



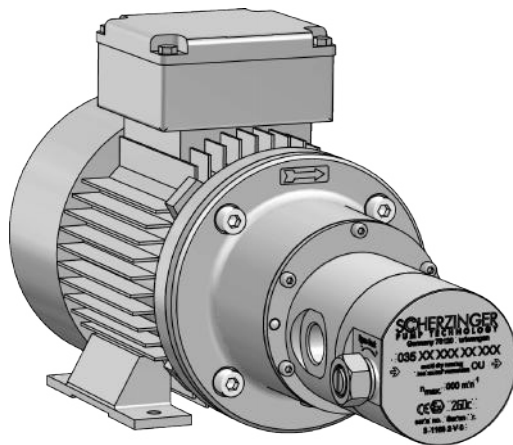
Product Manual

Pump

40X5-280-XM... 40X5-280-B-XM...

40X5-450-XM... 40X5-450-B-XM...

40X5-710-XM... 40X5-710-B-XM...



© by Scherzinger Pumpen GmbH & Co. KG

Version: 3.1 English

Date: 09/2017

Author: Schlipf C.

Release: Heizmann R.

This page was intentionally left blank

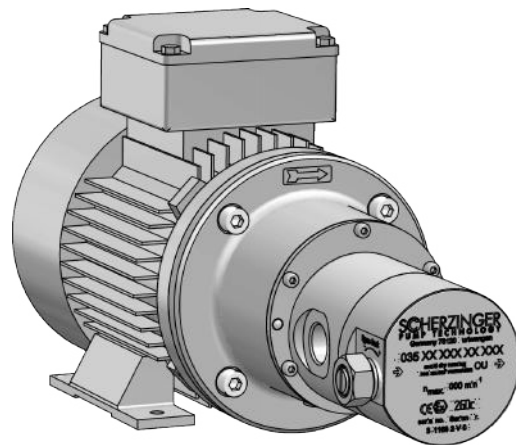


Information Manual Pump

40X5-280-XM... 40X5-280-B-XM...

40X5-450-XM... 40X5-450-B-XM...

40X5-710-XM... 40X5-710-B-XM...



© by Scherzinger Pumpen GmbH & Co. KG

Version: 3.1 English

Date: 09/2017

Author: Schlipf C.

Release: Heizmann R.



© by Scherzinger Pumpen GmbH & Co. KG

The copyright to this document shall remain with **Scherzinger Pumpen GmbH & Co. KG**, 78120 Furtwangen / Germany.

This documentation is intended exclusively for the operator.

The contents of this documentation (texts, illustrations, diagrams, graphics, plans etc.) may not, in whole or in part, be redistributed, reproduced, used for unauthorized competitive purposes or made available to third parties without our express written consent.

Scherzinger Pumpen GmbH & Co. KG

Bregstrasse 23 - 25

78120 Furtwangen / Germany

Telephone: +49 (0) 7723 6506-0

Fax: +49 (0) 7723 6506-40

Email: info@scherzinger.de

Internet: www.scherzinger.de

Manual: Information Manual

Edition: 3.1 English

Date of issue: 09/2017

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

Structure of the product manual

The entire documentation comprises:

Product Manual

Information Manual (IM)

- for the operator of the pump

Operating Instructions (OI)

- for the operator and

- for the technical consultant of the pump

Overview of the entire documentation

Overview of the information manual (for the operator)

Register	Contents
	Information Manual (IM)
	Chapter Contents
1	Introduction
2	Technical data
3	Disposal
4	Signature list
5	List of revisions

Overview of the operating instructions (for the operator and technical advisor)

Register	Contents	
I	Operating Instructions (OI)	
	Chapter	Contents
	1	Introduction
	2	Safety instructions
	3	Transport and interim storage
	4	Mode of operation/Functional description
	5	Installation/Dismantling
	6	Commissioning/Decommissioning
	7	Maintenance/Cleaning
	8	Faults, causes and rectification
	9	Components
	10	Technical data
	11	Disposal

Table of contents

1 Introduction	7
1.1 Preface	7
1.2 Product identification/Product information	7
1.3 Storage	7
1.4 Definition of terms	8
1.5 Offices abroad	8
1.6 Obligations of the operator	8
1.7 Definition of qualified/authorized personnel	10
1.8 Intended use	10
1.9 Complaints	10
1.10 Warranty and liability	11
1.11 Declaration of conformity	12
1.11.1 Declaration of conformity as per Directive 2014/34/EU	12
1.11.2 Declaration of conformity as per Directive 2006/42/EC (Machinery Directive)	13
1.11.3 Information on CE conformity	14
2 Technical Data	15
2.1 Pump dimensions	15
2.1.1 Pump variant with standard thread	15
2.2 Type plate based on the example of the pump type 4035-450-B-N6-DM-55-2	16
2.3 Pump data	16
2.4 Sound pressure level	19
2.5 Non-ionizing radiation	20
3 Disposal	21
3.1 Disposal of the fluid	21
4 Signature list	23
5 List of revisions	25

This page was intentionally left blank

1 Introduction

1.1 Preface

Dear Operator,

With the acquisition of a **pump** from **Scherzinger Pumpen GmbH & Co. KG** you now possess a state-of-the-art product. The pump is setting new standards of performance, quality and applications in the proven Scherzinger tradition.

In order to safeguard the complex technical possibilities of the system on a sustained basis, you will need to instruct operating and maintenance personnel in its installation, commissioning, decommissioning and maintenance, etc.

Instruction is provided through this product manual.

In order to avoid breakdowns and damage to the product as much as possible, please allow the relevant staff the opportunity to acquaint themselves with the functionality of the product by means of these operating instructions.

Your

Scherzinger Pumpen GmbH & Co. KG

1.2 Product identification/Product information

Validity

The descriptions in this product manual refer exclusively to the pump as described in the technical data (⇒ **Chapter 2 page 15**) and developed and built by the manufacturer.

Product information

The pump from **Scherzinger Pumpen GmbH & Co. KG** is suitable for transporting fluids which do not have a corrosive or aggressive effect on the materials (⇒ **Chapter 2.3 page 17**) used.

Other valid documents

Other valid documents are documents that are not included in the operating instructions but 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 near the machine.

1.3 Storage

This **information manual** is part of the pump product manual, it is written for the operator and explains his responsibilities to him.

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

- 4035-...
- 4045-...
- 4055-...

and will hereinafter only be called 40X5. All motor variants will hereinafter only be called 40X5-...-XM.

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.

These offices are in most instances 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 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 (⇒ **OI, Chapter 7 Maintenance/Cleaning!**)
- 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 in-

structured 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.

(⇒ **OI, Chapter 2 Safety instructions**)

1.7 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.

1.8 Intended use

The sole use of the pump defined in the technical data is for the transportation of fluids that do not have a corrosive or aggressive effect on the materials fed into the pump.

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.

1.9 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 the case of returns (due to transport damages/repairs), please immediately make a damage protocol and send the parts back to the manufacturer's factory, in the original packaging when 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 2.2 page 16**),

- Description of the fault
- For transport damages: name of the delivery company and, if possible, the exact delivery date, name of the driver and registration number of the delivery vehicle.
- Certificate of non-objection

1.10 Warranty and liability

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

Divergent 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 bid.

Warranty and liability claims in respect 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 acts of God.

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

1.11 Declaration of conformity

1.11.1 Declaration of conformity as per Directive 2014/34/EU

Declaration of Conformity as per Directive 2014/34/EU (ATEX)

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

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

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

Pump Type

40X5-280-XM... 40X5-280-B-XM...

40X5-450-XM... 40X5-450-B-XM...

40X5-710-XM... 40X5-710-B-XM...

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 deposited at a body notified by the European Commission.

Responsible person for documentation: Matthias Derse

Furtwangen, September 22, 2017



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

1.11.2 Declaration of conformity as per Directive 2006/42/EC (Machinery Directive)**Declaration of Conformity
as per Directive 2006/42/EC**

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

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

declares that the product:

Pump

40X5-280-XM... 40X5-280-B-XM...
40X5-450-XM... 40X5-450-B-XM...
40X5-710-XM... 40X5-710-B-XM...

is supplied with an electric drive unit and therefore complies with the provisions of
Directive 2006/42/EC, Appendix 1, 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:

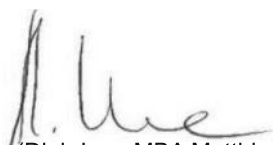
2006/42/EC Machine directive
2014/30/EU Electromagnetic compatibility (EMC Directive)
2014/34/EU Explosion-protection directive (ATEX)

Applied national technical standards and specifications:

Accident prevention regulations

Responsible person for documentation: Matthias Derse

Furtwangen, September 22, 2017



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

1.11.3 Information on CE conformity

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
- Pump must not be painted

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 22, 2017



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

2 Technical Data

2.1 Pump dimensions

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

2.1.1 Pump variant with standard thread

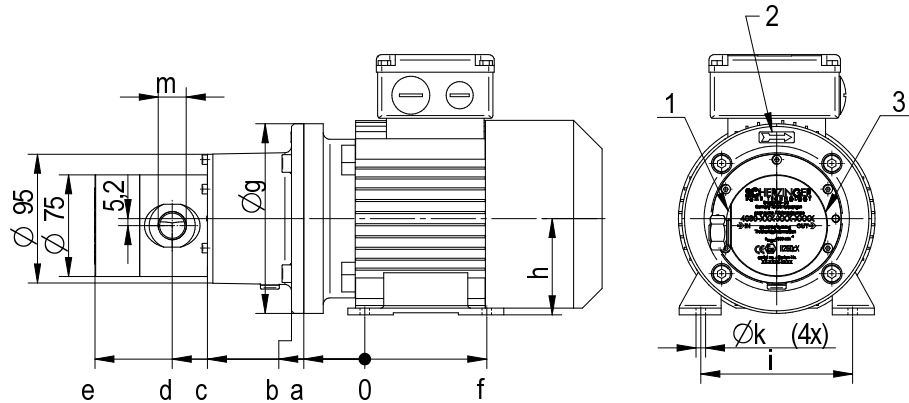
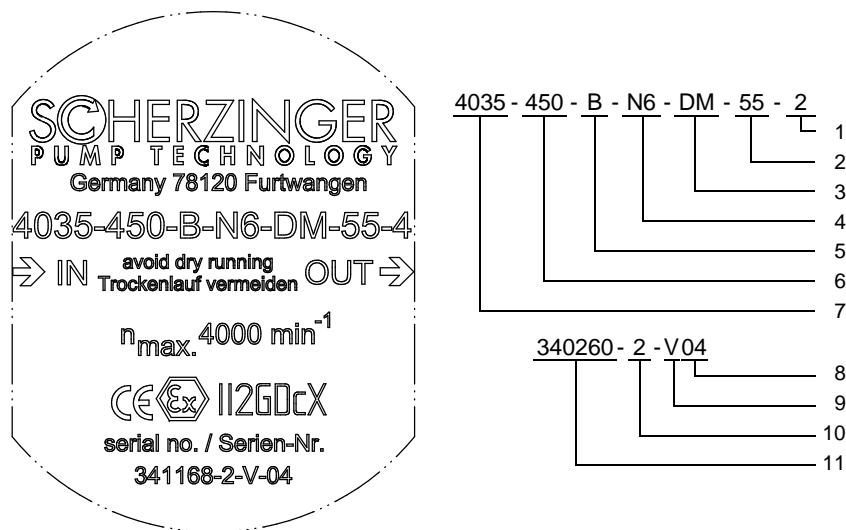


