

Operating manual
FZ-B pump

BA_2021_1_GB_FZ-B (rev. B)
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1. Introduction

This operating manual contains important information and warnings relating to all of the product's life phases. We therefore strongly advise that all people in the target groups mentioned below read this document carefully before assembly, commissioning and maintenance. Additionally, it must be ensured that the operating manual is available at the place of use at all times.

We reserve the right to make technical changes that are necessary for improvement to the illustrations and information in this operating manual. DELIMON retains the copyright to this operating manual. It contains regulations and drawings of a technical nature that may not be distributed, either in whole or in part, or used without authorisation for competition purposes or communicated to others.

1.1 Target groups

This operating manual is intended for assembly, operating and maintenance personnel.

1.2 Required knowledge and qualifications

Qualified mechanic

A person with suitable technical training, knowledge and experience who can recognise and prevent the hazards that may occur during transport, assembly, commissioning, operation, maintenance, repair and disassembly.

Qualified electrician

A person with suitable technical training, knowledge and experience who can recognise and prevent the hazards that can be caused by electricity.

Operator

A trained person who, based on their knowledge and experience, is capable of commissioning and operating the product. This also includes preventing potential hazards that may arise during operation.

1.3 The manufacturer's contact details

Düsseldorf head office	Beierfeld plant
DELIMON GmbH Arminstrasse 15 40227 Düsseldorf, Germany Phone: +49 (0)211 77 74-0 Fax: +49 (0)211 77 74-210 	DELIMON GmbH Am Bockwald 4 08344 Grünhain-Beierfeld, Germany Phone: +49 (0)3774 6511-0 

Email: kontakt@bijurdelimon.com

Web: www.bijurdelimon.com

Please address product returns for repairs to the 'Repair Department' at the Beierfeld plant.

1.4 Copyright

© Copyright DELIMON, all rights reserved

1.5 Warranty and disclaimer

Warranty

Please refer to our General Terms and Conditions for warranty information

Disclaimer

The manufacturer is not liable for damage caused by

- Unintended use
- Failure to comply with this operating manual
- Unauthorised modification of the product
- Use of non-genuine DELIMON spare parts

1.6 Abbreviations

The following abbreviations and symbols may be used in the document.

General abbreviations		Technical abbreviations / units	
re.	regarding	∅	diameter
©	Copyright	△ / Y	delta connection / star connection
approx.	approximately	°C	degrees Celsius
i.e.	id est (in other words)	°F	degrees Fahrenheit
etc.	et cetera	A	Amperes
poss.	possibly	Ah	Ampere-hours
where necc.	where necessary	AC / DC	alternating current / direct current
AAR	as a rule	cm ³ / ccm	cubic centimetres
incl.	including	db (A)	sound pressure level
min.	minimum	Hz	Hertz (frequency)
max.	maximum	I	Amperage
no.	number	kg	kilograms
PPE	personal protective equipment	kW	kilowatts
ASO	and so on	l	litres
e.g.	exempli gratia (for example)	ml	millilitres
Time-related abbreviations		mm	millimetres
h / hr.	hour	mm ²	square millimetres
Min.	minute	mm ³	cubic millimetres
s / sec.	seconds	N / Nm	Newton / Newton meters
d	day	nc / no	N/O (normally open) contact / N/C (normally closed) contact
General symbols		V	Volts
○	list	W	Watts
➤	instruction (chronological)	Conversion factors	
👉	reference to other documents	Pressure	1 bar = 14.5 psi
		Length	1 inch = 25.4 mm

2. Safety

This section describes general and product-specific safety instructions that must be observed and followed. Further safety instructions can be found at appropriate points in other sections of this operating manual. Please read this section carefully to understand the safety instructions throughout this document and on the product itself.

2.1 Intended use

The pump described below is intended for commercial use to supply lubricant to industrial machines and systems. The pump may only be used by qualified operators. The pump is deemed as functional when connected to a power supply.

The following is also required for intended use:

- Connecting line (pipe or hose) from the pump outlet to at least one suitable lubrication point (e.g. bearing or chain) on an existing machine or system
- Lubricant that is free from contamination and suitable for feeding with the described pump according to the specification in this operating manual
- Compliance with all specifications, safety instructions and general instructions

The pump described may also be part of a more complex central lubrication system. This may include, for example, several pump outlets, downstream lubricant distributors and, if necessary, control and monitoring elements. The compatibility of all system components must be ensured (e.g. operating pressure, approved lubricants, temperature range, etc.).

Any use that extends beyond this is considered unintended use. The manufacturer is not liable for any damage resulting from this; the risk is borne solely by the operating company. The use of substances that are classified as hazardous (according to the CLP Regulation 1272/2008) is only allowed following consultation with and written confirmation from Delimon. The use of any media that enters into food is not permitted.

