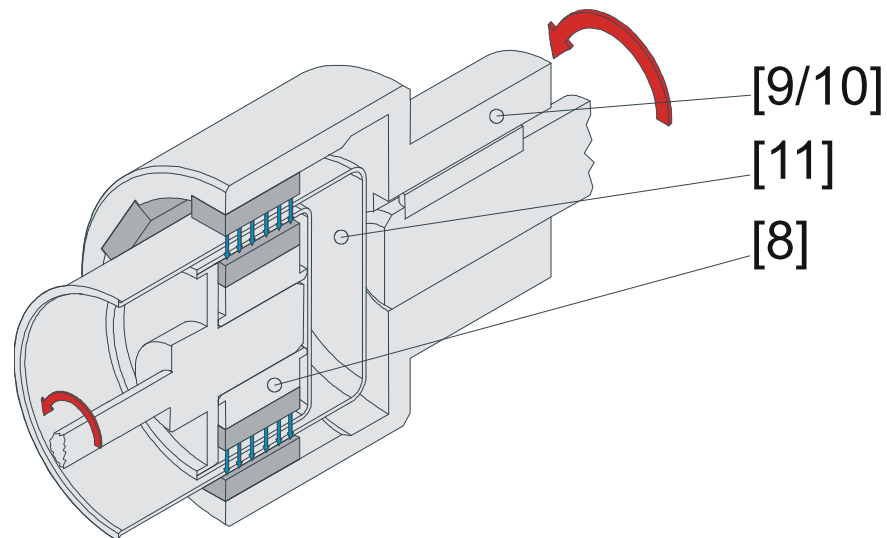


Figure 4.2-4: Magnetic coupling

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

The pump head is hermetically sealed with the aid of the magnetic coupling. This means that no rotating shaft end must be led outwards. A leakage caused by wear becomes impossible as the sealing is performed only by means of O rings (29).

The torque is transferred to the magnetic coupling hub (8) via alternately magnetized magnets on the inside of the magnetic coupling clutch (9) and through a partition wall [containment can (11)]. There are also magnets that polarize alternately at the outside.

Once the maximum transferable torque is exceeded, the magnetic field is pulled off and the drive continues to run; the system starts to rattle constantly and the fluid is no longer transported.

ATTENTION!

Operating times exceeding 2 minutes in an uncoupled state result in the excessive heating of the coupling. The magnets can be demagnetized. The torque to be transferred and the relating achievable pressure rise decrease. Avoid operating in this state.

4.2.4 Bearing bushes

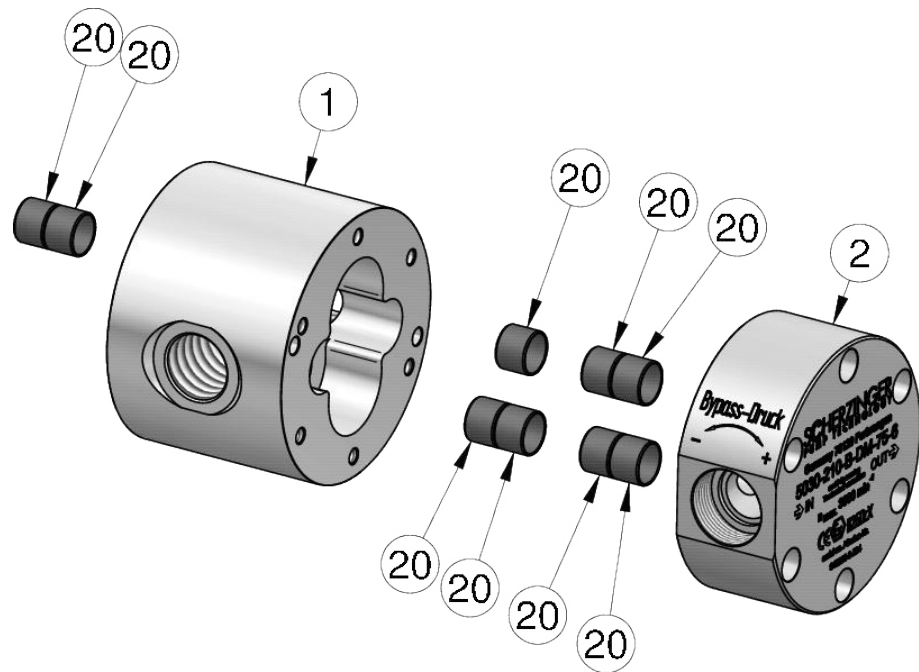


Figure 4.2-5: Shaft bearings

Dismantling

ATTENTION!

To replace the bearing bushes, the pumps are to be sent to Scherzinger, since the most precise manufacturing tolerances must be adhered to behind the press-in operation in order to ensure trouble-free operation.

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5 Installation/Dismantling



DANGER!

The design of the pump means that its center of gravity has shifted which may result in the pump unit tipping during mounting.

The pump must be earthed.

- Connect an earthing cable to the earthing points provided.

The connection pipe to be connected must be sealed. We recommend appropriate sealing rings for this purpose.

5.1 Information about the installation location



ATTENTION!

When selecting a location, make sure that there is enough space for maintenance and repair work. You have to be able to install and dismantle the pump without problems.



DANGER!

Note that installation, dismantling, and maintenance work may only be undertaken in a non-explosive atmosphere and when cooled! The pump must not be installed in a corrosive atmosphere.



DANGER!

Pumps 50X5-130-B..., 50X5-210-B-... and 50X5-350-B-... -..., that is, those with integrated pressure relief valve, may also be installed in explosive areas if proper use is ensured.

If improper use cannot be ruled out with certainty, the operator must put appropriate monitoring measures in place.

5.2 First installation



ATTENTION!