Figure 2.1-1: Pump variant with standard thread (1: suction connection, 2: rotation direction, 3: pressure connection)

Pump type	Dimensions [mm]										
	a	b	c	d	e	f	g	h	i	k	m
40X5-280- XM-55-2 XM-35-2/4 XM-25-4/6 XM-12-8	45,0	54,0	116,0	142,0	196,0	90,0	140,0	71,0	112,0	7,0	G1/2"
40X5-450- XM-55-2 XM-35-2/4 XM-25-4/6 XM-12-8	45,0	54,0	116,0	142,0	202,0	90,0	140,0	71,0	112,0	7,0	G1/2"
40X5-710- XM-110-2 XM-75-2/4 XM-55-4/6 XM-25-8	50,0	62,0	147,5	173,5	242,5	100,0	160,0	80,0	125,0	9,0	G3/4"
40X5-280-B- XM-55-2 XM-35-2/4 XM-25-4/6 XM-12-8	45,0	54,0	116,0	142,0	199,0	90,0	140,0	71,0	112,0	7,0	G1/2"
40X5-450-B- XM-55-2 XM-35-2/4 XM-25-4/6 XM-12-8	45,0	54,0	116,0	142,0	205,0	90,0	140,0	71,0	112,0	7,0	G1/2"
40X5-710- XM-110-2 XM-75-2/4 XM-55-4/6 XM-25-8	50,0	62,0	147,5	173,5	245,5	100,0	160,0	80,0	125,0	9,0	G3/4"

2.2 Type plate based on the example of the pump type 4035-450-B-N6-DM-55-2



- 1 Drive speed
- 2 Drive performance
- 3 Drive variant
- 4 Gear material
- 5 Basic variant
- 6 Performance variables
- 7 Basic type
- 8 Month
- 9 Year
- 10 Quantity
- 11 Customer order number

Figure 2.2-1: Type plate for pump with motor

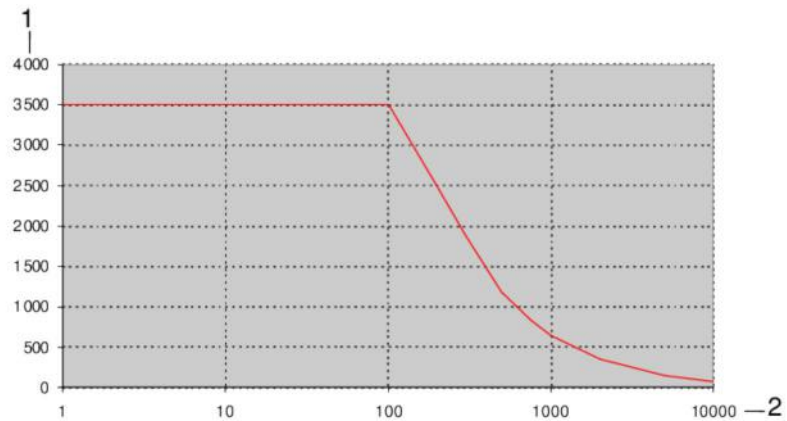
2.3 Pump data

Description	Value
Max. differential pressure rise	max. 12 bar (Depending on combination of materials and fluid))
Max. system pressure (pressure side)	100 bar
Max. suction vacuum	0.9 bar (filled with fluid)
Operating temperature	-20 to 120°C
Viscosity range	0.5 to 10,000mm ² /s
Speed range	0 to 4,000 rpm (Dependent on the gear material)
Sound pressure level	< 75 dB(A) determined at: Speed: 2,000 rpm Operating pressure: 10 bar Operating temperature: 20 °C Fluid: 1mm ² /s, non-lubricating ⇒ Chapter 2.4 page 19
Dimensions	Observe the respective data sheets ⇒ Chapter 2.1 page 15 et seq.

Wetted parts:

Casing [1], [2], [16]:	1.4404 / 2.4610 / 3.7235
Shafts [3], [4]	1.4571 / 2.4610 / 3.7235 Cr ₂ O ₃ coated / Al ₂ O ₃ coated
Gears [5]	Nitronic 60 (N6), Waukesha 88 (W8), 1.4528 hardened (SS)
Bearing [6]	SSiC, Al ₂ O ₃
Magnetic coupling hub [15]	1.4404 / 2.4610 / 3.7235
Clamp screw [32]	1.4571 / 2.4610 / 3.7235
Valve piston [30]	1.4571 / 2.4610 / 3.7235
Adjustment screw [31]	1.4404 / 2.4610 / 3.7235
Seals [27], [28]	PTFE / FKM / FFKM / EDPM / NBR
Compression spring [34]	1.4310 / 2.4610 / 3.7235
Fluid	Note the resistance of the materials mentioned above

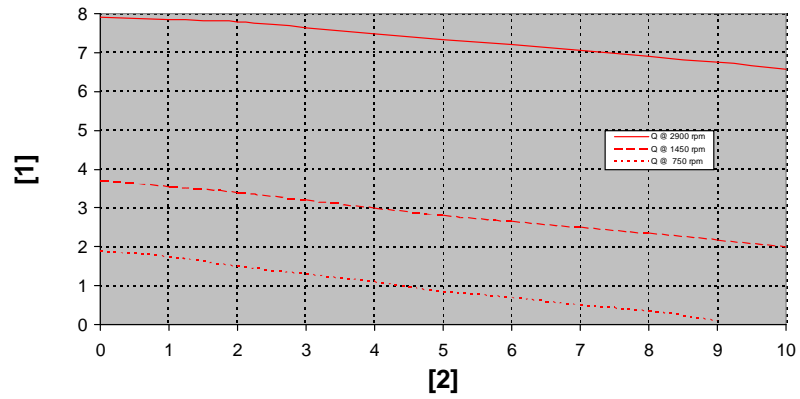
Max. possible speed dependent on the fluid viscosity:



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

Figure 2.3-1: Viscosity range

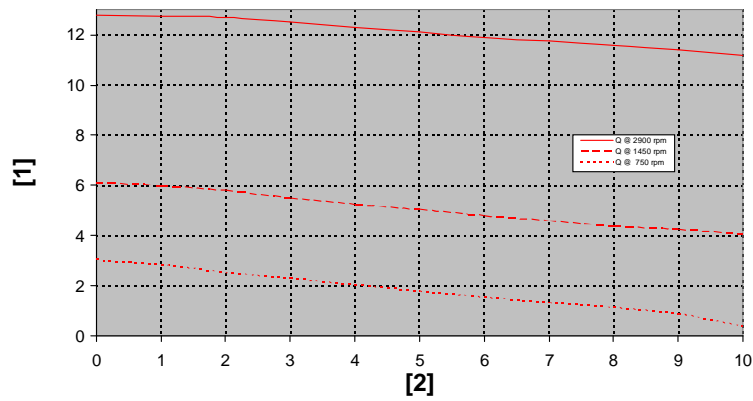
Output volume depends on differential pressure for the 40X5-280-... and 40X5-280-B-... pumps, viscosity 1mm²/s:



- 1 Output volume (l/min)
- 2 Differential pressure (bar)

Figure 2.3-2: Differential pressure range for 40X5-280-... and 40X5-280-B-... pumps

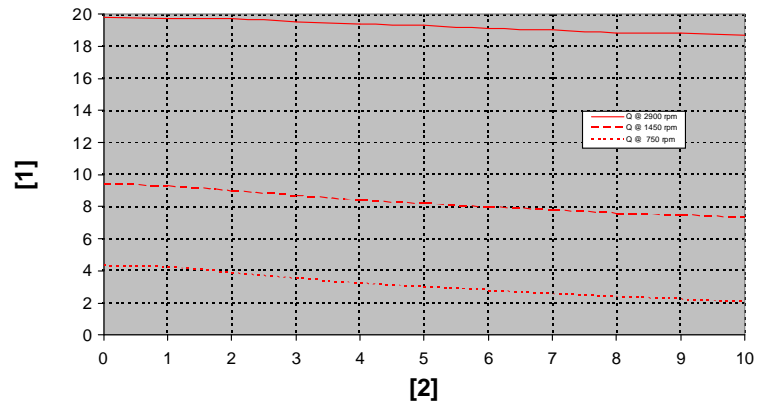
Output volume depends on differential pressure for 40X5-450-... and 40X5-450-B-... pumps, viscosity 1mm²/s:



- 1 Output volume (l/min)
- 2 Differential pressure (bar)

Figure 2.3-3: Differential pressure range for 40X5-450-... and 40X5-450-B-... pumps

Output volume depends on differential pressure for 40X5-710-... and 40X5-710-B-... pumps, viscosity 1mm²/s:



- 1 Output volume (l/min)
- 2 Differential pressure (bar)

Figure 2.3-4: Differential pressure for 40X5-710-... and 40X5-710-B-... pumps



DANGER!

If one or more limit values described in this section are exceeded, you have to ask in 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.

2.4 Sound pressure level

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

Distance from the sensor to the pump: 1m.

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

Note to the sound pressure level:

- The measurement of the pump takes place with a decoupled structure, on rubber feet and with tubing elements for damping the suction and pressure pipe.
- If there is cavitation in the pump (e.g suction pipe is too small) and / or solid-borne sound caused by vibrations of the entire system (pump / system) the above mentioned value could be exceeded up to 10 dB(A).

2.5 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, electronical and fine mechanical devices (e.g. hard drives).

Please observe the safety instructions within the operating instructions:

(⇒ OI, chapter 2 Safety instructions)

3 Disposal

The pump can be dismantled into its constituent components and recycled according to what materials were used after a correct decommissioning (⇒ **OI, chapter 6.5 Decommissioning**) 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 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.

3.1 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.

This page was intentionally left blank

4 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

5 List of revisions

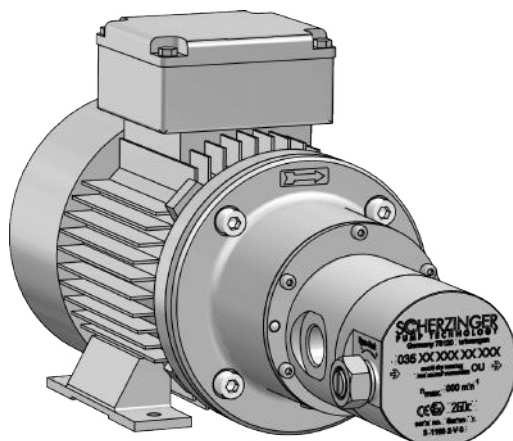
Revision No.	Description	Date	Author	Approved
2.0	Adaptation to current guidelines	20-04-2016	SCA	DMI
2.1	Adaptation to current guidelines	15-02-2017	SCA	DMI
3.0	Revised in: OI, Chapter 2.1.9, OI, Chapter 5.3, Adaptation to current guidelines	02-05-2017	DMI	DM
3.1	Abb.2.1-1 adapted	01.09.2017	SCA	DMI

This page was intentionally left blank



Operating Instructions Pump

40X5-280-XM... 40X5-280-B-XM...
40X5-450-XM... 40X5-450-B-XM...
40X5-710-XM... 40X5-710-B-XM...



© by Scherzinger Pumpen GmbH & Co. KG

Version: 3.1 English

Date: 09/2017

Author: Schlipf C.

Release: Heizmann R.



