

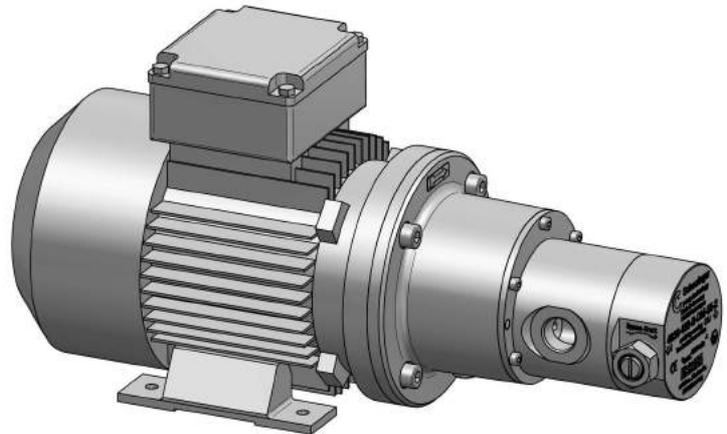
Operating Instructions

Pump Series

4030

4040

4050



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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 of the company **Scherzinger Pumpen GmbH & Co. KG** are part of the product (pump).

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

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

Should you have any questions with regards to the product (pump) its application range or in case of any other questions, our employees be available for assistance.

1.2 Product Identification/Product Information

Validity

The descriptions in these operating instructions refer exclusively to the product (pump), as described in the technical data (⇒ [chapter "Technical Data" ¹⁶⁰](#)) and as developed and built by the manufacturer.

Product Information

The product (pump) from Scherzinger Pumpen GmbH & Co. KG is suited for pumping liquids. That which do not have a corrosive or aggressive effect on the materials used (⇒ [chapter "Medium-affected Parts" ¹⁶](#)).

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

1.3 Storage

These **operating instructions** must always be close to the product (pump) and be within easy reach when needed.

1.4 Definition of Terms

In the following section, any type of fluid to be transported will be referred to as "**fluid**".

These operating instructions are valid for the following pump series:

4030
4040
4050

To make things clearer, the series **4030**, **4040** and **4050** are identified below as **40X0**.

The **40X0** pump series are available in the following designs (⇒ chapter "[Pump Body](#)"³⁶):

- 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.

The exact design of your pump is specified / included in 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 certain 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 Levels of Danger



DANGER!

Texts labelled 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 taken note of and preventative countermeasures are taken!



WARNING!

Texts labelled with WARNING! warn of exceptionally great and potential 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 taken note of and preventative countermeasures are taken!



CAUTION!

Texts labelled with CAUTION! warn of potentially 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 taken note of and preventative countermeasures are taken!

ATTENTION!

Texts labeled with ATTENTION! contain important notes about situations which, if the preventative countermeasures are not taken, could possibly damage the product and/or its functions or materials located in its immediate vicinity.

It is imperative that these texts are taken note of and preventative countermeasures are taken!



Texts labeled with this symbol contain very important instructions!

It is imperative that these texts are taken note of!



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) injuries 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!



Warning of incorrect direction of rotation!



Warning of moving machine!

1.6.3 Command Symbols



Take note of the documentation and information provided!



Switch off release the pump!



Wear hearing protection!



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



Wear protection class 1 safety shoes!



Wear respiratory protection!



Wear safety glasses!

1.6.4 General Symbols

- This dot indicates the description of activities that are to be performed.
 - This dash indicates numerations.
 - ⇒ This arrow indicates cross-references.
- For purposes of clarity, abbreviations are used for cross-references made to other chapters in the text, e.g.:
- (⇒ **chapter "Offices Abroad"**)
- This means: Refer to page **6**, chapter **Offices Abroad** in these operating instruktion.
- (3) Numbers in parentheses refer to positions within the figures.

1.7 Personal Protective Equipment

The personal protective equipment suggested in these operating instructions only applies to this particular product (pump).

The requirements for personal protective equipment arising from local environmental conditions, the fluid, other products, or the (combined) usage 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 product (pump). For this reason, only qualified personnel may operate the product (pump), commission and decommission it, clean and maintain it.

In this sense, qualified personnel are persons who:

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

1.9 Obligations of the Operator

The operator undertakes to only let experts work with this product (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 for the handling of the product (pump);
- have read and understood the safety and warning instructions contained in these operating instructions.

In the interests of all these 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 product (pump) according to these regulations!
- In addition to these operating instructions, please make available instructions regarding operational particularities such as those related to work organization, workflows, authorized personnel (including obligatory supervision and registration)!
- Clearly establish the specific responsibilities of the personnel for operation, cleaning, maintenance, etc.!
- Ensure that the personnel are working in a safety- and risk-conscious manner by checking in regular intervals!
- Implement measures that ensure that the product (pump) is only operated in a safe and fully functional condition!
- Have the product (pump) cleaned and serviced in the specified intervals (= **chapter "Maintenance / Cleaning"**!)
- Do not make any structural changes (excluding those described in the operating instructions) without prior written consent from the manufacturer!
- Implement stringent provisions to ensure that personnel that has not been instructed on the basis of the safety instructions and the residual risks which may arise when working on or with the product (pump), do not enter the hazard area of the product (pump)!
- When surface temperatures exceed 50 °C (122 °F), a warning sign must be placed on the machine in a clearly visible position. When surface temperatures exceed 80°C (176 °F), 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 product (pump) are obliged, before commencing work to

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

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

- Do not carry out any work that is 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 available 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 carry out any repair work without contacting the manufacturer and an authorized representative of the operating company first!
 - 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 4030-450-B-DM-55-2

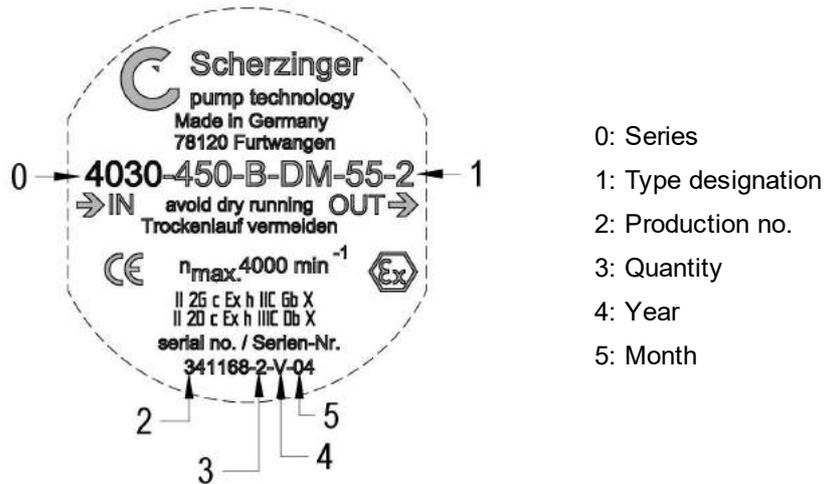


Fig. 1: Type plate for pump with motor

Equipment group	II	Above ground working
Category	2	High degree of safety
Zones	1 und 21 2 und 22	High level of protection Extended level of protection
Atmosphere	G	Gas
	D	Dust
Ignition protection category	c	Constructional safety
Level of protection	Ex h	High level of protection
Group	IIC	Gas group
	IIIC	Conductive dust
Equipment protection level	Gb	Gas
	Db	Dust
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 determined by the device itself (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 product (pump) defined in the technical data is the transportation of low to medium viscous particle-free media with degreasing to well-lubricating characteristics, that do not have a corrosive or aggressive effect on the product material (pump). It is suitable for the transportation of alkaline as well as acid fluids.