Pay attention to the pump's ignition protection type as well as the ignition protection type of all components added. The type plates of the single components are crucial. For use in explosive areas, the lowest ignition protection type of all components used applies.

- First, visually check the pump supplied by us for transport damages (⇒ **Chapter 1.14 on page 23**).
- Using the following points, check if this is an appropriate pump type:
 - Model type and design
 - Direction of rotation and position of the suction/pressure side
 - Temperature range

ATTENTION!

If you detect differences between the pump design you require and the one supplied by us, please contact us immediately.



- Do not commission the pump without request.
- Only fix the pump/pump units to the base provided. The installation space must be level. Compensate for unevenness near the connection points with appropriate support pads which results in an even level over these four connection points. If strong oscillations /vibrations occur during pump operation, please observe the points listed in the fault table (⇒ **Chapter 8 on page 61**).

It is important that the drive rotation direction set, enables the correct transport direction. Reversing the rotation direction also results in a reversal of the transport direction.

Significant damages to the system and danger for the attending personnel can occur if the pump is run in the wrong rotation direction. Especially in the case of the 50X5-130-B-..., 50X5-210-B-... and 50X5-350-B-... pumps, the specified rotation direction must be strictly observed, otherwise the pressure relief valve will be decommissioned!



A drop test as defined in DIN EN 13 463-1, section 13.3.2.1 was not carried out. Protect the pump against vibrations and shocks. Vibrations or shocks can affect function, but not the explosion protection. Earth the gear pump (⇒ **Chapter 1.13.8 on page 21**).

5.3 Installation position



ATTENTION!

Please note that the pump unit is designed only for horizontal installation. In exceptional cases, the pump unit can also be installed vertically. Please note that the drive unit is arranged above the pump. In this case, you have to expect a higher noise level.

5.4 Installation of the magnetic coupling

ATTENTION!

Repair as well as maintenance work to the magnetic coupling must only be carried out by the manufacturer.

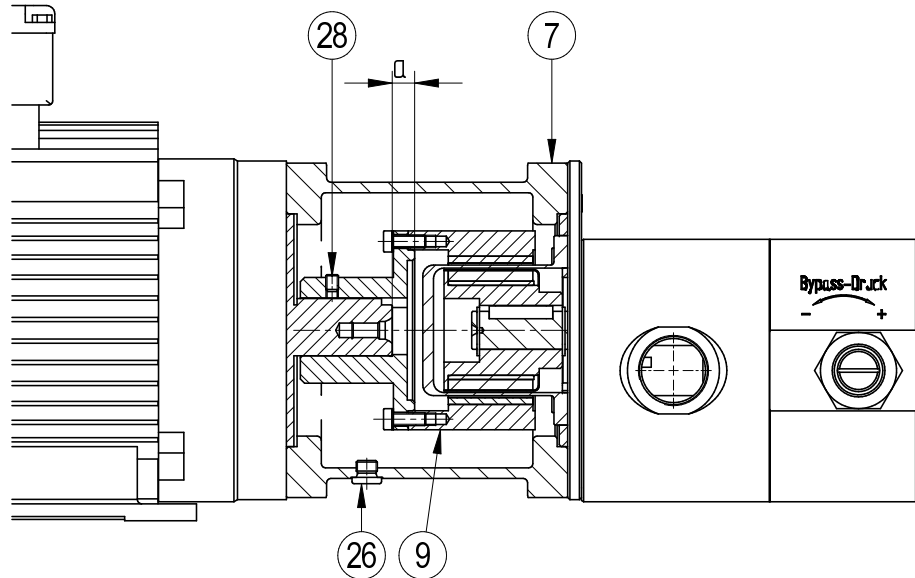


Figure 5.4-1: Installation of the magnetic coupling

Loosely slide the magnetic coupling case (9) onto the motor shaft up to stop. This process should produce the following dimensions:

Motor size 80	17,0 mm
Motor size 90S, 90L	7,0 mm
Motor size 100, 112	1,8 mm

Then, tighten the magnetic coupling case to 9,5 Nm with the threaded pin (28) using a 3 mm hexagon screwdriver. Afterwards, fix the motor to the motor flange (7).

5.5 Installation/dismantling of motor flange and drive unit

ATTENTION!

First secure the magnetic coupling case (9) and motor flange (7) as described in ⇒ Chapter 5.4 on page 47. Note the installation dimensions for the magnetic coupling. The pump head is secured to the motor flange using the four retaining bolts (24). Prevent foreign matter from being attracted by the magnetic coupling. Hold the pump head against the suction/pressure connections and guide straight into the motor flange. Attention: danger of injury through trapping of body parts. (Attention: highly magnetic). If the customer is installing a motor/drive on the pump, also ensure that the CE/Machinery Directives are observed. To do this, the fitted motor/drive must satisfy the following criteria:



- Sufficient performance and design data with regard to the necessary delivery volume and pressure
- Only attach pump with the associated intermediate flange and flange diameter, and the specified motor sizes and appropriate motor shaft dimensions
- Correct design for types of protection required and ambient conditions, such as IP and/or Ex
- Motor conformity with EC/Machinery Directive of the standard currently required