© by Scherzinger Pumpen GmbH & Co. KG

The copyright to this document shall remain with **Scherzinger Pumpen GmbH & Co. KG**, 78120 Furtwangen / Germany.

This documentation is intended exclusively for the operator.

The contents of this documentation (texts, illustrations, diagrams, graphics, plans etc.) may not, in whole or in part, be redistributed, reproduced, used for unauthorized competitive purposes or made available to third parties without our express written consent.

Scherzinger Pumpen GmbH & Co. KG

Bregstrasse 23 - 25

78120 Furtwangen / Germany

Telephone: +49 (0) 7723 6506-0

Fax: +49 (0) 7723 6506-40

Email: info@scherzinger.de

Internet: www.scherzinger.de

Manual: Operating Instructions

Edition: 3.1 English

Date of issue: 09/2017

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

Structure of the product manual

The entire documentation comprises:

Product Manual

Information Manual (IM)

- for the operator of the pump

Operating Instructions (OI)

- for the operator and

- for the technical consultant of the pump

Overview of the entire documentation

Overview of the information manual (for the operator)

Register	Contents
	Information Manual (IM)
	Chapter Contents
1	Introduction
2	Technical data
3	Disposal
4	Signature list
5	List of revisions

Overview of the operating instructions (for the operator and technical advisor)

Register	Contents	
I	Operating Instructions (OI)	
	Chapter	Contents
	1	Introduction
	2	Safety instructions
	3	Transport and interim storage
	4	Mode of operation/Functional description
	5	Installation/Dismantling
	6	Commissioning/Decommissioning
	7	Maintenance/Cleaning
	8	Faults, causes and rectification
	9	Components
	10	Technical data
	11	Disposal

Table of contents

1	Introduction	7
1.1	Preface	7
1.2	Product identification/Product information	7
1.3	Storage	7
1.4	Definition of terms	8
1.5	Offices abroad	8
1.6	Symbols used in this manual	9
1.6.1	Dangers - warning levels	9
1.6.2	Danger symbols	10
1.6.3	Command symbols	11
1.6.4	General symbols	12
1.7	Personal protective equipment	12
1.8	Definition of qualified/authorized personnel	12
1.9	Staff obligations	13
1.10	Intended use	14
1.11	Complaints	14
1.12	Warranty and liability	15
1.13	Declaration of conformity	16
1.13.1	Declaration of conformity as per Directive 2014/34/EU	16
1.13.2	Declaration of conformity as per Directive 2006/42/EC (Machinery Directive)	17
1.13.3	Information on CE conformity	18
1.14	Certificate of non-objection	19
2	Safety instructions	21
2.1	Safety instructions for specific types of danger	21
2.1.1	Danger from moving machine parts	21
2.1.2	Danger from insufficient securing of the workplace	22
2.1.3	Danger from insufficient lighting	22
2.1.4	Danger from operators with limited sensory perception	22
2.1.5	Danger from hot parts	22
2.1.6	Danger from dust	23
2.1.7	Danger from dry running of the pump	23
2.1.8	Danger from electric shocks	24
2.1.9	Danger from magnetic fields	25
2.1.10	Danger from incorrect direction of rotation	25
2.1.11	Danger from operation with too high of a speed	26
2.1.12	Danger from potential difference	26
2.2	Danger from fluids	27
3	Transport und interim storage	29
3.1	Shipping of the pump and protective measures	29
3.2	Interim storage	29
3.3	Conserving the machine for storage after operating/flushing the pump.	30
3.4	Return to the factory	30
4	Mode of operation / Functional description	31
4.1	Pump function	31
4.2	Constructive design of the pump	32
4.2.1	Pump body	32
4.2.2	Pressure relief valve (only for 40X5-...-B-...)	33
4.2.3	Magnetic coupling	33
4.2.4	Intended use of the pump	34
5	Installation / Dismantling	35
5.1	Information about the installation location	35
5.2	Installation position	35

5.3	Installation of the magnetic coupling	36
5.4	Electrical drive	37
5.5	First installation	38
5.6	Connection pipes	39
6	Commissioning/Decommissioning	41
6.1	Requirement for commissioning	41
6.2	Commissioning	41
6.3	Adjusting the pressure relief valve (only with 40X5-...-B-...)	42
6.4	Monitoring	43
6.4.1	Identification	43
6.4.2	General information	43
6.4.3	Normal operation	44
6.4.4	Faults	44
6.4.5	Temperature classes and approved temperatures	45
6.4.6	Overview of monitoring measures	46
6.4.7	Assignment of the monitoring measures concerning the expected operating conditions	47
6.4.8	Primary explosion protection	47
6.4.9	Secondary explosion protection	47
6.4.10	Tertiary explosion protection	48
6.5	Decommissioning	52
6.6	Removal from the system	52
6.7	Pump head disassembly	53
7	Maintenance / cleaning	55
7.1	General information	55
7.2	Safety instructions for maintenance, inspection and installation work	55
7.3	Maintenance cycle	55
7.4	Dismantling and re-installation	56
7.4.1	Assembly tools	56
7.4.2	Pump body	57
7.4.3	Pressure relief valve (only for 40X5-...-B)	59
7.4.4	Bearing bushes	60
7.5	External cleaning of the pump	61
7.6	Cleaning of the pump for use in special areas	61
8	Faults, causes and rectification	63
9	Components	67
9.1	Spare parts list	67
9.2	Explosion drawing	68
10	Technical Data	69
10.1	Pump dimensions	69
10.1.1	Pump variant with standard thread	69
10.2	Type plate based on the example of the pump type 4035-450-B-N6-DM-55-2	70
10.3	Pump data	70
10.4	Sound pressure level	73
10.5	Non-ionizing radiation	74
11	Disposal	75
11.1	Disposal of the fluid	75

1 Introduction

1.1 Preface

Dear operator,

You now have the task of operating and maintaining a pump from the **company Scherzinger Pumpen GmbH & Co. KG** .

These operating instructions are intended to help you perform your duties responsibly.

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 applications or in case of any other questions, our employees are always available and will assist you personally.

Your

Scherzinger Pumpen GmbH & Co. KG

1.2 Product identification/Product information

Validity

The descriptions in this product manual refer exclusively to the pump as described in the technical data (⇒ **Chapter 10 page 69**) and developed and built by the manufacturer.

Product information

The pump from **Scherzinger Pumpen GmbH & Co. KG** is suitable for transporting fluids which do not have a corrosive or aggressive effect on the materials (⇒ **Chapter 10.3 page 71**) used.

Other valid documents

Other valid documents are documents that are not included in the operating instructions but 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 near the machine.

1.3 Storage

These **operating instructions** are part of the product manual of the pump and 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

- 4035-...
- 4045-...
- 4055-...

and will hereinafter only be called 40X5. All motor variants will hereinafter only be called 40X5-...-XM.

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**.

These offices are in most instances 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 Dangers - 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 off (release)!



Use ear protection!



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 relates to a page, diagram or item number, this information is attached at the end of the cross reference. If the cross-reference refers to a particular 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 this 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 aligned 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 Staff obligations

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!
- Observe the fire alarm and fire-fighting possibilities and familiarize yourself with the location and use of fire extinguishers!
- 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 area 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!



1.10 Intended use

The sole use of the pump defined in the technical data is for the transportation of fluids that do not have a corrosive or aggressive effect on the materials fed into the pump.

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.

1.11 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 the case of returns (due to transport damages/repairs), please immediately make a damage protocol and send the parts back to the manufacturer's factory, in the original packaging when 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 10.2 page 70**),
 - Description of the fault
 - For transport damages: name of the delivery company and, if possible, the exact delivery date, name of the driver and registration number of the delivery vehicle.
 - Certificate of non-objection

1.12 Warranty and liability

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

Divergent 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 bid.

Warranty and liability claims in respect 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 acts of God.

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

1.13 Declaration of conformity

1.13.1 Declaration of conformity as per Directive 2014/34/EU

Declaration of Conformity as per Directive 2014/34/EU (ATEX)

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

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

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

Pump Type

40X5-280-XM... 40X5-280-B-XM...

40X5-450-XM... 40X5-450-B-XM...

40X5-710-XM... 40X5-710-B-XM...

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 deposited at a body notified by the European Commission.

Responsible person for documentation: Matthias Derse

Furtwangen, September 22, 2017



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

1.13.2 Declaration of conformity as per Directive 2006/42/EC (Machinery Directive)**Declaration of Conformity
as per Directive 2006/42/EC**

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

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

declares that the product:

Pump

40X5-280-XM... 40X5-280-B-XM...
40X5-450-XM... 40X5-450-B-XM...
40X5-710-XM... 40X5-710-B-XM...

is supplied with an electric drive unit and therefore complies with the provisions of
Directive 2006/42/EC, Appendix 1, 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 Machine directive
2014/30/EU Electromagnetic compatibility (EMC Directive)
2014/34/EU Explosion-protection directive (ATEX)

Applied national technical standards and specifications:

Accident prevention regulations

Responsible person for documentation: Matthias Derse

Furtwangen, September 22, 2017



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

1.13.3 Information on CE conformity

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
- Pump must not be painted

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 22, 2017



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

1.14 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.

This page was intentionally left blank

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,

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

residual risks exist.

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 Safety instructions for specific types of danger

2.1.1 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!

2.1.2 Danger from insufficient securing of the workplace

ATTENTION!

Securing the workplace and the working environment is solely the operator's responsibility!

2.1.3 Danger from insufficient lighting



DANGER!

In the case of insufficient lighting, the danger of personal injury or damage to the property arises when operating the pump.

The operator must make sure that a minimum level of illumination of 200 Lux is present in the working area.

2.1.4 Danger from operators with limited sensory perception



DANGER!

When working on the pump with limited sensory perception, risks for the operator, third persons and the environment can arise.

Working on the pump with limited sensory perception is strictly prohibited.

2.1.5 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 an automatic monitoring.
- If danger from hot parts arises, you have to protect these parts from being touched by means of a protective construction.

2.1.6 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.
- Clean the pump as described in chapter ⇒ Chapter 7.5 page 61. Observe the manufacturer's specifications!

2.1.7 Danger from dry running of the pump



DANGER!

Without fluid, the pump runs dry. When starting up with steel gears, always ensure that the pump is filled with fluid first. Operating without a filled pump may result in impermissible operations and operation in accordance with the explosion protection guideline is no longer permitted as the sliding surfaces are not lubricated. The gears and bearing bushes therefore 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 10.3 page 70).

2.1.8 Danger from electric shocks

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 an 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

2.1.9 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, active or passive implants must not enter the magnetic field. A safety distance of 2 m should be observed from unfitted individual clutch parts. A minimum safety distance of 1 m 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 150mm.

2.1.10 Danger from incorrect direction of rotation



DANGER!

Operating the pump in the opposite rotation direction 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 2.1.7 page 23).

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.

2.1.11 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!

2.1.12 Danger from potential difference



DANGER!

The non-earthed pump can present an ignition source. 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 16mm²!

2.2 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
-

This page was intentionally left blank

3 Transport und 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 a 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 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 eventual 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 page 69).
- 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 1.14 page 19) 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.