The product (pump) is exclusively intended

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

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

The product (pump) is not designed for use in a radioactive or biologically contaminated atmosphere and fluids!

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

1.12.1 Limit Values

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

Description	Value
Max. differential pressure rise	7 bar with PTFE gears 12 bar with PEEK gears
Max. system pressure (pressure side)	100 bar
Max. suction vacuum	0.9 bar (filled with fluid)
Operating temperature	-20 to 130 °C with PEEK gears/bearings -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 mm ² /s
Speed range	0 to 4000 1/min (dependent on the gear material)
Sound pressure level	< 75 dB(A) determined at: Rotation speed: 2800 1/min Operating pressure: 10 bar Operating temperature: 20 °C Fluid: 1 mm ² /s, non-lubricating (⇒ chapter "Sound Pressure Level" ⁶⁴)
For dimensions	observe the respective data sheets (⇒ chapter "Technical Data" ⁶⁰)
For attachments	observe applicable/supplied documents (motor, PT100, etc.)
For electrical characteristics	observe applicable/supplied documents (motor, PT100, etc.)
Max. torque of coupling	4 Nm

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

Due to the versatile combination possibilities in terms of the different sizes, gears, motor speeds and electrical characteristics, 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 instructions is deemed improper

1.12.2 Temperature Classes and Approved Temperatures

Temperature class		Switch-off temperature when Tmax of magnetic coupling is reached	Switch-off temperature when Tmax of fluid is reached	Switch-off temperature when Tmax of pump surface on containment can is reached
T3 ^{*1/*2}	200°C	150°C*	150°C*	150°C*
T4 ^{*1/*2}	135°C	85°C	85°C	85°C
T5 ^{*2}	100°C	50°C	50°C	50°C
T6 ^{*2}	85°C	35°C	35°C	35°C

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

*1 Operation with media temperatures above 130°C with PEEK gears is not approved for design-related reasons

*2 Operation with media temperatures above 70°C with PTFE gears is not approved for design-related reasons

1.12.3 Overview of Series/Medium-affected Parts

The 4030, 4040, and 4050 series only differ in terms of the different combinations of materials.

	4030	4040	4050
Casing [1], [2], [16]	1.4404	Hastelloy C4	Titanium
Shafts [3], [4]	1.4571	Hastelloy C4	Titanium
Drive gears [5], [6]	PEEK mod	PTFE 25% coal	
Bearings [10]	PEEK mod	PTFE 25% coal	
Magnetic coupling hub [14], [25]	1.4571	Hastelloy C4	Titanium
Clamp screw [32]	1.4571	Hastelloy C4	Titanium ^{*3}
Valve piston [30]	1.4571	Hastelloy C4	Titanium ^{*3}
Adjustment screw [31]	1.4404	Hastelloy C4	Titanium ^{*3}
Sealing [27], [28], [29],[33]	PTFE		
Compression spring [34]	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, the dissemination of brush charges must be prevented by ensuring that 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 in conjunction with IIC.

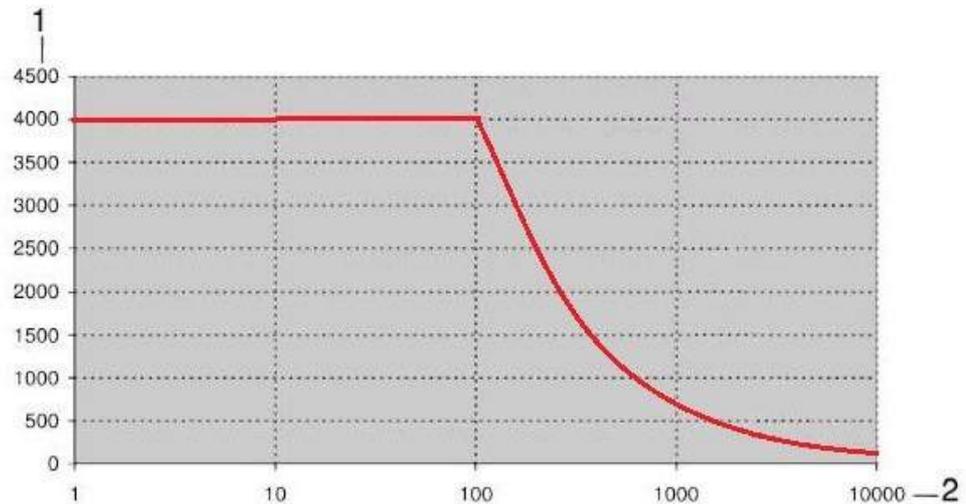
1.12.5 Maximum Possible Speed

The maximum possible speed depends on the gear materials:

PEEK mod.: 4000 1/min

PTFE: 3000 1/min

as well as the fluid viscosity:



1 Max. pump speed (1/min)

2 Fluid viscosity (mm²/s)

Fig. 2: Viscosity range

DANGER!



If one or more limit values described in this section are exceeded, you must ask the manufacturer's plant if these operating conditions are authorized by the manufacturer. Otherwise, a modification of the pump that is adapted to your case must be carried out, 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 (>50µm) (such as beads of sweat, deposits from tanks, sediments, sealing material (teflon strip)...))
- 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. Make sure 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 in (⇒ chapter "[External Cleaning of the Pump](#)"⁵⁵). Take note of the manufacturer's specifications!*

1.13.2 Danger from Dry Running of the Pump



DANGER!

Without fluid, the product (pump) runs dry. As the sliding surfaces are not lubricated, the drive 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 for transportation must always be present in order to avoid temperature rises above the maximum permissible temperature (⇒ chapter "[Limit Values](#)"¹⁵”).

Dry running protection

When the pump is being operated, the interior of the pump must always be filled with fluid. This way, the development of an explosive atmosphere can be prevented. If this cannot be ensured by the operator, we recommend appropriate monitoring measures:

- 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 serves only 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 appropriate monitoring measures for this purpose:

- Resistance thermometers on critical pump components such as depositories in the cover.
- Resistance thermometers on 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

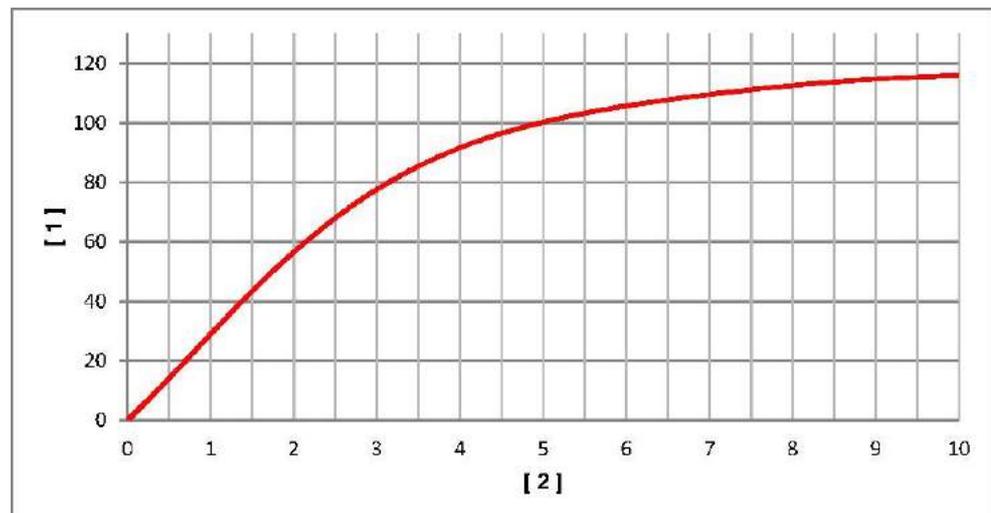
If the pump is not equipped with an integrated pressure relief valve, we recommend appropriate monitoring measures for this purpose:

- 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 80K within 4 minutes (2500 rpm, opening pressure 7 bar, closed pressure pipe).