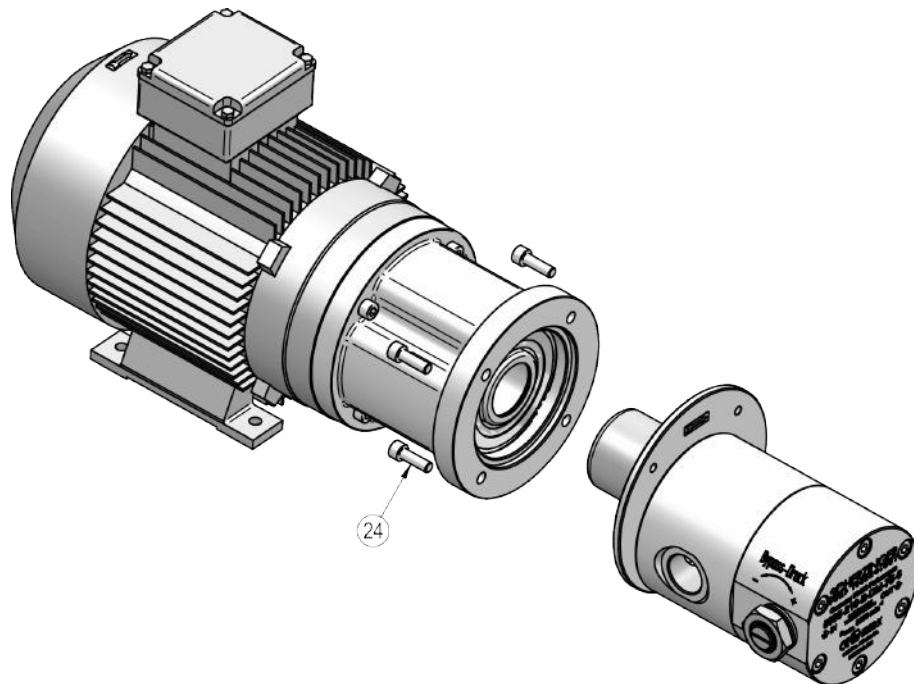


Figure 5.5-1: Pump head disassembly

DANGER!



- Earth the motor/pump unit at the drive terminal provided.
- When installing the motor, do not bring any insulating elements between the pump support and the motor.
- Take care that the connection screws between the pump/motor and base consist of electrically conductive material (e.g. steel).
- Installation work must only be carried out when the drive unit is switched off.
- Never install motor pumps in restricted installation situations without sufficient air ventilation as the motor will then be insufficiently cooled and can overheat.
- Connect the motors to the mains in accordance with the directives of the VDE (German Electrical Engineering Association) and those of the local utility companies.
- Also observe the motor operating instructions included.
- Due to the large variety of motors available, the drive is not further detailed at this point. Please observe the enclosed motor documentation.
- Do not exceed the maximum permissible limit speed and the maximum permissible speed dependent on the viscosity of the fluid.

ATTENTION!



The risk of explosion arises in case of an improper electrical installation. Also observe IEC 60079-14 for electrical installation in explosive areas. We recommend the following monitoring measures:

- motor circuit-breaker.
- load monitor.

5.6 Connection pipes

- Check if the connection flanges of the pipes correspond to those of the pump, prior to connecting the suction and pressure pipes.

WARNING!



Do not exert pressure or forces on the pump via the connection pipes, a connection pipe support may be required before each pump. Furthermore, no forces induced by thermal expansion must have an impact on the pump.

The connection pipes must be adequately dimensioned. They must not be chosen smaller than the nominal width of the pump connections. On the suction side, we recommend a nominal width one size bigger than the nominal width of the pump's suction connection.

The following guideline values apply as max. flow speed values in the pipes: For recommended flow speed, see table.

	up to 200 mPas	up to 600 mPas	up to 2000 mPas
Suction pipe	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

ATTENTION!



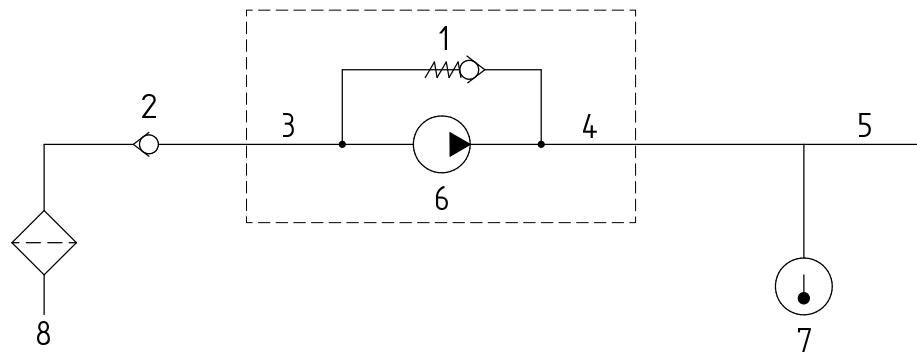
- Position a suction filter with at least a 50 μm filter mesh upstream of the pump, in order to avoid premature wear or damages caused by the ingress of foreign matter that can lead to the destruction of the pump. Select a sufficient size for the filter because of its interior resistance as otherwise it can affect the suction performance of the pump.
- Use the largest possible radius for necessary curves in the pipe run. Avoid sharp-angled elbows, if possible.
- Lay the suction pipe rising up to the pump. If pipes must be laid rising and falling, integrate ventilations at the highest points.
- After laying, check the pipes for deposits, chips or other dirt as otherwise the pump can be damaged when being commissioned.

Note that all pipes, fittings and screw connections must be perfectly dense, otherwise gas can enter into the pipe on the suction side. The pump does not suck in any more. Fluid can escape on the pressure side.

If a suction height of 3 m is achieved, we recommend the installation of a foot valve in the suction pipe. When switching off the pump, the valve ensures that no reverse fluid flows through the pipe or no emptying of the suction pipe occurs.

Please note that in the case of an installation situation in which the pump is idle, the pressure at the inlet is equal to the pressure at the outlet. Please note the max. system pressures (\Rightarrow Chapter 1.12.1 on page 14).

Recommended installation in explosive areas



- 1** Internal pressure relief (only for 50X5-...-B-...)
- 2** Non-return valve
- 3** Inlet
- 4** Outlet
- 5** Pressure pipe
- 6** Pump
- 7** Temperature sensor
- 8** Filter

Figure 5.6-1: Pipe installation

Elements for noise insulation may be required in the pipes, e.g. flexible hose connections.