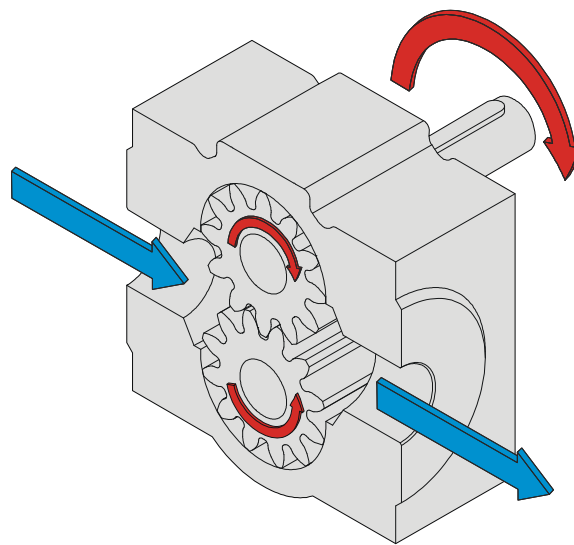


Figure 4.1-1: Functional principle of the gear pump

4.2 Constructive design of the pump

4.2.1 Pump body

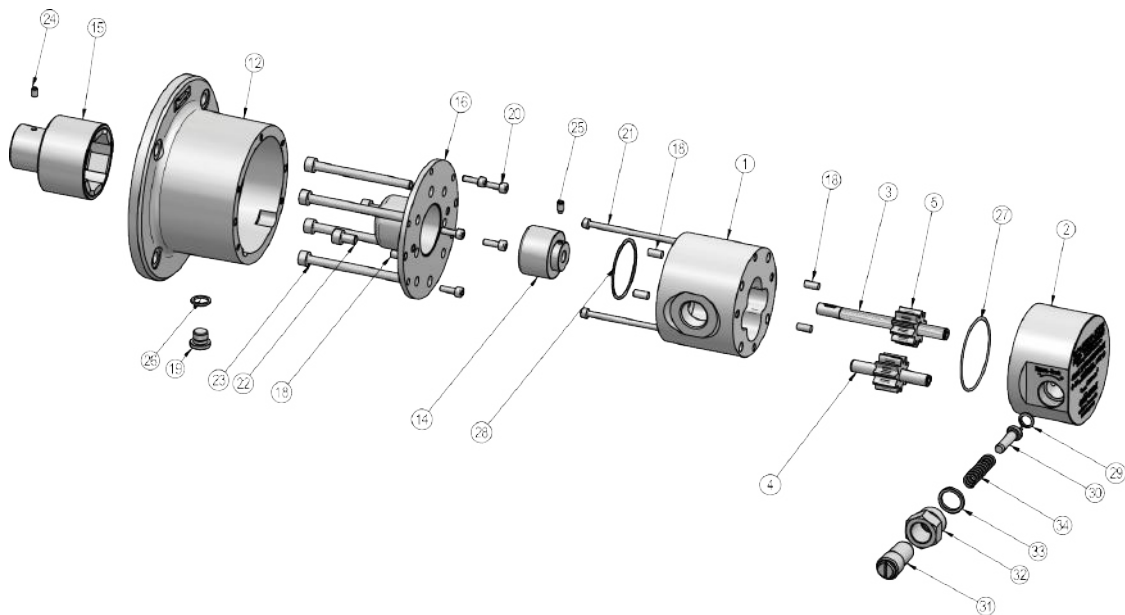


Figure 4.2-1: Pump body

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 cylinder pins (18).

A sealing ring (27) is mounted between the casing and the cover.

The gears (5) 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 bearing (6). (⇒ **Chapter 7.4.4 page 60**)

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

Scherzinger stainless steel pump heads of the 40X5 series are available in three different sizes (size- 280 to size- 710).

The theoretical transport data are:

Pump head	$V_{g_{th}}$ Displacement	Q_{th} at 1400 1/min	Q_{th} at 2800 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	6.30 l/min	12.60 l/min
-710 and -710-B	7.1 cm ³ /U	9.94 l/min	19.88 l/min

4.2.2 Pressure relief valve (only for 40X5-...-B-...)

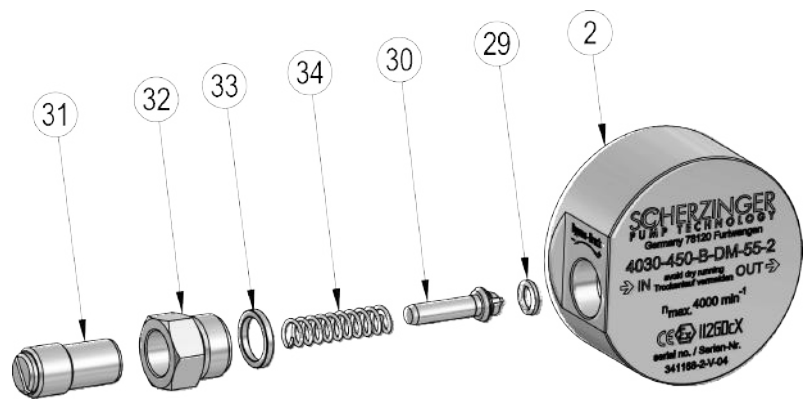


Figure 4.2-2: Pressure relief valve

The pressure relief valve (bypass valve) serves as an overpressure limit. The adjustment range lies between 0.5 and 6.0 bar as well as 5.0 and 12.0 bar, depending on the pressure spring used.

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.

How to correctly adjust the valve, see in (⇒ **Chapter 6.3 page 42**).

4.2.3 Magnetic coupling

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 (27, 28).

The torque is transferred to the magnetic coupling hub (14) via alternately magnetic magnets on the inside of the magnetic coupling bell (15) and through a partition wall (can (16)). 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 almost resistance-free; 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.

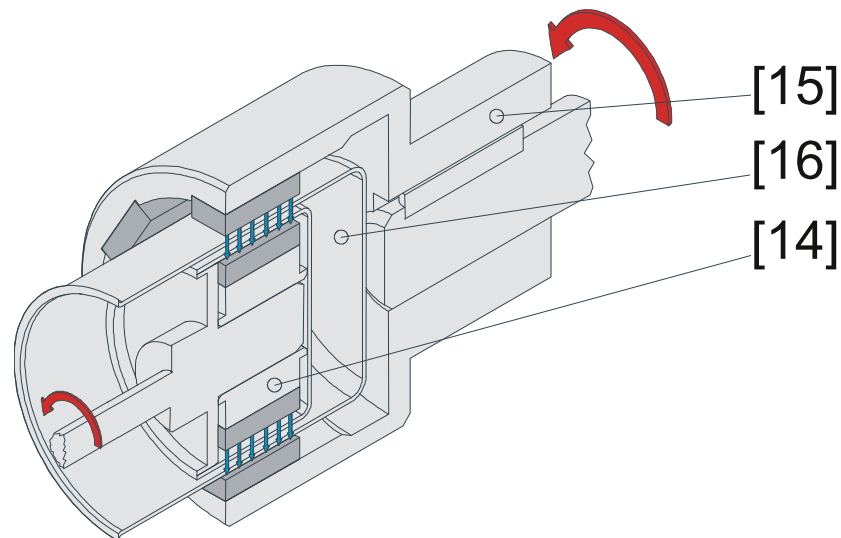


Figure 4.2-3: Magnetic coupling

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

4.2.4 Intended use of the pump

The pump is preferably used for low to middle viscous particle-free fluids that have degreasing to well lubricating characteristics. They are suitable for the transport of alkaline as well as acid fluids. Inlet pressures of 20 mbar to 100 bar overpressure are representable. The torques vary between 0 to 4,000 min^{-1} depending on the series.

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

The resistance of the materials stated in \Rightarrow **Chapter 10.3 page 71** should be noted!
The pump distinguishes itself by a solid construction with magnetic coupling.

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.

The pump must not be installed in a corrosive atmosphere.

5.2 Installation position



ATTENTION!

Please note that the pump is designed only for horizontal installation. In exceptional cases, the pump 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.

5.3 Installation of the magnetic coupling

ATTENTION!

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

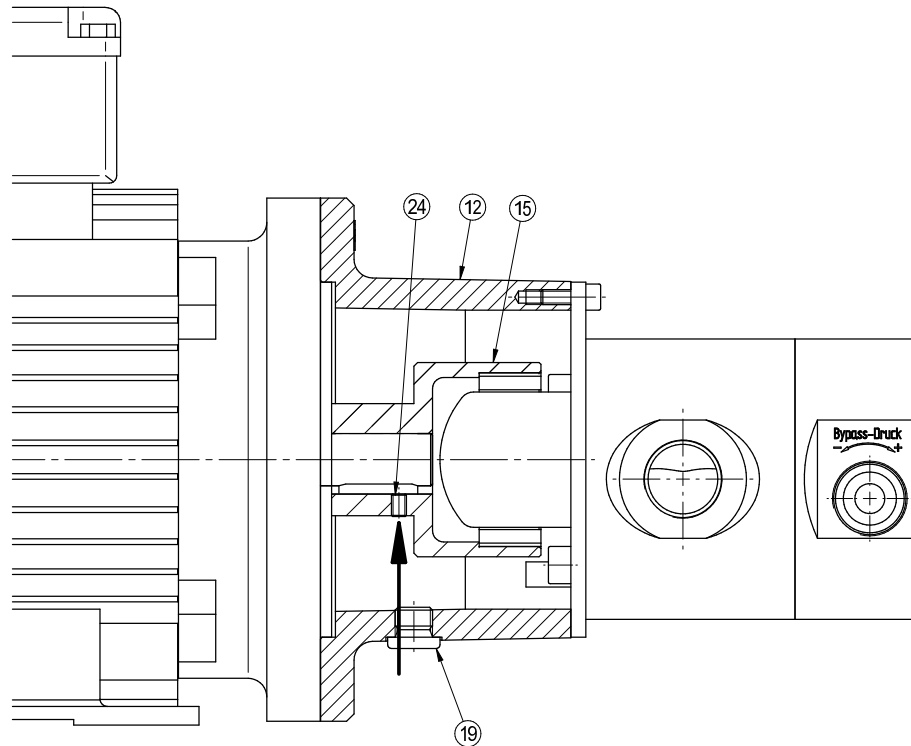


Figure 5.3-1: Installation of the magnetic coupling

Slide magnetic clutch case (15) all the way onto motor shaft. Fix magnetic clutch case (15) with threaded pin (24). Remove drain plug (19) from intermediate flange (12). Now align threaded pin (24) of magnetic clutch 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 clutch case (15) can move freely and without resistance on shaft in an axial direction! Magnetic clutch case (15) and inner magnet (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 clutch case (15) in an axial direction when tightening threaded pin (24)!

5.4 Electrical drive

ATTENTION!

First fix the magnetic coupling bell (15) and the motor flange (12) as described in ⇒ Chapter 5.3 page 36. Note the installation dimensions of the magnetic coupling. The pump head is fastened to the motor flange using five retaining bolts (20). Hold the pump head against the suction/pressure connections and guide these into the motor flange straight. **Caution: Risk of injury through trapping of body parts.** If the customer has mounted a motor/drive on the pump, also ensure that the CE/machinery guidelines are observed. This involves the fitted motor/drive satisfying 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

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.

5.5 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 1.11 page 14**).
- Using the following points, check if this is an appropriate pump type:
 - Corrosion behavior of the fluid
 - Fluid viscosity
 - Fluid to be transported
 - Pump performance (transport performance)
 - Model type and design
 - Rotation direction and suction/pressure side position
 - Temperature range

ATTENTION!

If you detect differences between the pump design required by you 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 page 63**).

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 40X5-280-B-..., 40X5-450-B-... and 40X5-710-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 2.1.12 page 26**).