2.2 Warnings, signs and symbols

This operating manual contains the following symbols according to DIN EN ISO 7010 to indicate health hazards and property damage and how to avoid them. Failure to observe the safety instructions may put people at risk.

Warnings:

Warning level	Consequence	Probability
	Death or serious injury	Imminent
	Severe injury	Possible
	Slight injury	Possible
	Property damage	Possible

Pictograms:

General warning signs		General mandatory signs		General prohibition signs			
	General warning		General mandatory sign		No unauthorised access		
	Warning - electric voltage		Observe instructions		Other signs		
	Warning - slipping hazard		Wear safety goggles				
	Warning - tripping hazard		Wear hearing protection				
	Warning - substances that are harmful to health		Wear safety boots				CE mark
	Warning - flammable substances		Wear safety gloves				Waste electrical and electronic equipment symbol
	Warning - possibility of hand injuries		Wear face protection				
	Warning - possibility of hand injuries due to pulling in		Wear a safety hat				
	Warning - hot surface		Wear protective clothing				
	Warning - explosive atmosphere		Disconnect from the mains before commencing work				
	Warning - suspended load		Earth before use				
	Warning - possibility of injuries due to pressure injection		Keep closed				

Combined warnings:

	WARNING
	Danger Example of a hazard warning

	WARNING	
	Danger Example of a hazard warning, with information about how to avoid it	

2.3 General safety instructions

- This operating manual must always be available at the machine's / system's place of use.
- This operating manual must be kept for further use.
- The described product was manufactured according to the current standards. However, unintended use could potentially put people at risk or result in property damage.
- If safety-related faults occur, the product must be taken out of operation immediately until they have been eliminated. In addition, the legal accident prevention and environmental protection regulations must be observed.
- Not only must the general safety instructions listed under this main point entitled 'Safety' be observed; the special safety instructions outlined under the other main points must be too
- The product may only be used by qualified personnel, in a technically perfect condition and according to the information and safety instructions contained in this manual.
- Please read this operating manual carefully and familiarise yourself with the product and how it works. The operating steps' sequence must be observed.

2.4 Basic behaviour when using the pump

- For the pump to be operated, it must be in good working order, installed correctly and, if necessary, connected to the electrical system by a professional. In the event of any uncertainties, operation of the pump is prohibited until the issues have been clarified.
- Keep unauthorised or unqualified individuals away from the pump.
- Observe internal company instructions and relevant safety regulations.
- Wear personal protective equipment (PPE).
- Check protective and safety equipment (e.g. pressure limitation valves) regularly. They may not be removed or tampered with in any way.
- If safety equipment is replaced, it must be immediately reinstalled and tested to ensure that it is working.
- Never use parts of the pump or the connected central lubrication system as a standing or climbing aid.

2.5 Safety instructions for maintenance, inspection and assembly work

- The operation, maintenance, inspection and assembly personnel must be appropriately qualified for this work.
- The personnel's area of responsibility, competence and supervision must be regulated by the operating company. Operational precautions and work instructions must be observed.
- The operating company must ensure that personnel understand the contents of the operating manual in full.
- Only work on the pump when it is at a standstill, depressurised and disconnected from the mains (secured against accidental restart).
- Pumps or units that feed media that are harmful to health must be decontaminated.
- All safety and protective equipment must be reattached or put back into operation as soon as the work is completed.
- Product transport requires suitable transport and lifting equipment. Use marked paths.
- Maintenance and repair work should preferably be carried out at room temperature. The lubricant's flow properties change at low or high temperatures.
- Dry wet, slippery surfaces or cover them as appropriate.
- Cover hot or cold surfaces as appropriate.
- Work on electrical components may only be carried out by qualified electricians using suitable tools and when the components are de-energised. The valid wiring diagram and local regulations must be observed.
- Do not touch cables or electrical components with wet hands or cloths.
- Do not bypass fuses. Always use the same fuse type in the event of replacement.
- Ensure that the protective earthing conductor is connected correctly.
- Observe tightening torques (if specified). Use a calibrated torque wrench when tightening.
- Label individual parts after disassembly to avoid mixing them up.

Note:

DELIMON holds qualified training courses to ensure maximum safety and efficiency. Please get in touch with your contact or the DELIMON service address for further information.

2.6 Safety instructions for the operating company

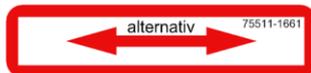
- If hot or cold machine parts lead to hazards, the customer must secure these parts against contact.
- Never remove contact protection for moving parts (e.g. pendulum lever) while the machine is in operation.
- Eliminate leaks so that people and the environment are not put at risk. Legal regulations must be observed.
- Take all necessary measures to eliminate the possibility of hazards caused by electrical energy (for details, see the regulations set down by the Association for Electrical, Electronic & Information Technologies (VDE) and local power supply companies).