Under these operating conditions, you must monitor the surface temperature. You must switch the pump off at least at 50K 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 with a closed pressure pipe and permanent circulation via the internal pressure relief valve. The fluid temperature was the same as the ambient temperature (20°C) at the beginning of the measurement.



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

Fig. 3: 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, which can cause the development of very high temperatures 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. In addition, the medium on the pressure side can be sucked empty, with the risk of dry running (⇒ chapter "[Danger from Dry Running of the Pump](#)"¹⁹).



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 rotation direction as well as the connections are marked.



Rotation direction control

If an explosive atmosphere is also present during the installation phase, the rotation direction cannot under any circumstances 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 with 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 as an ignition source. The pump must be grounded via a suitable point provided on the motor.

The earthing cable must have a cross section 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 IIC. 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 is exceeded (=chapter "[Intended Use/Normal Operation](#)"¹⁴) 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.

1.13.10 Danger from Mechanically Produced Sparks



DANGER!

Mechanically produced sparks may arise in operating statuses that differ from normal operation.



(A) Running noises

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 spark generation. 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 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 number of the product (pump),
 - 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 and Delivery Terms and Conditions** generally apply for the use of our product (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 several of the following causes:

- Improper use of the product (pump).
- Operation of the product (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 concerning to security, transport, storage, installation, commissioning, operation, maintenance and repair of the product (pump).
- Incorrect installation, commissioning, operation, maintenance and repair of the product (pump).
- Inadequate monitoring and maintenance of parts subject to wear.
- Unauthorized modifications to the product (pump).
- Major emergencies caused by the influence 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

**40X0-280... 40X0-280-B...
40X0-450... 40X0-450-B...
40X0-710... 40X0-710-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 1127-1:2019**

The pump type mentioned corresponds to the ignition protection type constructional safety "c".

An ignition hazard assessment is included. The pump has the identification:



II 2G c Ex h IIC Gb X

II 2D c Ex h IIIC Db 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, Monday, June 21, 2021



Dipl.-Ing., MBA Matthias Derse
Managing Director

1.16.2 Declaration of Conformity as per Direktion 2006/42EC (Maschinery Direktive)

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 declares:

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

that the product:

Pump

40X0-280... 40X0-280-B...

40X0-450... 40X0-450-B...

40X0-710... 40X0-710-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 12100:2011
EN ISO 13857:2020
EN ISO 13732-1:2008
EN 809:1998+A1:2009 + AC:2010
EN 60204-1:2019

The following directives were applied:

Directive 2006/42/EC Machinery directive
Directive 2014/30/EU Electromagnetic compatibility (EMC directive)
Directive 2014/34/EU Explosion-protection directive (ATEX)

Applied national technical standards and specifications:

Accident prevention regulations

Person responsible for documentation: Matthias Derse

Furtwangen, Monday, June 21, 2021



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 met 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 intermediate flange (motor lantern) provided by Scherzinger and a suitable coupling. These parts must not be reworked.
- The required flange and motor shaft dimension 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 Machinery directives
- Guaranteed grounding
- The pump may be painted in compliance with (⇒ **chapter "Paint"**¹⁷)

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 distributor 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, Monday, June 21, 2021



Dipl.-Ing., MBA Matthias Derse
Managing Director

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

If

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

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

Due to these latent residual risks, the manufacturer is obliged to notify the operator and user about 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 for protection against moving parts while the pump or the system is switched on!***

2.2 Danger from Hot Parts



DANGER!

- *If the pump is operated in a closed casing, it must be ensured that the casing 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 carriers or devices.*
- *Do not place any ferromagnetic tools onto the axes or in proximity 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 conveyed fluids can cause injury, poisoning and danger to life.

- *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*



2.6 Danger from Pump Weight



CAUTION!

- *The 40X0 pump with three-phase motor has a total weight of over 10 kg. Therefore, it is important to ensure that the pump does not fall down when it is lifted. If the pump falls, there is a risk that a limb may be crushed and injured. It is therefore necessary to wear safety equipment.*
 - *Avoid transporting the pump with your hands!*
 - *If carrying the pump cannot be prevented, make sure to always use both hands!*
-

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.

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 bare metal 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 transported fluid, 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 dangerous 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 flushing.*

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

- *Carry out the cleaning with conventional cleaning agents (=chapter " [Technical Data](#) ^{□60}").*
- *Flush the pump once again with water at middle pump speed after re-installation.*
- *Observe the regulations when dealing with substances hazardous to health!*



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.

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 "[Certificate on Non-objection](#)"²⁸) completely and enclose it. The repair cannot be carried out without this certificate!

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.