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 200mPas	up to 600mPas	up to 2,000 mPas
Suction pipe	1.5m/s	0.5m/s	0.2 m/s
Pressure pipe	3.0m/s	1.0m/s	0.5m/s

ATTENTION!

- **Position a suction filter with at least a 50 μ m 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.**

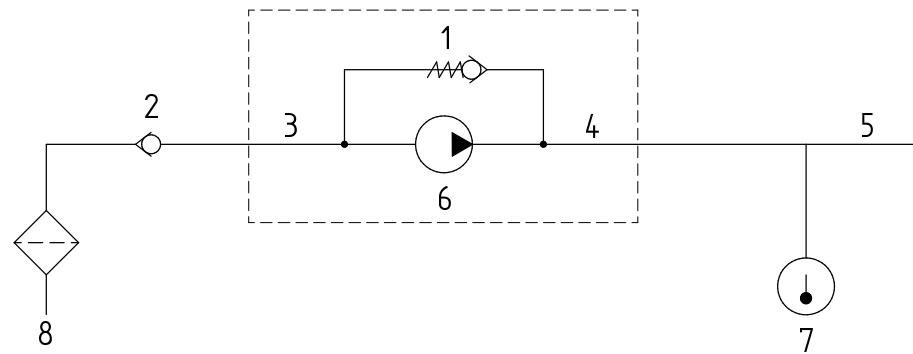


Note that all pipes, fittings and screw connections must be perfectly dense, otherwise gas can enter into the pipe on the suction side. The pump does not suck in any more. Fluid can escape on the pressure side.

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 10.3 page 70) for this purpose.

Recommended installation in explosive areas



- 1 Internal pressure relief valve (only for 40X5-...-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.

6 Commissioning/Decommissioning

6.1 Requirement for commissioning

- After the complete installation of the pump and the periphery, 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 of 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 a not recognized or unforeseeable malfunction that may arise during the first powering of the machine?
 - Is the pump fully filled with fluid?
 - 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.
- Ensure that the pump doesn't run dry. Operating without fluid is not permitted in accordance with the explosion protection guideline and may destroy 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 Adjusting the pressure relief valve (only with 40X5-...-B-...)

The pressure relief valve is a safety valve for the protection of the pump and the system. 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, tab 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

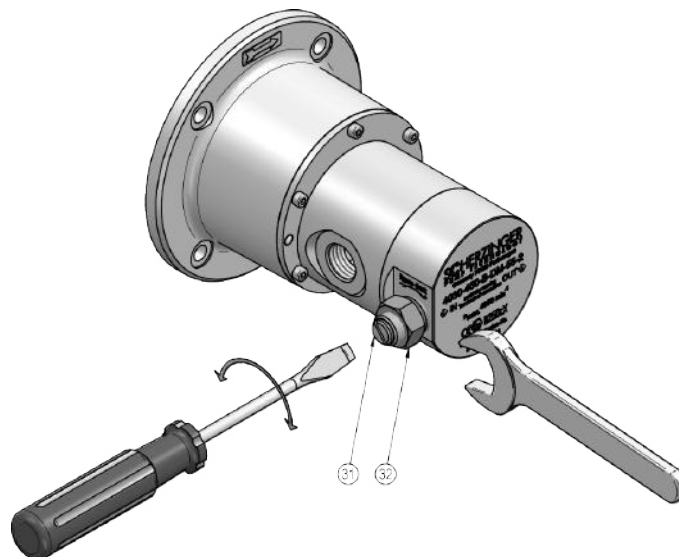


Figure 6.3-1: Adjustment of the pressure relief valve

Proceed as follows for adjusting the pressure relief valve:

- Loosen the clamp screw (32) by a quarter turn (anti-clockwise).
- Adjust the valve by turning the overpressure valve screw (31).
 - to the left (anti-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 9 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.

6.4 Monitoring

The implementation of monitoring measures is the responsibility of the operator only.

6.4.1 Identification

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 13463-1). This means that the temperature of pump surfaces is determined by the fluid in the case of normal operation.

6.4.2 General information

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.

6.4.3 Normal operation

The following operating conditions are defined as normal operation. Also see ⇒ **Chapter 10.3 page 70**.

Description	Value
Max. differential pressure rise	max. 12 bar (Depending on combination of materials and fluid))
Max. system pressure (pressure side)	100 bar
Max. suction vacuum	0.9 bar (filled with fluid)
Operating temperature	-20 to 120°C
Viscosity range	0.5 to 10,000mm ² /s
Speed range	0 to 4,000 rpm (Dependent on the gear material)

Due to the versatile combination possibilities in terms of the different sizes, gears and motor speeds, 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 data sheets.

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

6.4.4 Faults

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 liquid (>50µm) (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”.

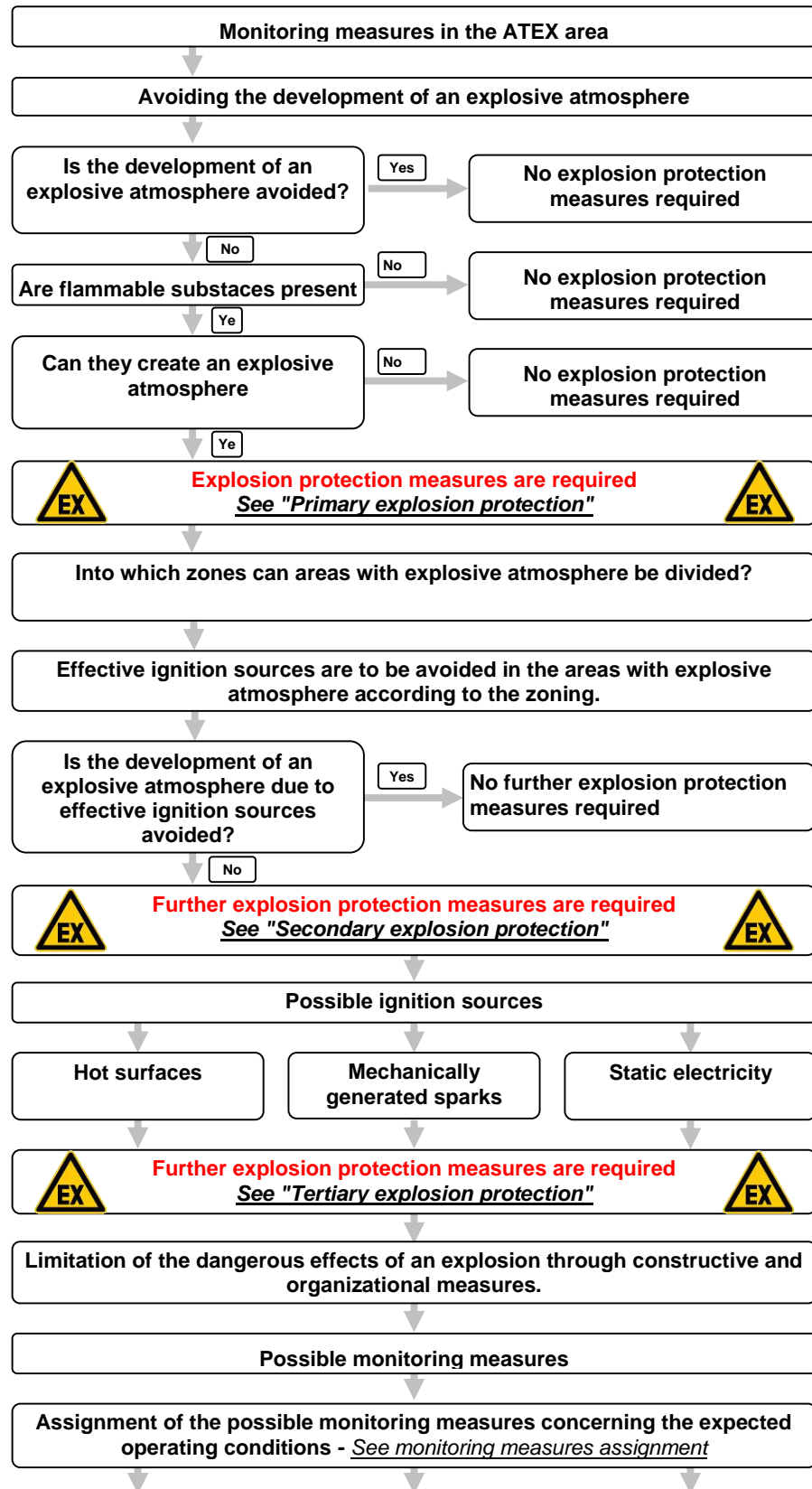
6.4.5 Temperature classes and approved temperatures

Temperature class		Switch-off temperature when magnetic coupling T_{max} is reached	Switch-off temperature when fluid T_{max} is reached	Switch-off temperature when pump surface T_{max} is reached at the containment can
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

6.4.6 Overview of monitoring measures

The following image shall serve as help in selecting appropriate explosion protection measures.



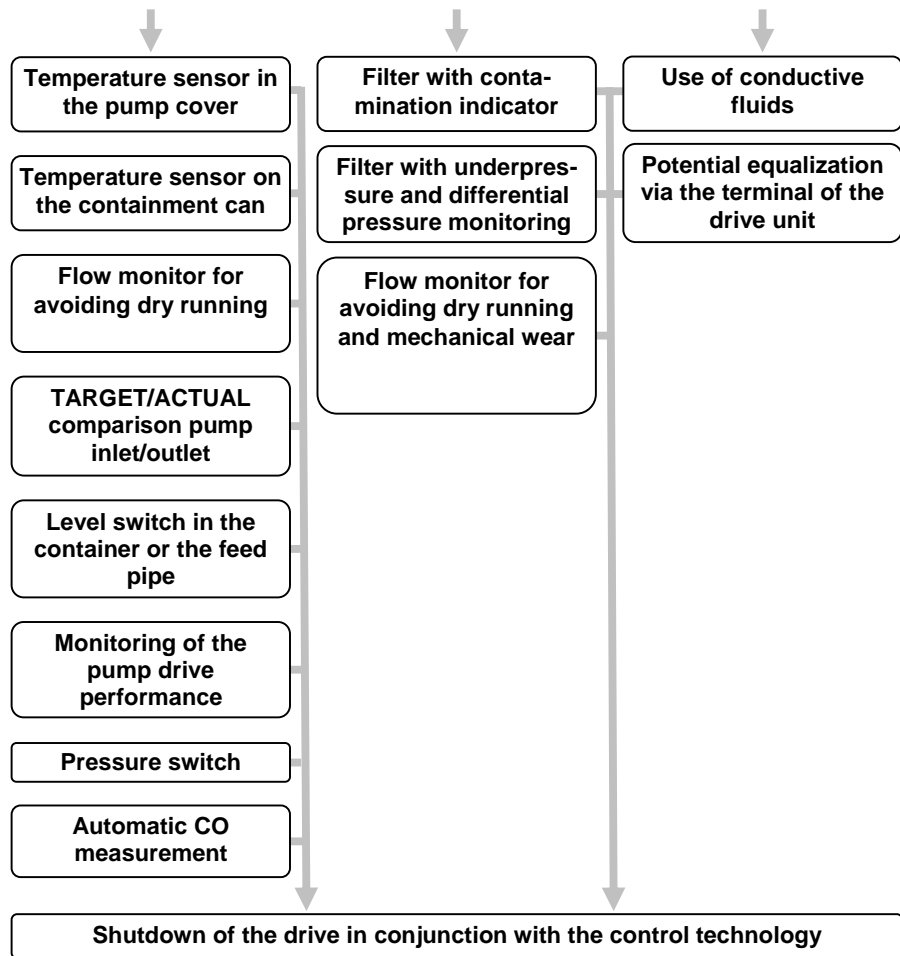


Figure 6.4-1: Overview of monitoring measures

6.4.7 Assignment of the monitoring measures concerning the expected operating conditions

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.