If you do not use the pump in explosive areas, it can be helpful to install a shut-off valve directly before and after the pump. In this case, the pipe system must not be emptied in case of a necessary removal of the pump.

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6 Commissioning/Decommissioning

6.1 Requirement for commissioning

- After the complete installation of the pump and the peripheral equipment, check them once again according to the following points:
 - Can you manually turn the pump (e.g. on the impeller of the motor)?
 - Have you connected the suction and pressure side the right way round?
 - Is the rotation direction of the drive the same as that of the pump?
 - Are sliders, flaps and valves in the system in the right position?
 - Has the piping system been checked for leakages?
 - Is it possible to shut down the pump with the emergency stop in case of an unrecognized or unforeseeable malfunction that may arise during the first powering of the machine?
 - Is the fluid filled into the container sufficient and correct?
 - Temper the pump prior to commissioning when the temperature difference between the pump and the fluid is greater than 50 °C!
 - Is the pump earthed?



Installation work must only be carried out when the drive unit is switched off.

6.2 Commissioning

- Disinfect the pump head and the pipes if necessary.
- In order to avoid contamination of the fluid, flush pipes at least five minutes with the desired fluid and accordingly selected speed to remove any test fluid residuals from the pump head.
- The dry cycle time of the pump head should not exceed 30 seconds as longer dry cycle times present the risk of destroying the pump.



ATTENTION!

The ignition temperature of the transported fluid must be at least 50°K above the max. permissible surface temperature of the pump.

6.3 Monitoring

The implementation of monitoring measures is the responsibility of the operator only. Taking into account the ATEX directive, the manufacturers and operators of non-electrical devices commit themselves to providing proof of safety in an explosive atmosphere. Also when combining single devices, safety must be ensured in explosive areas. It must be checked that no new ignition sources develop or, if necessary, respective measures must be taken. When differing from normal operation, possible faults are to be taken into consideration.

The stainless steel pumps are designed in such a way that no ignition sources occur during normal operation. The risk of mechanical faults that can lead to ignition sources is reduced to a very low level.

DANGER!

When checking for leaks in the area around the magnetic coupling, ensure that the following requirements are met:

- Drive unit shut down
- Pump unit cooled to room temperature
- Check performed only outside an explosive atmosphere. Alternatively, the check can be performed with an ignition-free tool.



In order to detect a leakage at an early point in time, you have to unscrew the locking screw (26)

- after commissioning,
- monthly

and check if leakage fluid has collected in the flange (7). If a leak is found on the pump, ensure that the leak is fixed before starting the pump up again.

Danger of injury:

In the case of a leakage, hot, toxic or corrosive fluid can leak out. Wear suitable protective equipment.



After checking, re-insert the locking screw. No pump without locking screw must be used in the explosive areas!

6.4 Decommissioning



- Make sure that there is no explosive atmosphere outside the pump.
- Completely empty the pump head by reducing the counter-pressure to 0 bar and, if possible, remove the suction pipe from the reservoir so that the ambient air can be sucked in.

CAUTION!

Do not decommission when a system pressure, a vacuum or reacting fluids are present.



- Take care that the dry running time does not exceed 30 seconds, as the pump can be destroyed otherwise.
- When fluids that present a health risk have been transported, flush the pump head several minutes with an appropriate cleaning or neutralization agent.
- Finally, the pump head must be flushed once again with water.
- Close the shut-off valve (if present) before and after the pump. Close the shut-off devices only if the pump is idle for a long time (in automatic plants only if the entire plant is decommissioned).

6.5 Removal from the system

ATTENTION!

Switch off the drive unit! Take care that the work steps described in (⇒ Chapter 6.4 on page 55) have already been performed.
Remove the connection pipes.

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7 Maintenance/Cleaning

7.1 General information

For maintenance purposes, you must ensure that the pump was flushed with harmless fluids. If the pump was operated with fluids hazardous to health, the maintenance must be carried out with respective protection measures (⇒ **Chapter 2 on page 29**).

When shipping the pump, completely fill in the certificate of non-objection attached. Pumps are not repaired without a certificate of non-objection.

7.2 Safety instructions for maintenance, inspection and installation work

DANGER!

You, the operator, are responsible that any maintenance and installation work is performed by authorized and qualified experts who are sufficiently informed after having carefully read the operating instructions.



- As a basic principle, all work must only be carried out with the pump stopped.
- Prior to any installation and maintenance work, the motor must be de-energized and locked.
- Pumps or pump aggregates distributing fluids hazardous to health must be decontaminated.
- Make sure that no explosive atmosphere is present near the pump. Ventilate, render the air inert or bring it to a non-explosive zone.
- Personal protective equipment must be worn (⇒ Chapter 1.7 on page 10).
- Directly after having carried out the work, all safety and protection devices must be re-mounted and put into operation again.
- Prior to commissioning, the items listed in (⇒ Chapter 6 on page 53). Initial commissioning are to be observed.

7.3 Maintenance cycle

The pump is not subject to regular maintenance cycles.

Cleaning/maintenance is necessary when:

- the pump is stored,
- the pump is decommissioned for a long time,
- the pump no longer meets the basic data shown in the chapter Technical data (⇒ **Chapter 10 on page 68**),
- another fluid is transported,
- leakages occur on the pump.

Observe also the transport notes (⇒ **Chapter 3 on page 33**) and the troubleshooting notes (⇒ **Chapter 8 on page 61**).

ATTENTION!

Observe that all O-rings must be replaced during re-assembly in case of any maintenance work including the dismantling of the pump. Otherwise, complete leakage safety cannot be guaranteed. It is also important to keep the workplace absolutely clean, as dirt can endanger the proper function of the pump.

7.4 External cleaning of the pump



DANGER!