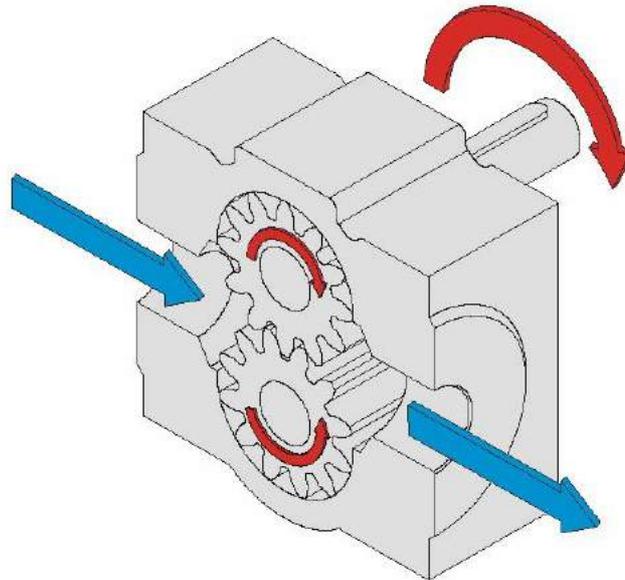


Fig. 4: Functional principle of the gear pump

4.2 Constructive Design of the Pump

4.2.1 Pump Body

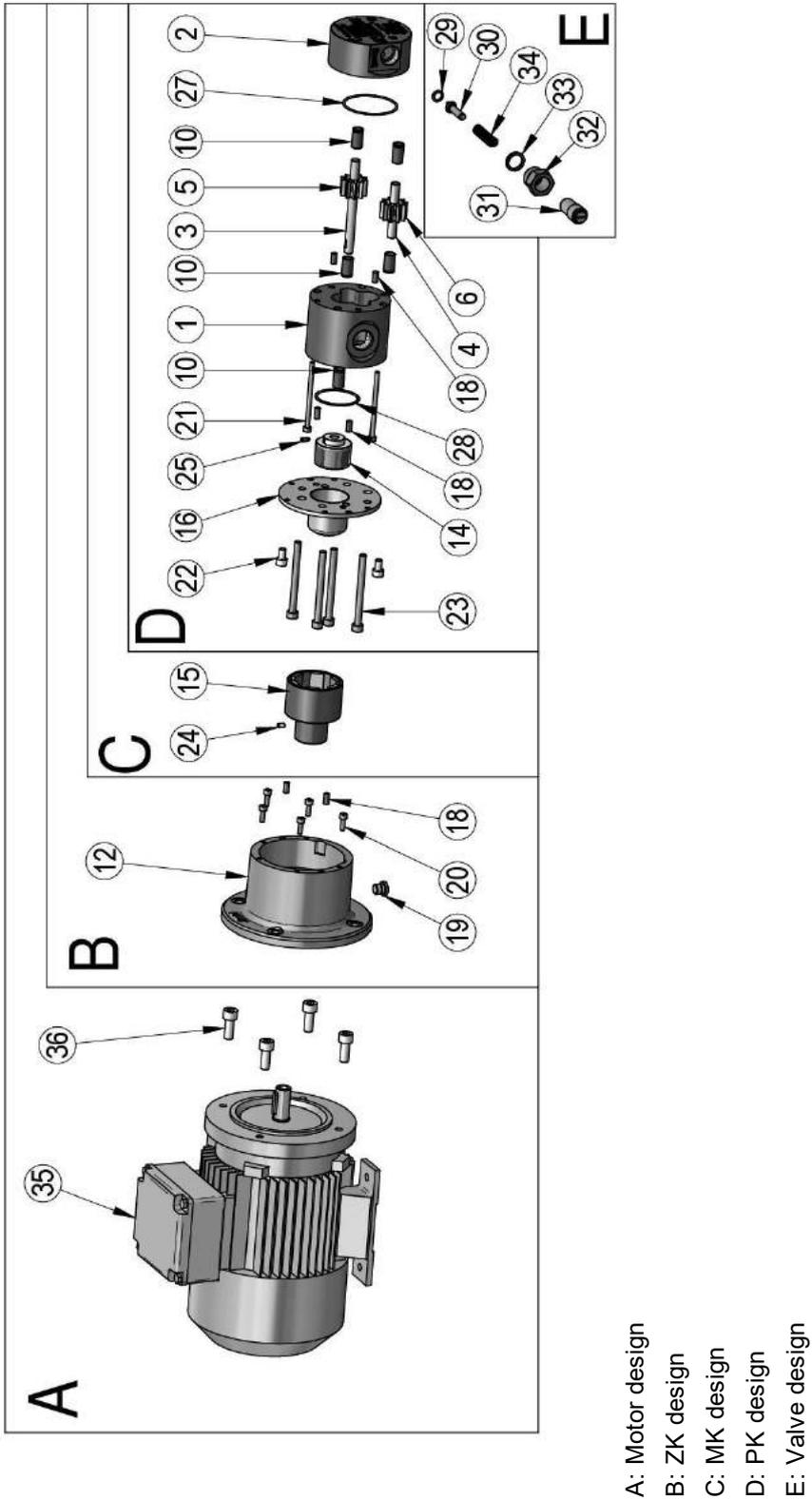


Fig. 5: Pump body

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 two screws (21). The exact distance is determined by two pins (18).

A sealing ring (27) 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 shaft bearing in the casing and the cover is supported by plain bearings (10). (⇒ chapter "[Bearing Bushes](#)"¹⁴³)

The rotation from the drive unit to the pump is transferred via a Magnetic coupling (14) and (15) to the drive shaft (3) with drive gear (5).

Scherzinger pump heads of the 40X0 series are available in different sizes (size -280 to size -710).

The theoretical pumping rate data include:

Pump head	Vg _{th} Displacement	Q _{th} at 1400 1/min	Q _{th} at 2000 1/min
-280 and -280-B	2.8 cm ³ /U	3.92 l/min	7.84 l/min
-450 and -450-B	4.5 cm ³ /U	6.3 l/min	12.60 l/min
-710 and -710-B	7.1 cm ³ /U	9.94 l/min	19.88 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 "Installation/Dismantling of Motor Flange and Drive Unit"**⁴⁷).
- Lay the pump head in front of you with the containment can (16) on top.
- Loosen and remove the two cylinder screws (22).
- Loosen and remove the four cylinder screws (23)
- Pull the containment can (16) out upwards.
- Remove the O-ring (28) without damaging the O-ring seat.
- Loosen the grub screw (25) by two revolutions.
- Pull out the magnetic coupling hub (14) upwards (**attention:** highly magnetic!).
- Loosen and remove the two cylinder screws (21)
- Carefully remove the pump cover (2).
- Remove the O-ring (27) without damaging the O-ring seat.
- Now you can remove the cylinder pins (18) drive shaft (3) with drive gear (5) and shaft (4) with driven gear (6)

Assembly:

- 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 cylinder pins (18)
- Insert the new O-ring (27).
- Carefully put the cover (2) onto the cylinder pins (18).
- Turn the pump. The free shaft end is now facing upwards.
- Screw in the cylinder screws (21) and tighten to 2.2 Nm. Check if the pump can be turned easily.
- Put the magnetic coupling hub (14) onto the drive shaft (3). (**attention:** highly magnetic!)
- Tighten the grub screw (25) to around 0.5 Nm. Ensure that the grub screw reaches into the notch in the drive shaft (3).
- Insert the new O-ring (28).
- Put the containment can on with centering ring (16).
- Put the four cylinder screws (23) into the drillings of the casing (1).
- Screw all four cylinder screws (23) in and tighten them crosswise with 3.5 Nm.
- Screw in the cylinder screws (22) and tighten to 8 Nm.

4.2.2 Design and Commissioning of Pressure Relief Valve (only for Valve Design)

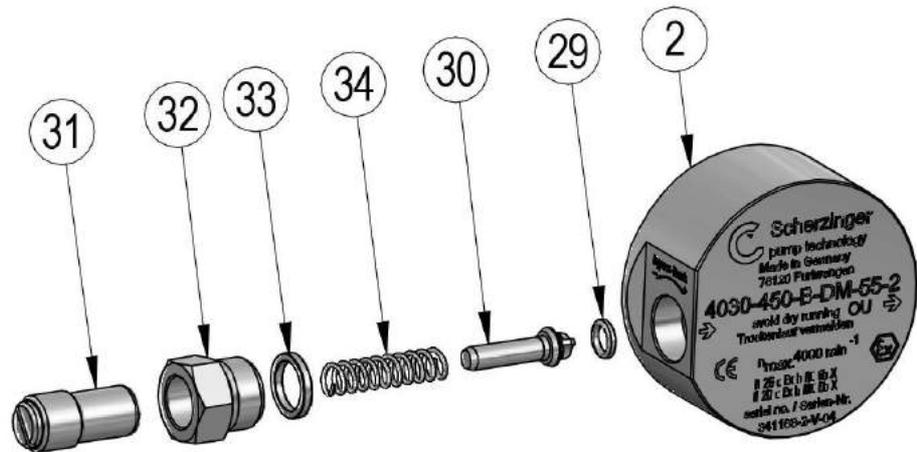


Fig. 6: Pressure relief valve

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 0-6 bar; 5-12 bar and 8-15 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