6.4.8 Primary explosion protection

First and foremost, the prevention of an explosive atmosphere must be ensured. Firstly, it should be checked if the explosive substance can be replaced by another substance from which no explosion risk arises. The explosion danger of explosive dusts can be reduced by removing these dusts on a regular basis.

6.4.9 Secondary explosion protection

This term describes the avoidance of effective ignition sources. Areas in which explosive mixtures can occur must be marked as explosive areas. Dependant on the use, sparks in electrical devices, potential differences, flames, hot surfaces etc. can be considered as effective ignition sources. **Explosion protection measures** depend on the respective expected ignition source. Possible measures can be:

- ventilation,

- gas alarm,
- temperature monitoring.

6.4.10 Tertiary explosion protection

When primary and the secondary explosion protection are not enough, further explosion protection measures must be taken. If proper function and the maximum permissible surface temperature cannot be guaranteed by regular inspections by the operator, appropriate temperature monitoring measures must be taken. Subsequently, some safety measures are sorted and listed according to potential ignition sources.

(I) Hot surfaces



(a) 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.



(b) Temperature monitoring

Overload, overheating or non-observance of normal operation can lead to an inadmissibly high temperature rise. 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.



(c) Overpressure protection

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

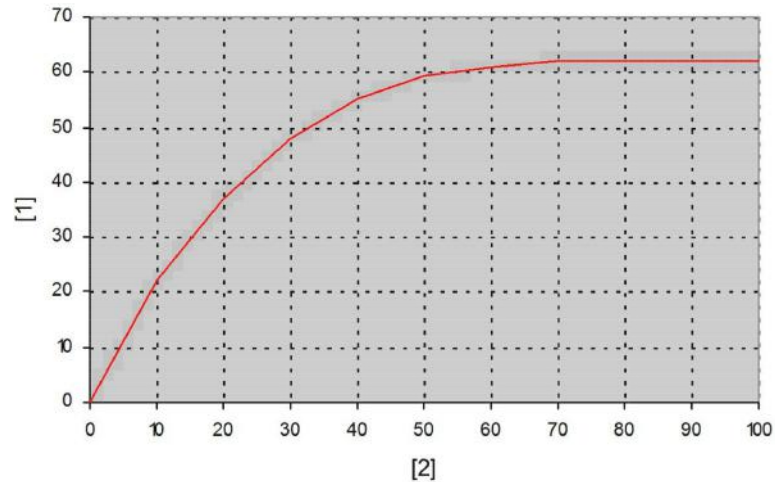
- Overflow valve,
- Pressure switch,
- Monitoring of the drive performance,
- Temperature monitoring.

If the pump is operated against a closed system, the pump will heat up. Measurements have shown a temperature input of 120°K within 7 minutes (2,800 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 30°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 6.4-2: Temperature rise

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



(d) Prefilter

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. We recommend the following monitoring measures:

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



(e) 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.



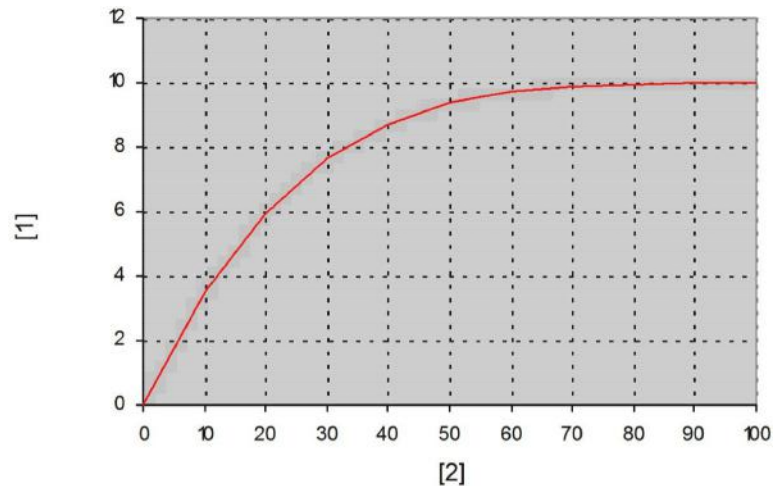
(f) Dust deposits

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



(g) 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 6.4-3: Surface temperature rise when pump is blocked

(II) Static electricity



(a) Motor protection

The risk of explosion arises in case of an improper electrical installation. Also observe IEC 600079-14 for electrical installation in explosive areas. We recommend the following monitoring measures:

- Motor circuit-breaker.
- Load monitor.



(b) 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.

(III) Mechanically generated sparks



(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.

(IV) Leakage monitoring

DANGER!



In order to detect a leakage at an early point in time, you have to unscrew the locking screw (19)

- after commissioning,
- monthly

and check if leakage fluid is collected in the flange (12). If this is the case, you have to immediately decommission the pump and remove the leakage.

Danger of injury:

In the case of a leakage, hot, toxic or corrosive fluid can leak out - wear appropriate protective gloves.



After checking, re-insert the locking screw and the gasket. No pump without locking screw must be used in the II 2 D explosive areas!

6.5 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. The pump must not be allowed to run dry!

CAUTION!

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



- Ensure that the pump doesn't run dry because this operating state is not permitted in accordance with the explosion protection guideline and the pump may be destroyed.
- 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).

6.6 Removal from the system

ATTENTION!

Switch off the drive unit! Take care that the work steps described in (⇒ Chapter 6.5 page 52) have already been performed.
Remove the connection pipes.

6.7 Pump head disassembly



Remove the four fastening screws (20) as represented in the following image. They fix the pump to the motor flange (12). The pump is still held in position by the magnetic force of the magnetic coupling. Now pull the pump straight to the front away from the motor. Prevent foreign matter from being attracted by the magnetic coupling. Attention: danger of injury through trapping of body parts!

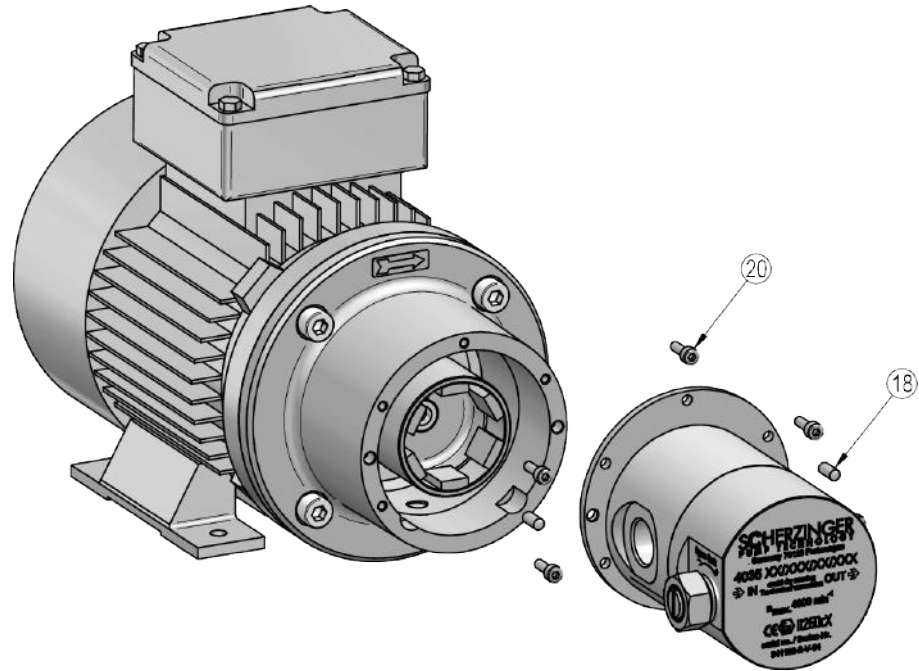


Figure 6.7-1: Pump head disassembly

This page was intentionally left blank

7 Maintenance / cleaning

7.1 General information

For the maintenance, 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 page 21**).

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 carefully reading 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 (see Section 2.2, page 12).
- 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 page 41**) 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 does not meet the basic data showed in Chapter 10 Technical Data any more,
- another fluid is transported,
- leakages occur on the pump.

Observe also the the transport notes (⇒ **Chapter 3 page 29**) and the troubleshooting notes (⇒ **Chapter 8 page 63**).

7.4 Dismantling and re-installation

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.

7.4.1 Assembly tools

You need the following tools:

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

7.4.2 Pump body

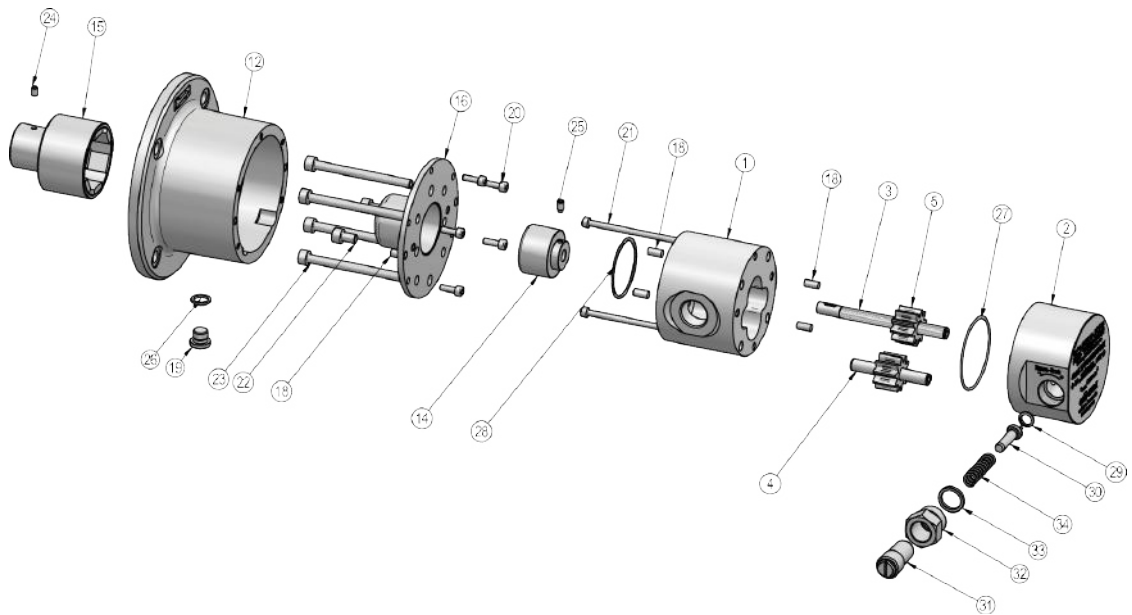


Figure 7.4-1: Pump body

Dismantling

- Switch off the pump and disconnect the power supply.
- Remove the pump head from the drive unit (⇒ **Chapter 6.6 page 52**).
- Lay the pump head in front of you with the containment can (16) on top.
- Open and remove the two cylinder screws (22).
- Open and remove the four cylinder screws (23).
- Pull the containment can (16) out.
- Remove the O-ring (28) without damaging the O-ring set.
- Loosen the grub screw (25) by two revolutions.
- Pull up the magnetic coupling hub (14) (**Attention:** highly magnetic).
- Open and remove the two cylinder screws (21).
- Carefully remove the pump cover (2).
- Remove the O-ring (27) without damaging the O-ring set.
- Now you can remove cylinder pins (18), the drive shaft (3) with gear (5) and shaft (4) with gear (5).