2.7 Particular hazards when handling the pump

- Risk of crushing when closing the reservoir lid.
- Risk of hand injuries due to the scraper and agitator in the reservoir. Never reach into the reservoir while the pump is running!
- When the pump is being driven by a pendulum lever, there is a particular risk of injury in the pendulum lever area while the pump is running.
- The pendulum lever drive must be suitably covered during operation to protect against unintentional contact.

2.8 Notes and pictograms on the pump

	<p>Warning – possibility of hand injuries</p> <p>Risk of injury due to the rotating scraper in the reservoir! Never reach into the reservoir while the pump is running. Hands or fingers can be crushed, cut off or broken.</p>
------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------



The pump can rotate in a clockwise and an anti-clockwise direction

Wichtiger Hinweis!
 Nur sauberen Schmierstoff in Behälter füllen! Verschmutzungen führen zum Ausfall der Pumpe.
Important notice!
 Make sure to fill only clean lubricant into the tank! Contaminations cause pump failure.

75011006

Information sign: only pour clean lubricant into the reservoir

All labels on the pump must be legible at all times.

2.9 Type plate

The type plate contains important specifications for identifying the pump. This must always be legible.

  	
Artikelnummer / Code no. 	
Typ / Type	Seriennummer / Serial no. 
Fördervolumen / Feed volume	Betriebsdruck max. / Operating pressure
Übersetzung / Ratio	Baujahr / Year of manufacture
Hersteller / Manufacturer DELIMON GmbH	Fertigungsauftrag / Shop order no. 
www.bijurdelimon.com Tel: +49 211 7774 0 Made in Germany Delimon GmbH Am Bockwald 4 08344 Grünhain Beierfeld Germany	



www.bijurdelimon.com

2.10 General safety instructions for handling lubricants

Lubricants perform different tasks and are selected specifically for the application. Lubricants' main functions are:

- Reducing friction and wear
- Protecting against corrosion
- Reducing noise
- Protecting against dirt or foreign matter
- Extending the service life of bearings, chains, etc.
- Cooling

2.10.1 Selecting lubricants

Lubricants are usually selected during machines' and systems' design phase. They are selected by the machine manufacturer or, if appropriate, the machine operating company. The product's operating temperature or the ambient temperature must also be taken into account. Bijur Delimon takes the lubricant specification into account during the project planning process and when selecting suitable central lubrication components. If it does not have any relevant experience with regard to the compatibility of given lubricants, Bijur Delimon also offers preliminary tests to assess the compatibility.

Material compatibility:

The used lubricants must generally be compatible with the following materials and seals:

Steel, grey cast iron, brass, copper, aluminium

NBR, FPM, FKM, ABS, PA, PU



Only lubricants specified for the product (see the section entitled 'Technical data') may be used. All other system components' specified lubricants must also be observed! Unsuitable lubricants can lead to functional failure of the product or the entire system.



Do not mix lubricants. This has an impact on the lubricating properties and pumpability, and thus on the central lubrication system's function.



☞ When handling lubricants, the relevant safety data sheets and, if applicable, the hazard labels on the packaging must be observed

2.10.2 Lubricant ageing

If lubricants are stored in reservoirs or lines for an extended period of time, e.g. due to machine downtime, ageing effects may occur (e.g. separated lubricant components). Before putting the machine / system back into operation, check whether the lubricant is still suitable for use. If necessary, the lubricant must be replaced before the machine / system is put back into operation.

2.11 Foreseeable misuse

Misuse is considered to be unintended use, especially in the following cases:

- Operation outside the specified operating temperature range.
- Overriding or removing safety equipment (e.g. pressure limitation valve)
- Adding and feeding unspecified or contaminated lubricants
- Adding and feeding lubricants that require written approval from Delimon or are generally prohibited (e.g. hazardous substances or food fat)
- Contaminant in the lubricant reservoir
- Operation in corrosive / aggressive environments without a suitable protective coating or enclosure
- Operation under ambient conditions that require compliance with special guidelines (not mentioned in the manual) e.g. in potentially explosive areas (ATEX)
- Selecting an unsuitable installation site
- Tampering on the pump (e.g. shutting down an outlet)
- Replacing original attachments with unsuitable components, e.g. motor with too high a power / rotation speed

2.12 Product modifications

The machine may only be converted or modified following consultation with the manufacturer. Genuine spare parts and accessories authorised by the manufacturer are designed to keep users safe. Use of other parts may invalidate the liability for consequential damages.

2.13 The operating company's obligations

The operating company must guarantee the prerequisites for safe and proper use of the pump throughout its entire life cycle. These are described in detail below.