When cleaning the pump externally, the risk of burning flammable and/or explosive fluids arises as well as when using the wrong cleaning agents!

- For cleaning the pump, use only cloths that do not charge statically, because in case of discharge, the risk of fire and explosion arises.

7.5 Cleaning of the pump for use in special areas



CAUTION!

When using the pump for distributing food or in the pharmaceutical and/or cosmetics sector, observe the currently valid hygiene rules when using cleaning agents, disinfectants or flushing agent.

- Make sure that the fluids to be distributed are not contaminated with residual cleaning or flushing agents and/or disinfectants.

The manufacturer recommends only using liquids for cleaning, disinfecting and/or flushing, that do not affect the fluid in case of a contamination.

If this is not possible, measures have to be taken in order to guarantee a complete removal of cleaning or flushing agents and/or disinfectants prior to re-commissioning.

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8 Faults, causes and rectification

Number	Fault type
1	The pump does not suck in.
2	The pump builds up too little pressure or none at all.
3	The pump makes noise.
4	The pump heats up.
5	The pump operates loudly and/or vibrates/oscillates greatly.
6	The pump is blocked.

Fault						Cause and rectification of the fault
1	2	3	4	5	6	
x			x			<p>The pump runs dry</p> <p>There is no fluid in the suction pipe or the suction height is greater than 3 m. Operation without fluid lasting more than 30s can destroy the pump and should therefore be avoided .</p> <p>The pumps of this series can suck in fluid at a distance of 3m when dry. However, the suction performance can be further improved when the pump is filled with fluid before commissioning.</p>
x						<p>Pipework incorrectly laid</p> <p>Incorrectly dimensioned pipes can have a very negative effect on the suction performance of the pump. Observe the general information in (⇒ Chapter 5.6 on page 49).</p>
x						<p>Pressure/suction pipe closed</p> <p>If there is a shut-off valve integrated into the pressure or suction side, make sure that this is open. If there is still air in the pressure pipe, make sure that it can escape.</p>
x	x			x		<p>Pump components worn</p> <p>If the pump does not suck in any more at the same operating conditions and the suction as well as the pressure pipe are not closed, it is possible that the pump has to be repaired.</p>
x						<p>Suction pipe is leaking</p> <p>Make sure that the suction pipe is absolutely gas-tight so that the ambient atmosphere cannot be sucked in.</p>
x						<p>Connection pipe incorrect</p> <p>Check if the suction and pressure pipes are interchanged.</p>
x	x				x	<p>Foreign matter, soiling and/or deposits can block the pump</p> <p>These can normally only be analyzed/rectified by dismantling the pump (⇒ Chapter 4.2 on page 36).</p>
x						<p>Check motor connection</p> <p>The motor may be incorrectly polarized. See the motor manufacturer's operating instructions.</p>

Fault						Cause and rectification of the fault
1	2	3	4	5	6	
x						<p>Incorrect rotation direction of the pump</p> <p>See rotation direction information on the pump type plate (⇒ Chapter 1.11 on page 13).</p>
x	x					<p>Internal pressure relief valve incorrectly adjusted (with 50X5-130-B-..., 50X5-210-B-... and 50X5-350-B-...)</p> <p>Make sure that the overpressure valve integrated into the pump is closed to an extent to which the fluid to be transported can be transported with sufficient pressure (⇒ Chapter 4.2.2 on page 39).</p>
x	x					<p>Pipe closed</p> <p>If there are shut-off valves in the pipe on the pressure or the suction side, make sure that they are open.</p>
x	x	x				<p>Magnetic coupling uncoupled</p> <p>The uncoupling of the magnetic coupling is accompanied by a rattling sound. The magnetic coupling serves amongst other things as overload protection (⇒ Chapter 5.4 on page 47). In order to uncouple the magnetic coupling, an operating condition must be present that (at least for a short time) is above the pump specification value. Stop the drive and restart the pump. If the fault occurs again, rectify the causes. Possible causes can be:</p> <ul style="list-style-type: none"> - Differential pressure too high - Fluid viscosity too high - Dirt in the pump
	x					<p>Fluid viscosity too low</p> <p>The hydraulic efficiency of the pump depends on the viscosity (viscosity of the fluid). If the viscosity (induced by the fluid or too high temperatures) decreases too much, this can lead to the decrease of the output rate.</p> <p>Compare the current viscosity and temperature with the initial viscosity and temperature during the laying of the pipes and correct them if necessary (⇒ Chapter 1.12.1 on page 14).</p>
		x				<p>Operation in cavitation</p> <p>Due to an inadmissibly low inlet pressure (absolute) or inadmissibly high suction height, steam bubbles occur, depending on the vapor pressure of the fluid, in the suction zone of the pump. They implode on the pressure side and lead to the increased wear of the pump. This operating point can be avoided by changing the feeding conditions. Audible through a singing noise.</p> <p>Increase the inlet pressure by reducing the pipe resistance.</p> <p>Decrease the fluid temperature.</p>
			x			<p>Normal operation</p> <p>Please check first if this is not a normal heating caused by the fluid to be transported. The pump surface shortly reaches the same temperature as the fluid.</p>

Fault						Cause and rectification of the fault
1	2	3	4	5	6	
			x			<p>Permanent internal overflow only with 50X5-130-B-..., 50X5-210-B-... and 50X5-350-B-...</p> <p>If the differential pressure between the inlet and outlet side exceeds the set opening pressure of the overpressure valve, the internal overpressure valve opens and the fluid is circulated in the pump head (⇒ Chapter 1.12.1 on page 14). This leads to the heating of the pump head.</p>
			x		x	<p>Temperature range of the fluid or permissible pump temperature exceeded</p> <p>Check if the temperature range of the fluid has been exceeded (⇒ Chapter 1.12.2 on page 15).</p>
		x				<p>Component wear</p> <p>If you can hear a grinding noise, the cause might be wear in the pump. The pump cannot be further operated in this condition. Immediately stop the drive. The repair or replacement of the pump is mandatory.</p>
				x		<p>Unfavorable installation conditions</p> <p>Significant oscillations and vibrations do not occur in normal operation mode. Individually and dependent on the installation conditions, oscillations and vibrations can be reduced by the following measures:</p> <ul style="list-style-type: none"> - Put vibration-damping supports underneath the motor. - Fix the connection pipes with oscillation-damping elements.