Installation

- Hold the casing (1) with the gear casing 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 pins (18).
- Insert the new O-ring (27).
- Carefully put the cover (2) onto the pins (18).
- Turn the pump. The free shaft end is now facing upwards in front of you.
- 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 auxiliary flange (13).
- Screw all four cylinder screws (23) in and tighten them crosswise with 8 Nm.
- Screw in the cylinder screws (22) and tighten to 8 Nm.

7.4.3 Pressure relief valve (only for 40X5-...-B)

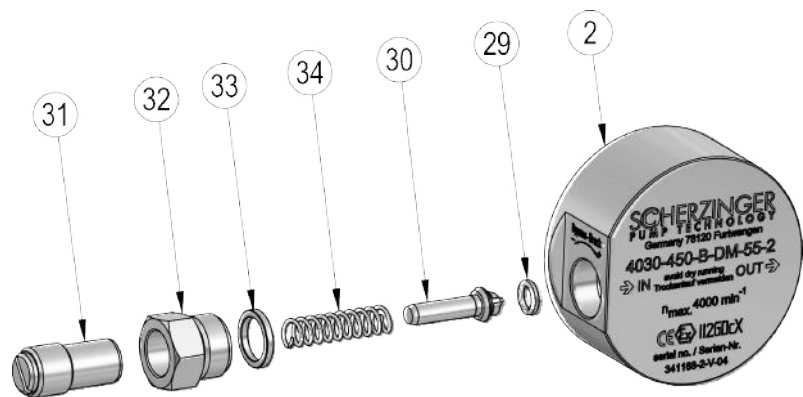


Figure 7.4-2: Pressure relief valve

Dismantling

- Take the pump or the already dismantled cover (2).
- Open the clamp screw (32) with an open-end 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 an open-end spanner.

7.4.4 Bearing bushes

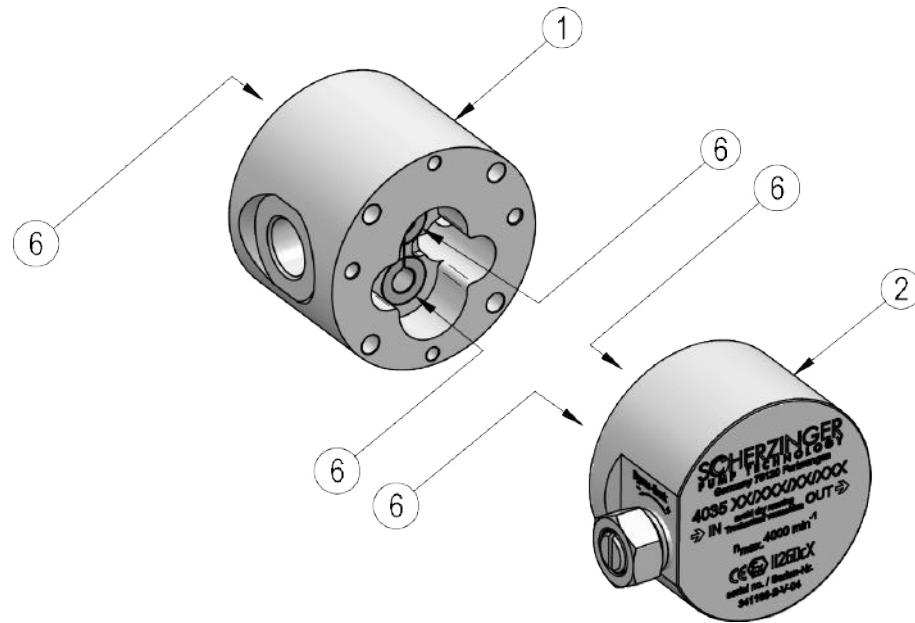


Figure 7.4-3: Shaft bearings

ATTENTION!

To replace the bearing bushings, send the pumps to Scherzinger because after pressing in, very accurate production tolerances must be observed to ensure a perfect function.

7.5 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.

7.6 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 to use only 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.

This page was intentionally left blank

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 . The pump must not be allowed to run dry (⇒ Chapter 2.1.7 page 23)</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 is not permitted in accordance with the explosion protection guideline and should therefore be avoided.</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 page 39). The pump must not be allowed to run dry (⇒ Chapter 2.1.7 page 23).</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. The pump must not be allowed to run dry (⇒ Chapter 2.1.7 page 23).</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. The pump must not be allowed to run dry (⇒ Chapter 2.1.7 page 23).</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 analysed/rectified by dismantling the pump (⇒ Chapter 7.4 page 56).</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						Incorrect rotation direction of the pump See rotation direction information on the pump type plate (⇒ Chapter 10.2 page 70).
x	x					Internal pressure relief valve incorrectly adjusted (with 40X5-280-B-..., 40X5-450-B-... and 40X5-710-B-...) 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 6.3 page 42).
x	x					Pipe closed If there are shut-off valves in the pipe on the pressure or the suction side, make sure that they are open. The pump must not be allowed to run dry (⇒ Chapter 2.1.7 page 23).
x	x	x				Magnetic coupling uncoupled The uncoupling of the magnetic coupling is accompanied by a rattling sound. The magnetic coupling serves amongst other things as overload protection (⇒ Chapter 5.3 page 36). 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: <ul style="list-style-type: none"> - Differential pressure too high - Fluid viscosity too high - Dirt in the pump
	x					Fluid viscosity too low 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. Compare the current viscosity and temperature with the initial viscosity and temperature during the laying of the pipes and correct them if necessary (⇒ Chapter 10.3 page 70).
		x				Operation in cavitation Due to an inadmissibly low inlet pressure (abs.) 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. Increase the inlet pressure by reducing the pipe resistance. Decrease the fluid temperature.
			x			Normal operation? 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.

Fault						Cause and rectification of the fault
1	2	3	4	5	6	
			x			<p>Permanent internal overflow only with 40X5-280-B-..., 40X5-450-B-... and 40X5-710-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 6.3 page 42). 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 10.3 page 70).</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.

This page was intentionally left blank

9 Components

9.1 Spare parts list

Pumps:

40X5-280-ZK..., 40X5-450-ZK..., 40X5-710-ZK...

40X5-280-B-ZK..., 40X5-450-B-ZK..., 40X5-710-B-ZK...

40X5-280-XM..., 40X5-450-XM..., 40X5-710-XM...

40X5-280-B-XM..., 40X5-450-B-XM..., 40X5-710-B-XM...

Pos.	Numbe	Designation
1	1	Casing
2	1	Cover Cover-B *
3	1	Drive shaft
4	1	Shaft
5	2	Gear
6	5	Plain bearing
12	1	Intermediate flange
14	1	Magnetic coupling hub
15	1	Magnetic coupling bell
16	1	Containment can with Centering ring
18	4	Cylinder pin
19	1	Drain plug
20	5	Cylinder screw
21	2	Cylinder screw
22	2	Cylinder screw
23	4	Cylinder screw
24	1	Headless screw
25	1	Headless screw
26	1	Sealing ring
27	1	O-ring
28	1	O-ring
29	1	Sealing ring *
30	1	Valve piston *
31	1	Adjustment screw
32	1	Clamp screw *
33	1	Sealing ring *
34	1	Compression spring * 0.5 - 8.0 bar Compression spring * 7.0 - 12.0 bar

* = only in 40X5-280-**B**, 40X5-450-**B** and 40X5-710-**B**

9.2 Explosion drawing

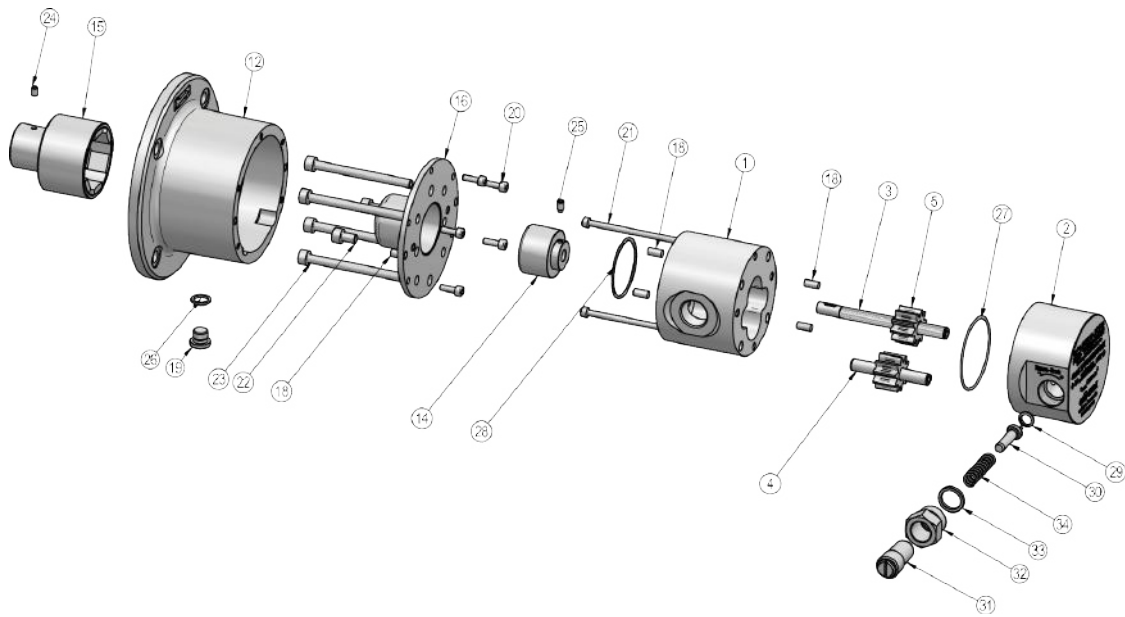


Figure 9.2-1: Explosion drawing

10 Technical Data

10.1 Pump dimensions

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

10.1.1 Pump variant with standard thread

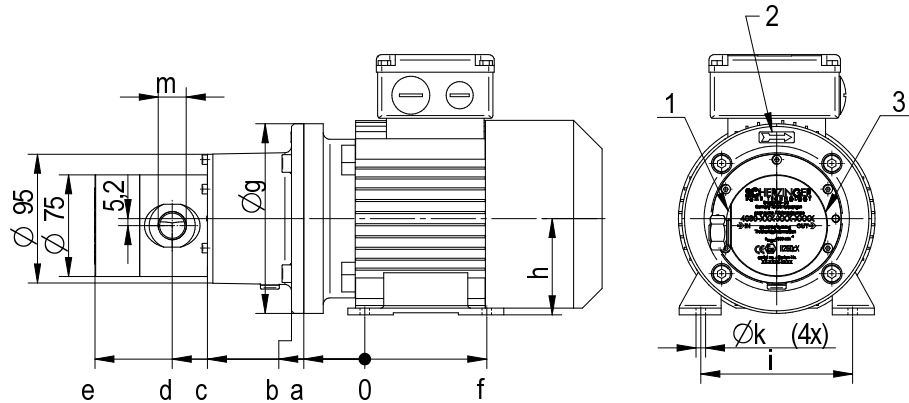
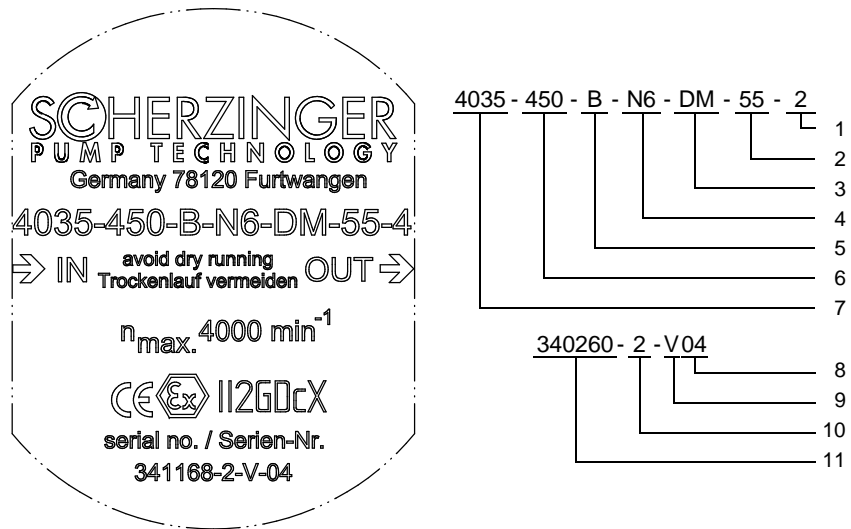