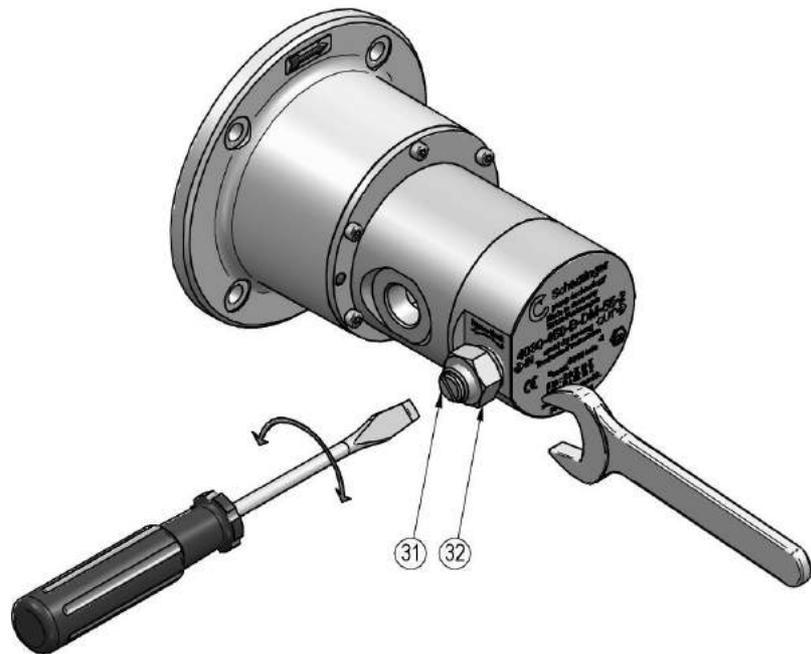


Fig. 7: Adjustment of the pressure relief valve

Proceed as follows for adjusting the pressure relief valve:

- Loosen the clamp screw (32) by a quarter turn (counter-clockwise).
- Adjust the valve by turning the overpressure valve screw (31).
 - to the left (counter-clockwise) = reduce the opening pressure,
 - to the right (clockwise) = increase the opening pressure.
- Re-tighten the clamp screw (32).

ATTENTION!

Take care that the overpressure valve screw (31) does not protrude more than 13 mm over the clamp screw (32). When the clamp screw (32) 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 (32) with a spanner by a quarter turn.
- Unscrew the adjusting screw (31) until it is no longer in the thread engagement, then pull it out by hand.
- Unscrew the clamp screw (32).
- Remove the sealing ring (33), the compression spring (34) and the valve disc (30).
- Remove the sealing ring (29) from the valve disc (30).

Installation

- Press the sealing ring (29) onto the valve disc (30).
- Push the valve disc (30), the compression spring (34) and the sealing ring (33) into the valve drilling.
- Screw the clamp screw (32) in by hand.
- Turn the adjusting screw (31) until it is flush with the clamp screw (32).
- Tighten the clamp screw (32) with a spanner.

4.2.3 Magnetic Coupling

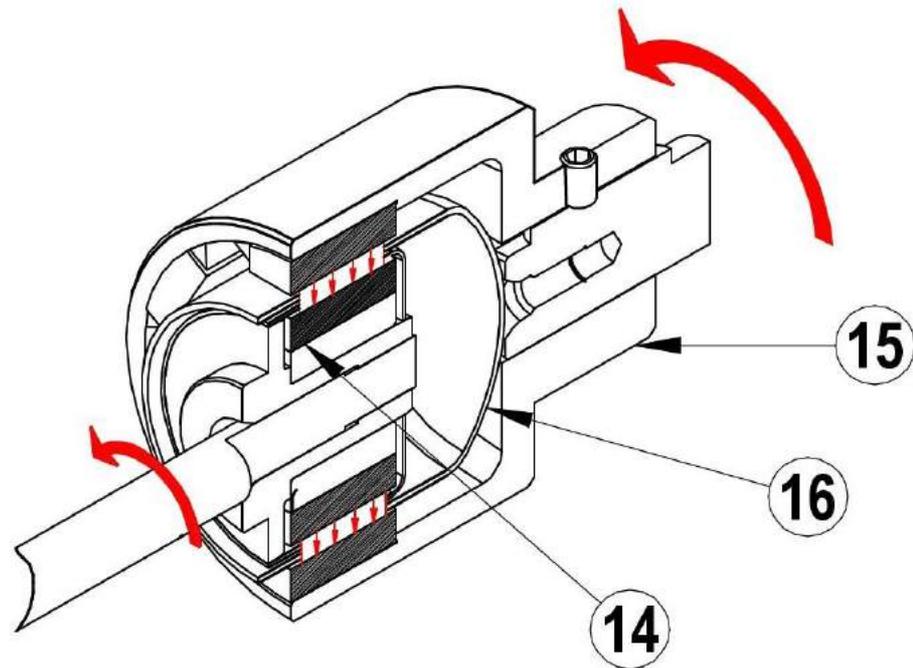


Fig. 8: Magnetic coupling
 (The vertical arrows show the direction of the magnetic field.
 The curved arrows show the direction of rotation.)

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

The torque is transferred through a partition wall (containment can (16)) to the magnetic coupling hub (14) via alternately magnetized magnets on the inside of the magnetic coupling case (15). 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.

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

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

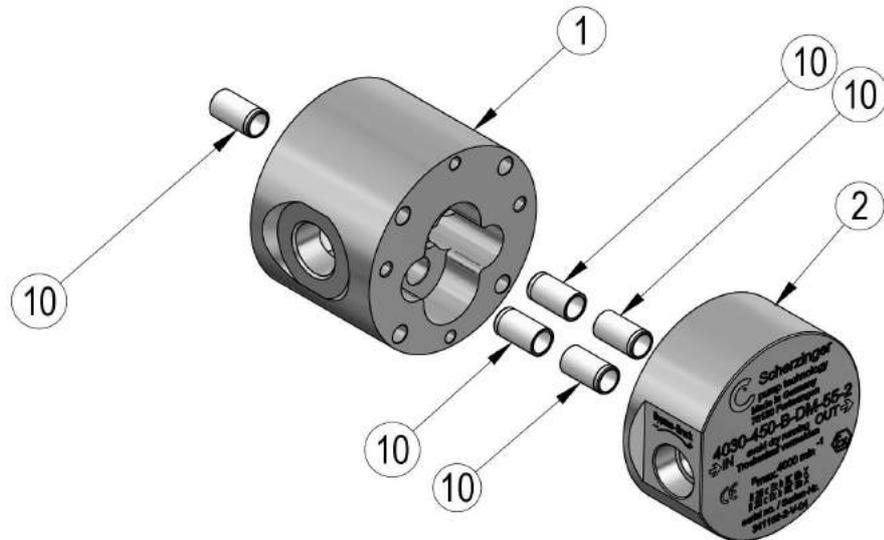


Fig. 9: Shaft bearings

Dismantling

ATTENTION!

Send the pumps to Scherzinger if a replacement of the bearing bushes is required as this replacement can easily lead to damages. The customer can replace the bearing bushes. However, then warranty and liability in case of personal injuries and damage to property are expressly void.

- Dismantle the pump as described in (⇒ chapter "[Pump Body](#)³⁶").
- Carefully pull the two bearing bushes (10) out of the cover (2) with the aid of an interior puller.
- Carefully pull the three bearing bushes (10) from both sides out of the casing (1) with the aid of an interior puller.

Do not damage the bearing seat or the sealing areas of the pump head when pulling. Make sure that only qualified personnel replaces the bearing bushes.