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9 Components

9.1 Components list

Pumps:

50X5-130-..., 50X5-210-..., 50X5-350-...

50X5-130-B-..., 50X5-210-B-..., 50X5-350-B-...

Pos.	Numbe	Designation
1	1	Casing
2	1	Cover Cover-B *
3	1	Drive shaft
4	1	Shaft
5	1	Drive gear
6	1	Driven gear
7	1	Intermediate flange Da160
8	1	Magnetic coupling hub
9	1	Magnetic coupling case
10	1	Motor coupling hub BG 80
10	1	Motor coupling hub BG 90
10	1	Motor coupling hub BG 100
10	1	Motor coupling hub BG 112
11	1	Containment can
12	1	Centering ring
20	5	Plain bearing (not a spare part)
21	4	Cylinder pin
22	6	Cylinder screw
23	8	Cylinder screw
24	4	Cylinder screw
25	4	Cylinder screw
26	1	Drain plug
28	1	Headless screw motor size 80
28	1	Headless screw motor size 90, 100, 112
29	2	O-ring
30	1	O-ring
31	2	Snap ring
32	1	Feather key
33	4	Retaining ring
34	1	Sealing ring *
35	1	Valve piston *
36	1	Compression spring * 1.0 - 15.0 bar
37	1	Sealing ring *

Pos.	Numbe	Designation
38	1	Clamp screw *
39	1	Adjustment screw
40	1	Motor
41	4	Cylinder screw
42	1	Mounting base
43	4	Cylinder Screw

* = only in 50X5-130-**B**, 50X5-210-**B** and 50X5-350-**B**

You will find the exploded drawing in ⇒ **Chapter 4.2.1 on page 36**

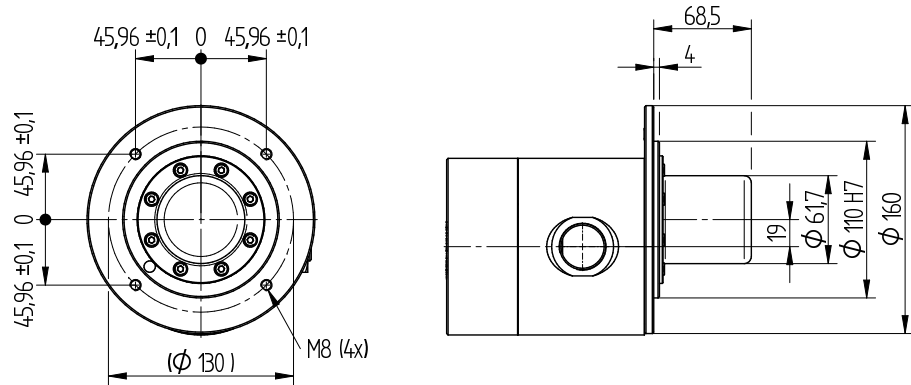
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10 Technical Data

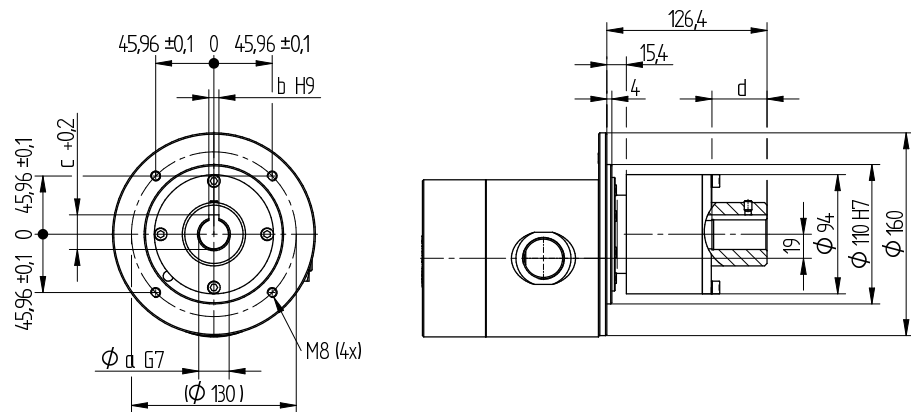
Note: Special pump designs may deviate from the following dimensions.