Figure 10.1-1: Pump variant with standard thread (1: suction connection, 2: rotation direction, 3: pressure connection)

Pump type	Dimensions [mm]										
	a	b	c	d	e	f	g	h	i	k	m
40X5-280- XM-55-2 XM-35-2/4 XM-25-4/6 XM-12-8	45,0	54,0	116,0	142,0	196,0	90,0	140,0	71,0	112,0	7,0	G1/2"
40X5-450- XM-55-2 XM-35-2/4 XM-25-4/6 XM-12-8	45,0	54,0	116,0	142,0	202,0	90,0	140,0	71,0	112,0	7,0	G1/2"
40X5-710- XM-110-2 XM-75-2/4 XM-55-4/6 XM-25-8	50,0	62,0	147,5	173,5	242,5	100,0	160,0	80,0	125,0	9,0	G3/4"
40X5-280-B- XM-55-2 XM-35-2/4 XM-25-4/6 XM-12-8	45,0	54,0	116,0	142,0	199,0	90,0	140,0	71,0	112,0	7,0	G1/2"
40X5-450-B- XM-55-2 XM-35-2/4 XM-25-4/6 XM-12-8	45,0	54,0	116,0	142,0	205,0	90,0	140,0	71,0	112,0	7,0	G1/2"
40X5-710- XM-110-2 XM-75-2/4 XM-55-4/6 XM-25-8	50,0	62,0	147,5	173,5	245,5	100,0	160,0	80,0	125,0	9,0	G3/4"

10.2 Type plate based on the example of the pump type 4035-450-B-N6-DM-55-2



- 1 Drive speed
- 2 Drive performance
- 3 Drive variant
- 4 Gear material
- 5 Basic variant
- 6 Performance variables
- 7 Basic type
- 8 Month
- 9 Year
- 10 Quantity
- 11 Customer order number

Figure 10.2-1: Type plate for pump with motor

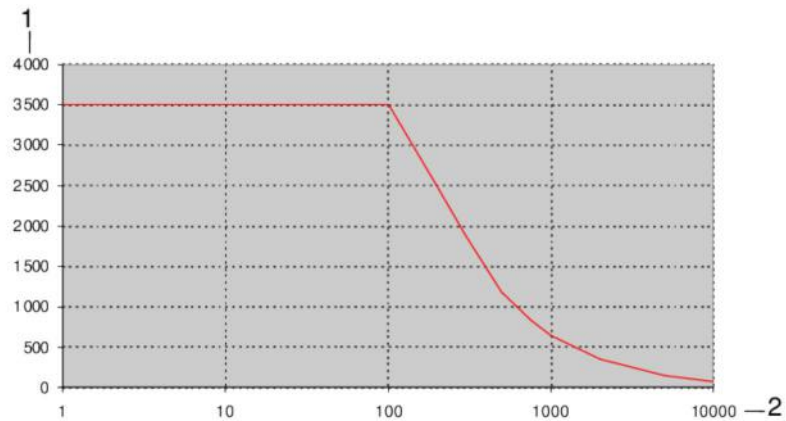
10.3 Pump data

Description	Value
Max. differential pressure rise	max. 12 bar (Depending on combination of materials and fluid))
Max. system pressure (pressure side)	100 bar
Max. suction vacuum	0.9 bar (filled with fluid)
Operating temperature	-20 to 120°C
Viscosity range	0.5 to 10,000mm ² /s
Speed range	0 to 4,000 rpm (Dependent on the gear material)
Sound pressure level	< 75 dB(A) determined at: Speed: 2,000 rpm Operating pressure: 10 bar Operating temperature: 20 °C Fluid: 1mm ² /s, non-lubricating ⇒ Chapter 10.4 page 73
Dimensions	Observe the respective data sheets ⇒ Chapter 10.1 page 69 et seq.

Wetted parts:

Casing [1], [2], [16]:	1.4404 / 2.4610 / 3.7235
Shafts [3], [4]	1.4571 / 2.4610 / 3.7235 Cr ₂ O ₃ coated / Al ₂ O ₃ coated
Gears [5]	Nitronic 60 (N6), Waukesha 88 (W8), 1.4528 hardened (SS)
Bearing [6]	SSiC, Al ₂ O ₃
Magnetic coupling hub [15]	1.4404 / 2.4610 / 3.7235
Clamp screw [32]	1.4571 / 2.4610 / 3.7235
Valve piston [30]	1.4571 / 2.4610 / 3.7235
Adjustment screw [31]	1.4404 / 2.4610 / 3.7235
Seals [27], [28]	PTFE / FKM / FFKM / EDPM / NBR
Compression spring [34]	1.4310 / 2.4610 / 3.7235
Fluid	Note the resistance of the materials mentioned above

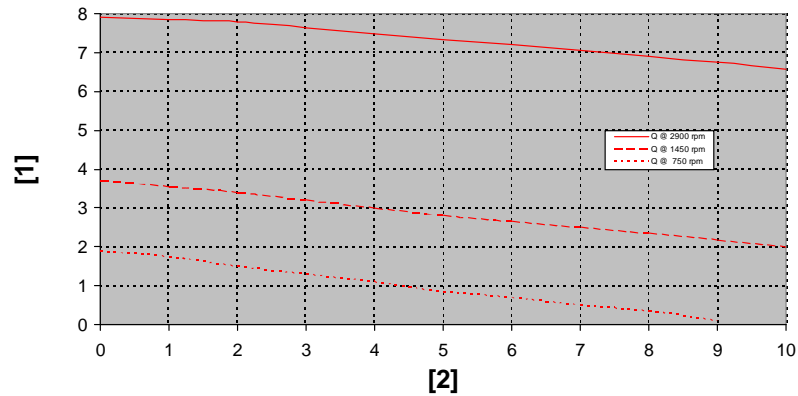
Max. possible speed dependent on the fluid viscosity:



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

Figure 10.3-1: Viscosity range

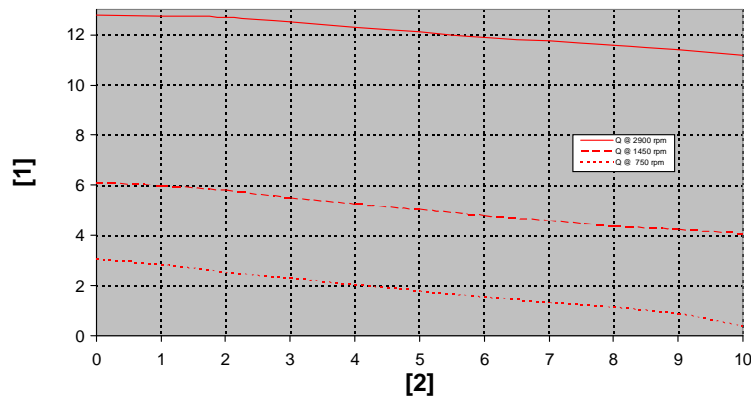
Output volume depends on differential pressure for the 40X5-280-... and 40X5-280-B-... pumps, viscosity 1mm²/s:



- 1 Output volume (l/min)
- 2 Differential pressure (bar)

Figure 10.3-2: Differential pressure range for 40X5-280-... and 40X5-280-B-... pumps

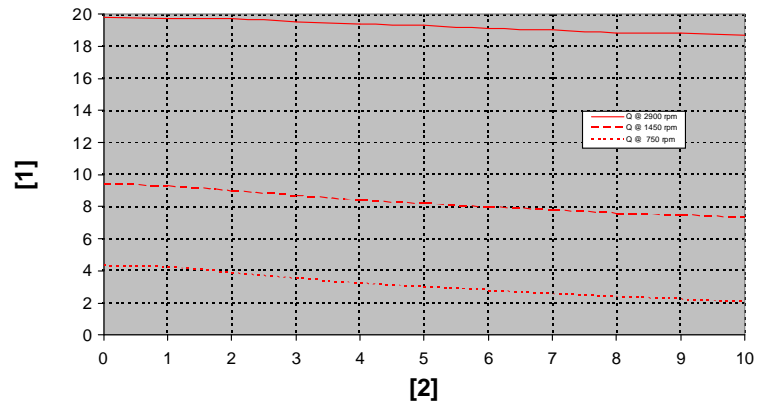
Output volume depends on differential pressure for 40X5-450-... and 40X5-450-B-... pumps, viscosity 1mm²/s:



- 1 Output volume (l/min)
- 2 Differential pressure (bar)

Figure 10.3-3: Differential pressure range for 40X5-450-... and 40X5-450-B-... pumps

Output volume depends on differential pressure for 40X5-710-... and 40X5-710-B-... pumps, viscosity 1mm²/s:



- 1 Output volume (l/min)
- 2 Differential pressure (bar)

Figure 10.3-4: Differential pressure for 40X5-710-... and 40X5-710-B-... pumps



DANGER!

If one or more limit values described in this section are exceeded, you have to ask in 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.

10.4 Sound pressure level

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

Distance from the sensor to the pump: 1m.

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

Note to the sound pressure level:

- The measurement of the pump takes place with a decoupled structure, on rubber feet and with tubing elements for damping the suction and pressure pipe.
- If there is cavitation in the pump (e.g suction pipe is too small) and / or solid-borne sound caused by vibrations of the entire system (pump / system) the above mentioned value could be exceeded up to 10 db(A).

10.5 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, electronical and fine mechanical devices (e.g. hard drives).

Please observe the safety instructions within the operating instructions:

(⇒ OI, chapter 2 Safety instructions)

11 Disposal

The pump can be dismantled into its constituent components and recycled according to what materials were used after a correct decommissioning (⇒ **OI, chapter ?? ??**) 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 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.



HEART OF HIGHTECH

Address:

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

Postal address:

Scherzinger Pumpen GmbH & Co. KG
Lockbox: 11 54
78120 Furtwangen / Germany

Communication:

Phone +49 (0) 7723 6506-0
Fax +49 (0) 7723 6506-40
E-mail: info@scherzinger.de
Internet: www.scherzinger.de