Re-installation

- Press the two new bearing bushes (10) with the centering spigot ahead via press-fit stamp with 0.1 to 0.2mm recess into the cover.
- Press in the housing's (1) the three new bearing bushes (10) as described in the previous step.
- Install the pump as described in (⇒chapter "[Pump Body](#)³⁶").

5 Installation / Dismantling



DANGER!

The design-related shift in the pump's center of gravity may result in the pump unit tipping during installation.

The pump must be earthed.

- The earthing cable must be attached at the point agreed with the manufacturer.

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!

The pumps 40X0-280-B..., 40X0-450-B... and 40X0-710-B... that is, those with an 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 individual 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 "Complaints"](#) 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 should occur during operation of the pump, please observe the points listed in the fault table (⇒ chapter "[Fault, Causes and Rectification](#)"⁵⁶).*

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. In particular with the pump 40X0-280-B..., 40X0-450-B... and 40X0-710-B... 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 "[Danger from Potential Difference](#)"²²).

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!

Reparaturen wie auch Wartungen der Magnetkupplung dürfen nur vom Hersteller durchgeführt werden.

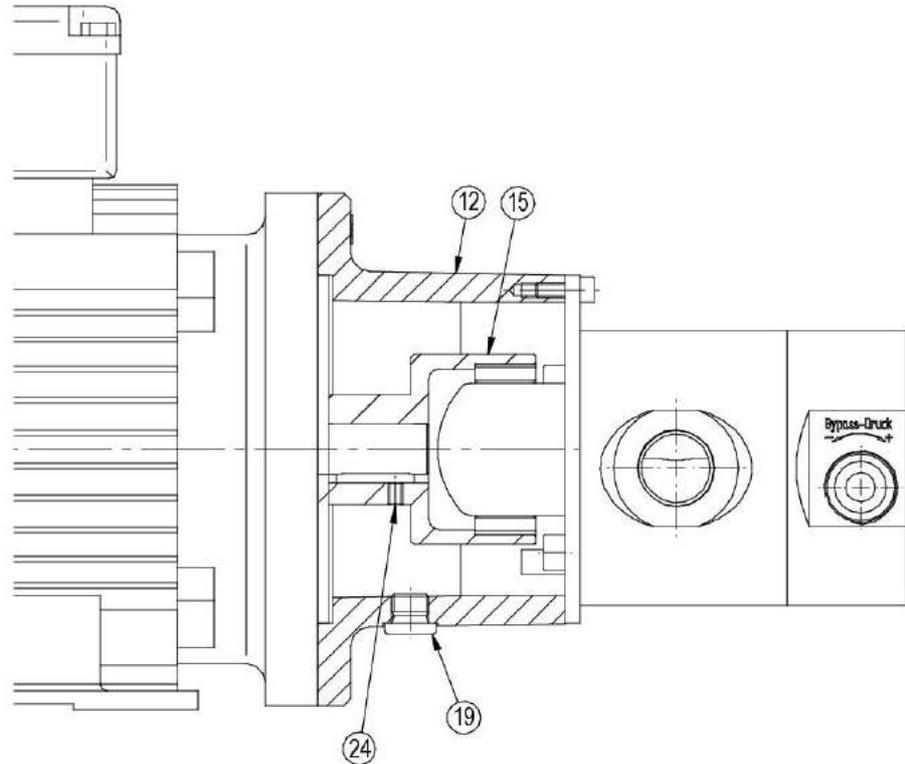


Fig. 10: Installation of the magnetic coupling

Slide magnetic coupling case (15) all the way onto motor shaft. Fix magnetic coupling case (15) with threaded pin (24). Remove drain plug (19) from intermediate flange (12). Now align threaded pin (24) of magnetic coupling case (15) so that it is flush with opening of drain plug (19). Fit intermediate flange (12) on motor or alternatively fit pump head on intermediate flange (12). Now loosen threaded pin (24) again until magnetic coupling case (15) can move freely and without resistance on shaft in an axial direction! Magnetic coupling case (15) and Magnetic coupling hub (14) are automatically aligned on pump shaft due to magnetic force. Now use a hexagon screwdriver (3 mm in size) to tighten threaded pin (24) to 2.8 Nm and then refit drain plug (19). Take great care not to move magnetic coupling case (15) in an axial direction when tightening threaded pin (24)!



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, any impact through forces induced by thermal expansion on the pump is prohibited.

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!

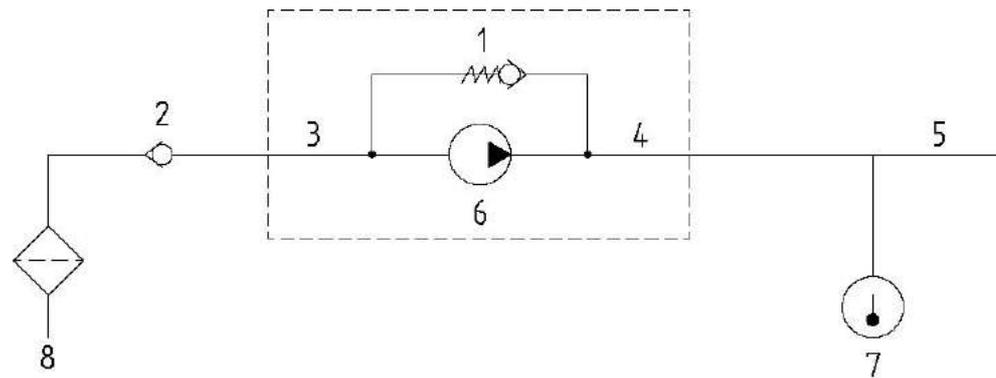


- **Position a suction filter with at least a 50µm filter mesh upstream of the pump, in order to avoid premature wear or damages caused by the ingress of foreign matter that can lead to the destruction of the pump. Select a sufficient size for the filter because of its interior resistance as it can otherwise affect the suction performance of the pump.**
- **Use the largest possible radius for necessary curves in the pipe routing. Avoid sharp-angled elbows, if possible.**
- **Lay the suction pipe rising up to the pump. If pipes must be laid rising and falling, integrate vents 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 sealed, 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 reached, 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 (= chapter "[Limit Values](#)"¹⁵).

Recommended installation in explosive areas


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

Fig. 12: 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 does not need not be emptied in case of a necessary removal of the pump.

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 correctly?
 - 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 for 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 conveyed 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 individual devices, safety must be ensured in explosive areas. It must be checked that no new ignition sources develop and 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 in the magnetic coupling hub at an early point in time, you have to

- ***after commissioning,***
- ***monthly***

unscrew the locking screw (19) and check if leakage fluid has collected in the flange (12). 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. A pump without locking screw must not be used in 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 cycle 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 with an appropriate cleaning or neutralization agent for several minutes.*
- *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 working steps described in (⇒ chapter "[Decommissioning](#)"⁵³) have already been performed.

Remove the connection pipes.

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 "Safety Instructions"¹²⁹](#)).

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 specialist personnel 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 or 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 "Personal Protective Equipment"¹¹⁰](#)).*
- *Directly after having carried out the work, all safety and protection devices must be re-mounted and put into operation again.*
- *Before commissioning, the points listed in the (⇒ [chapter "Commissioning/Decommissioning"⁵¹](#)) must 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 "[Technical Data](#)"^{□60}),
- another fluid is transported,
- leakages occur on the pump.