10.1 Connection dimensions at motor end

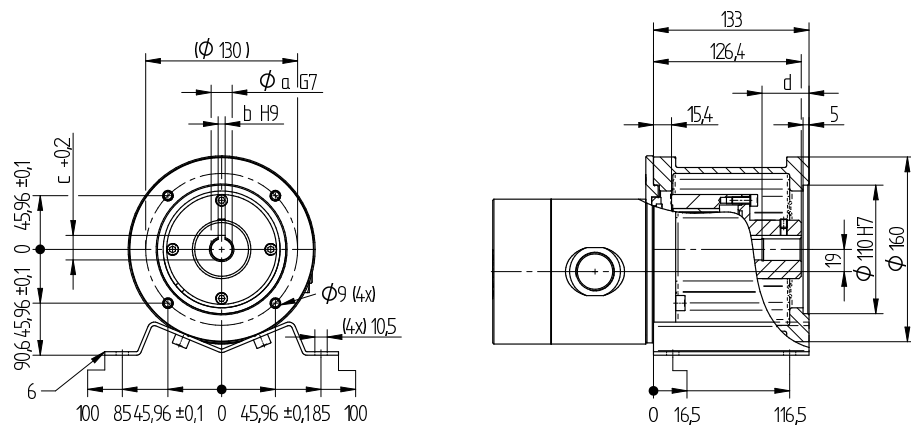
10.1.1 PK design



10.1.2 MK design



10.1.3 ZK design

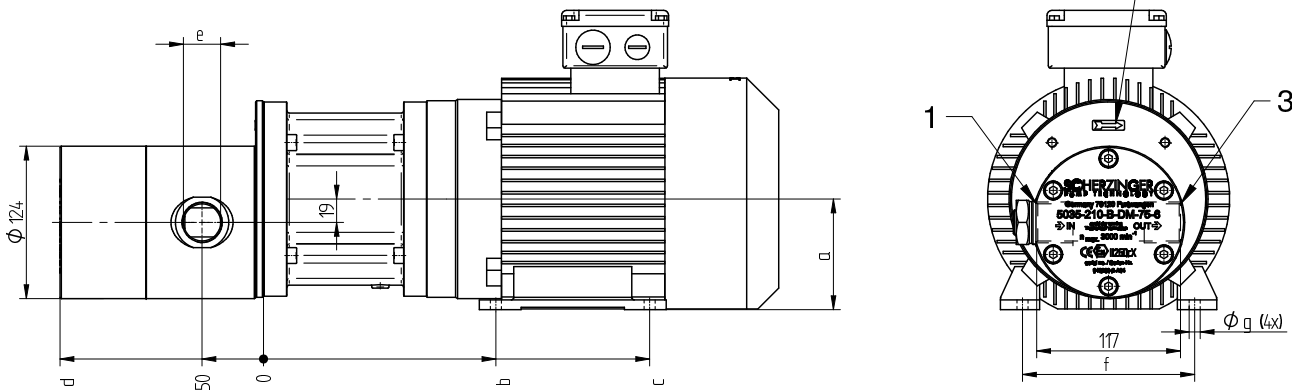


Motor size	a	b	c	d
80	19	6	21.5	33.5
90	24	8	27.3	46.7
100	28	8	31.3	53.5
112	28	8	31.3	53.5

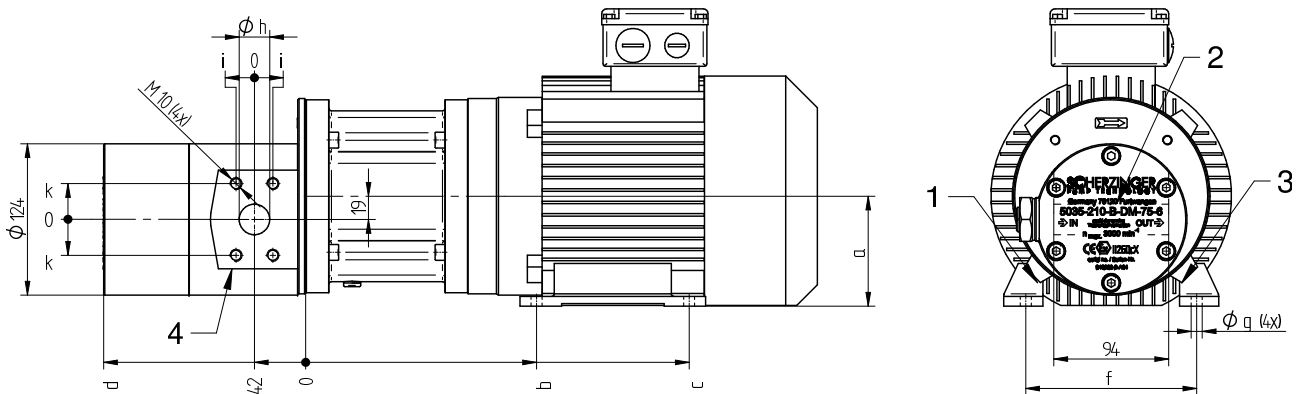
Connection dimensions suitable for motors in accordance with IEC 60072

10.2 Connection dimensions at pump end and motor connection

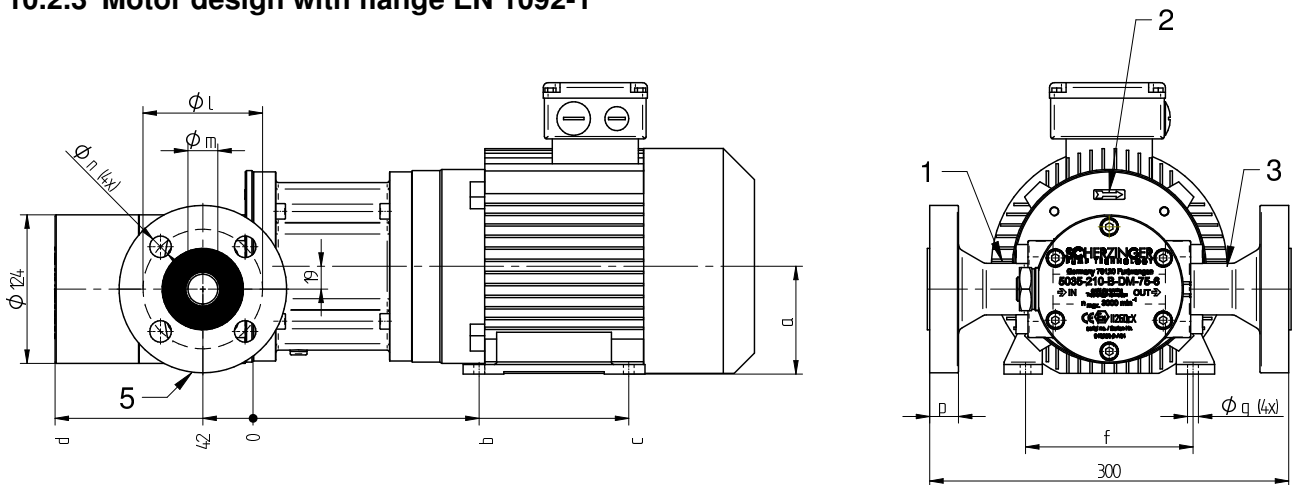
10.2.1 Motor design with connection in accordance with DIN ISO 228 or ANSI B1.20.1