Observe also the transport notes (⇒ chapter "[Transport and Interim Storage](#)"^{□33}) and the troubleshooting (⇒ chapter "[Faults, Causes and Rectification](#)"^{□56}).

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, due to the risk of fire and explosion that arises with static discharge.*

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 agents.

- *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.

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			The pump runs dry 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. 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.
x						Pipework incorrectly laid Incorrectly dimensioned pipes can have a very negative effect on the suction performance of the pump. Observe the general information in (⇒ chapter "Connection Pipes" 48).
x						Pressure/suction pipe closed 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.
x	x			x		Pump components worn 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 exchanged.
x						Suction pipe is leaking Make sure that the suction pipe is absolutely gas-tight so that the ambient atmosphere cannot be sucked in.
x						Connection pipe incorrect Check if the suction and pressure pipes are interchanged.
x	x				x	Foreign matter, soiling and/or deposits may be blocking the pump These can normally only be analyzed/rectified by dismantling the pump (⇒ chapter "Pump Body" 36).
x						Check motor connection The motor may be incorrectly polarized.
x						Incorrect direction of rotation of the pump See direction of rotation on the type plate of the pump.

Fault						Cause and rectification of the fault
1	2	3	4	5	6	
x	x					<p>Internal pressure relief valve incorrectly adjusted (with 40X0-280-B..., 40X0-450-B... and 40X0-710-B...)</p> <p>Make sure that the overpressure valve integrated into the pump is closed to an extent to which the fluid to be conveyed can be conveyed with sufficient pressure (⇒ chapter "Design and Commissioning of Pressure Relief Valve"^{□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 "Installation of the Magnetic Coupling"^{□46}). In order to uncouple the magnetic coupling, an operating condition must be present that (at least for a short time) was 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 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 "Limit Values"^{□15})</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. 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>
			x			<p>Permanent internal overflow only with 40X0-280-B..., 40X0-450-B... and 40X0-710-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 "Limit Values"^{□15}). 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 "Temperature Classes and Approved Temperatures"^{□16}).</p>

Fault						Cause and rectification of the fault
1	2	3	4	5	6	
		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.

9 Components

9.1 Parts List

Pumps:

40X0-280-..., 40X0-450-..., 40X0-710-...

40X0-280-B-..., 40X0-450-B-..., 40X0-710-B-...

Pos.	Anzahl	Bezeichnung
1	1	Casing
2	1	Cover Cover-B *
3	1	Drive shaft
4	1	Shaft
5	1	Drive Gear
6	1	Driven gear
10	5	Plain bearing
12	1	Intermediate flange
14	1	Magnetic coupling hub BG 71 Magnetic coupling hub BG 80
15	1	Magnetic coupling case BG 71 Magnetic coupling case BG 80
16	1	Containment can with Centering ring
18	6	Cylinder pin
19	9	Drain plug
20	4	Cylinder screw
21	6	Cylinder screw
22	8	Cylinder screw
23	4	Cylinder screw
24	4	Headless screw
25	1	Headless screw
27	1	O-ring
28	2	O-ring
29	1	Sealing ring *
30	2	Valve piston *
31	1	Adjustment screw *
32	4	Clamp screw *
33	1	Sealing ring *
34	1	Compression spring * 0-6 bar Compression spring * 5-12 bar Compression spring * 8-15 bar
35	1	Motor
36	1	Cylinder screw

* = only in 40X0-280-B, 40X0-450-B and 40X0-710-B

You will find the exploded drawing in (⇒ [chapter "Pump Body"](#)³⁶).

10 Technical Data

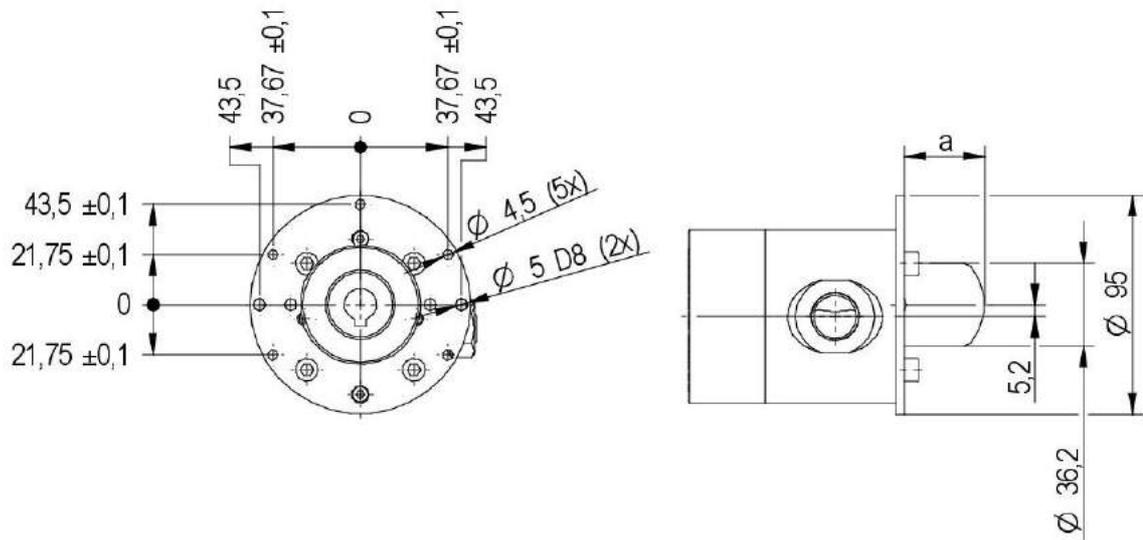
Note: Special pump designs may deviate from the following dimensions.

10.1 Connection Dimensions at Motor End

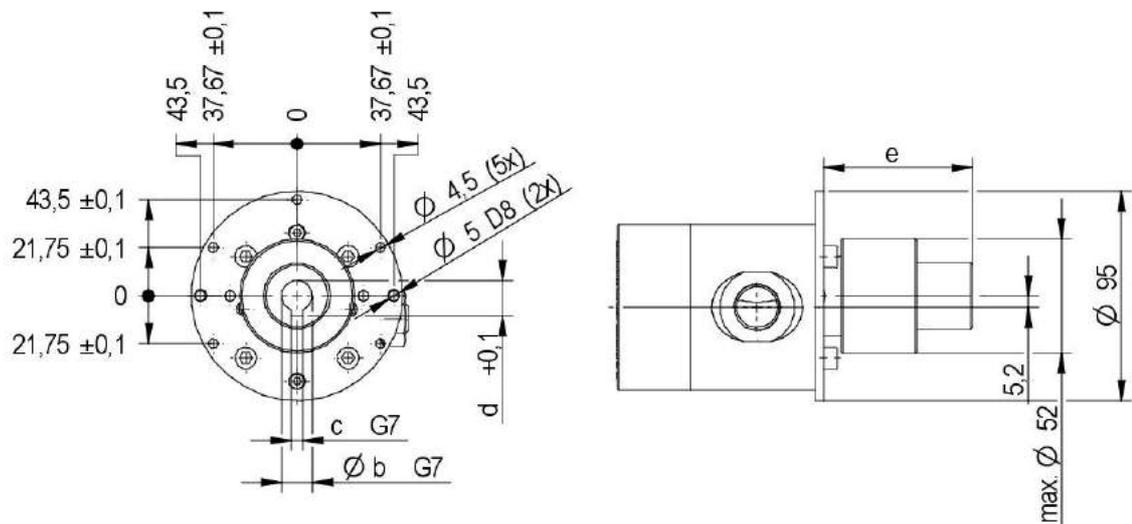
Motor size	a	b	c	d	e	f	g	h	i
71	35	14	5	16.2	67	115	67	95	140
80	51.5	19	6	21.5	93.5	130	93.5	110	160

Connection dimensions suitable for motors in accordance with IEC 60072

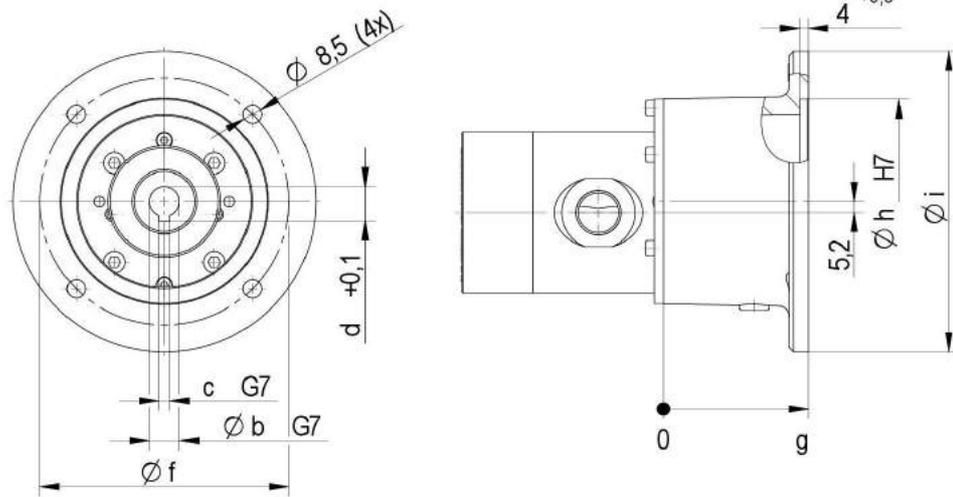
10.1.1 PK Design



10.1.2 MK Design



10.1.3 ZK Design

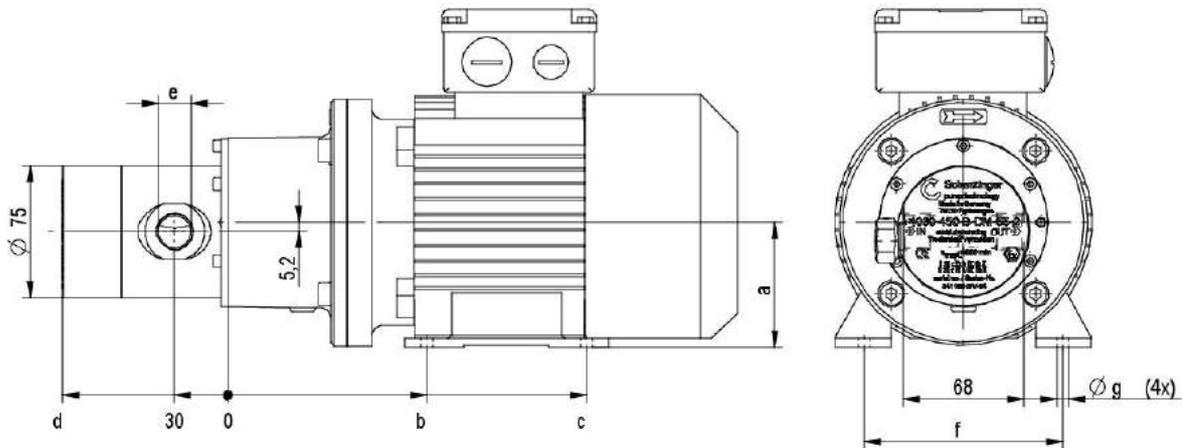


10.2 Connection Dimensions at Pump End and Motor Connection

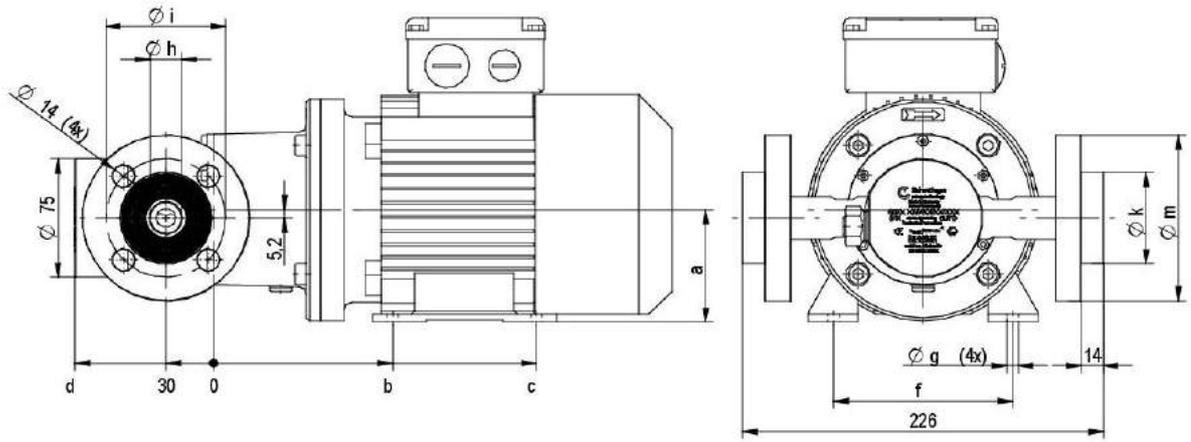
Pump design	Motor size				without Valve		with Valve							
		a	b	c	d		e		f	g	h	i	k	m
						G	NPT							
4030-280	71	112	202	84	87	1/2"	1/2"	112	7	20	75	58	105	
4030-280	80	143.5	243.5	84	87	1/2"	1/2"	125	10.5	20	75	58	105	
4030-450	71	112	202	90	93	1/2"	1/2"	112	7	20	75	58	105	
4030-450	80	143.5	243.5	90	93	1/2"	1/2"	125	10.5	20	75	58	105	
4030-710	71	112	202	99	102	3/4"	3/4"	112	7	25	85	58	105	
4030-710	80	143.5	243.5	99	102	3/4"	3/4"	125	10.5	25	85	58	105	

* Dimensions for the 4030-... pump series/design also apply to the 4040 and 4050 pump designs.

10.2.1 Motor Design with Connection in Accordance with DIN ISO 228 or ANSI B1.20.1



10.2.2 Motor Design with Flange EN 1092-1



10.3 Sound Pressure Level

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

Distance between the sensor and the pump: 1m

The sound pressure level of the pump is below 75 dB(A) for all operating points.

Information about the 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 among other things:

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

11 Disposal

The pump can be dismantled into its constituent components and recycled, according to what materials were used, after a correct decommissioning (⇒chapter "[Decommissioning](#)"⁵³) and after removal of the fluid and elimination of any residual lubricants.



CAUTION!

You have to dispose of the pump, 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 must clean them with the appropriate flushing/cleaning agents. The flushing/cleaning agent must be adapted to the fluid last transported by the pump to rule out a 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.

12 Appendix

12.1 List of Revisions

Revision no.	Description	Date	Author	Approved
4.0	Complete revision the operating instructions Adaptation to current guidelines	01.03.2021	SCA	SCZ

12.2 Signature List

Procedure/completing the signature list

- Make a copy of 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 product (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



Address:

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