10.2.2 Motor design with connection for SAE-ISO 6162-1



10.2.3 Motor design with flange EN 1092-1



Pumpen design *	Motor size															
		a	b	c	d	e		f	g	h	i	k	l	m	n	p
					G	NPT										
5030-130	80	/	/	137.5	1"	1¼"	/	/	20	11.1	23.8	75	20	14	14	
5030-130	90S	189	289	137.5	1"	1¼"	140	9	20	11.1	23.8	75	20	14	14	
5030-130	90L	189	314	137.5	1"	1¼"	140	9	20	11.1	23.8	75	20	14	14	
5035-130	100	196	336	137.5	1"	1¼"	160	12	20	11.1	23.8	75	20	14	14	
5035-210	80	/	/	145.5	1"	1¼"	/	/	25	15.1	29.5	100	25	18	24	
5035-210	90S	189	289	145.5	1"	1¼"	140	9	25	15.1	29.5	100	25	18	24	
5035-210	90L	189	314	145.5	1"	1¼"	140	9	25	15.1	29.35	100	25	18	24	
5035-210	100	196	336	145.5	1"	1¼"	160	12	25	15.1	29.35	100	25	18	24	
5035-350	80	189	289	161.5	1½"	1½"	140	9	32	15.1	29.35	110	32	18	24	
5035-350	90S	189	314	161.5	1½"	1½"	140	9	32	15.1	29.35	110	32	18	24	
5035-350	90L	197	337	161.5	1½"	1½"	160	12	32	15.1	29.35	110	32	18	24	
5035-350	100	203	343	161.5	1½"	1½"	190	12	32	15.1	29.35	110	32	18	24	

* Dimensions for the 5035-... pump series/design also apply to the 5045 and 5055 pump designs.

10.3 Sound pressure level

The sound pressure level measurement was performed under the following conditions:

Distance from the sensor to the pump: 1 m.

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

Information about sound pressure level:

- The pump measurement is taken when decoupled, on rubber feet and with hose elements to attenuate the suction and pressure line.
- In the event of pump cavitation (e.g. suction line too small) and/or structure-borne sound due to vibrations in the entire system (pump/system), the above value may be exceeded by up to 10 dB(A).

10.4 Non-ionizing radiation



DANGER!

A non-ionizing radiation emanates from the pump with magnetic coupling in the form of a magnetic field. This can destroy products that are sensitive to magnets.

These products include amongst other things:

- implanted medical devices (e.g. pacemakers),
- credit cards,
- electrical, electronic and fine mechanical devices (e.g. hard drives).

Please observe the safety instructions in ⇒ Chapter 2 on page 29

11 Disposal

The pump can be dismantled into its constituent components and recycled according to what materials were used after a correct decommissioning (⇒ **Chapter 6.4 on page 55**) and after removal of the fluid and elimination of any residual lubricants.

CAUTION!



You have to dispose of the pumps, pump accessories and fluids in accordance with the currently valid and nationally applicable regulations.

Pump components can be contaminated with toxic or radioactive fluids. Prior to the disposal of these components, you have to clean them with the respective flushing/cleaning agents. The flushing/cleaning agent must be adapted to the fluid last transported by the pump to rule out a potentially hazardous chemical reaction between the transported fluid and the flushing/cleaning agent. Wear appropriate protective equipment.

The pump manufacturer is not to be held liable for the disposal.

11.1 Disposal of the fluid

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

- Make sure the fluid is not released into the environment.
- Dispose of the fluid in suitable containers in accordance with the regulations.

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12 Appendix

12.1 List of revisions

Revisions-Nr.	Beschreibung	Datum	Autor	Genehmigt
1.1	Adjustment of: Pump designation, type plate declaration of conformity, layout and various additions	7/18/2013	DM	DMI
2.0	Adaptation to current guidelines	4/20/2016	SCA	DMI
2.1	Adaptation to current guidelines	2/15/2017	SCA	DMI
3.0	Corrections added in: ⇒ Chapter 2.4 on page 31 , Adaptation to current guidelines	5/2/2017	DMI	DM
4.0	Complete revision of the operating instructions	11/9/2017	DM	HR
4.1	Corrections added in: ⇒ Chapter 5.1 on page 45	02/20/2018	HR	DM
4.2	Corrections added in: ⇒ Chapter 1.16.3 on page 27 and ⇒ Chapter 1.12.4 on page 16	03/13/2018	HR	DM
4.3	Corrections added in: ⇒ Chapter 1.12.3 on page 15	09/26/2018	HR	DM

12.2 Signature list

Procedure/completing the signature list

- Copy the following signature list.
- Enter the name of your company/authority and use your company stamp to confirm.
- Make sure that every employee who works with this product signs this list to confirm that he/she has read and understood the operating instructions. Persons who do not provide their signature as confirmation are not authorized to work with this product!
- Then archive this list in your files.

Signature list

of the company / the operator

Address/stamp

By providing their signature, the persons listed hereinafter confirm that they have received instruction on the basis of the **operating instructions** in

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

of the **pump** and that they have read and understood the safety instructions of the operating instructions.

Participant Last name, first name	Date Signature	Instructor Last name, first name Date, signature



HEART OF HIGHTECH

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