2.13.1 Determining hazards

Installing the pump in a machine or system belonging to the operating company may cause a more complex hazard situation. It is the operating company's responsibility to determine all hazards at the place of use and necessary counter-measures to ensure safety and health protection.

2.13.2 Personnel qualification and training

The operating company shall ensure that all people authorised to use the pump have the necessary knowledge and qualifications before they use it for the first time. It shall ensure that this operating manual and any associated documents are accessible at all times and that the contents of the same are read and understood. It shall also regulate the responsibilities of assembly, operation and maintenance personnel.

2.13.3 Providing personal protective equipment

The operating company must provide personal protective equipment that is suitable for the relevant place and purpose of use.

2.13.4 Instructing external assembly fitters

Before being deployed, external assembly fitters must be brought to the same required level of knowledge as the operating company's own personnel. This includes all of the product information and safety instructions described in this document, as well as safety regulations and accident prevention regulations issued by the operating company.

2.13.5 Testing and ensuring proper use

The operating company shall ensure that the pump is being used as intended by taking suitable, periodic inspection measures. The periodic inspection should at least include:

- Function of the pump and safety equipment
- Checking for unauthorised tampering or conversion
- Legibility of all labels and the type plate
- Cleanliness of the reservoir contents, the pump and also the surrounding area (including the lubricant storage area)
- Condition of the electrical installation

2.13.6 How to behave in emergency situations

The operating company must ensure that the pump is shut down quickly in an emergency. To stop the pump, the power supply must be interrupted – for example by pressing an emergency shutdown switch on the pump or the higher-level machine. Personnel must be trained in the procedures to be followed in an emergency.

2.14 Dangers if the safety instructions are not observed

Failure to observe the safety instructions may result in personal injury as well as potential damage to the environment and the machine. In detail, failure to observe the safety instructions may result in the following hazards, for example:

- Failure of customer higher-level machine / system functions
- Failure of prescribed maintenance and repair methods
- People being put at risk due to electrical, mechanical and chemical effects
- The environment potentially being polluted due to hazardous substances leaking

Failure to observe the safety instructions may lead to any claims for damages lapsing.

2.15 Residual risks

Risk	Possible in life phase									Preventative / remedial measure
Physical injury, property damage due to lifted parts falling	A	B	C				G	H	K	Keep unauthorised individuals away. Do not allow people to stand under lifted parts. Lift parts with suitable lifting equipment.
Personal injury / property damage due to electric shock if the connection cable is damaged		B	C	D	E	F	G	H		Check the connection cable for damage before using the pump for the first time, and at regular intervals thereafter. Do not mount the cable on moving parts or chafing points, or take appropriate safety precautions. Connect and check the potential equalisation.
Physical injury / property damage / environmental pollution due to spilled, leaked lubricant		B	C	D		F	G	H	K	Take care when filling the reservoir and connecting or disconnecting the lubricant lines. Only use hydraulic screw connections and lubrication lines that are suitable for the specified pressure. Do not install lubrication lines on moving parts or chafing points.
Life phases: A = Transport, B = Assembly, C = Commissioning for the first time, D = Operation, E = Cleaning, F = Maintenance, G = Fault, repair, H = Decommissioning, K = Disposal										

3. Product description

3.1 Introduction

The FZ-B grease / oil lubrication pump is a positively driven piston pump. The operating principle is characterised by a very high level of reliability and constant delivery volume, even at a high back pressure. In contrast to other piston pumps, only one central piston is required to supply up to 2 outlets due to a special design.

The FZ-B pump also offers a variety of drive options. The standard flange-mounted motor, which can be put to universal use, can be combined with various gear ratios to optimally adjust the pump running time and delivery volume to customer requirements. The pump can also be configured with a motor flange only (for a motor that the customer has procured themselves), a free shaft end or a pendulum lever for a mechanical eccentric drive.

Difference between the FZ-B pump and FZ-A pump

The two pumps only have a different pump body design. The FZ-B pump is available with 1 or max. 2 outlets (FZ-A 12 outlets) and feeds 12 times or 2x 6 times the volume of the FZ-A pump due to internal volume combination.

3.2 Revision level

Current revision: level B (since 2019)

Revision B of the FZ pumps differs from revision A due to detail improvements inside the pump. This means that the FZ pump can also be operated with low-viscosity oils. The performance data, external appearance, dimensions and connection sizes remain unchanged. The spare parts kits have been adapted accordingly and can be found under the FZBETB00xx order numbers. Compatibility with the existing rev. A pumps is guaranteed. Please refer to the overview of spare parts kits in the annex for further details.

Revision B can be recognised by the code number. The revision letter A in sixth place has been replaced by 'B'. The rest of the item code remains unchanged. So you can easily reorder an existing pump.

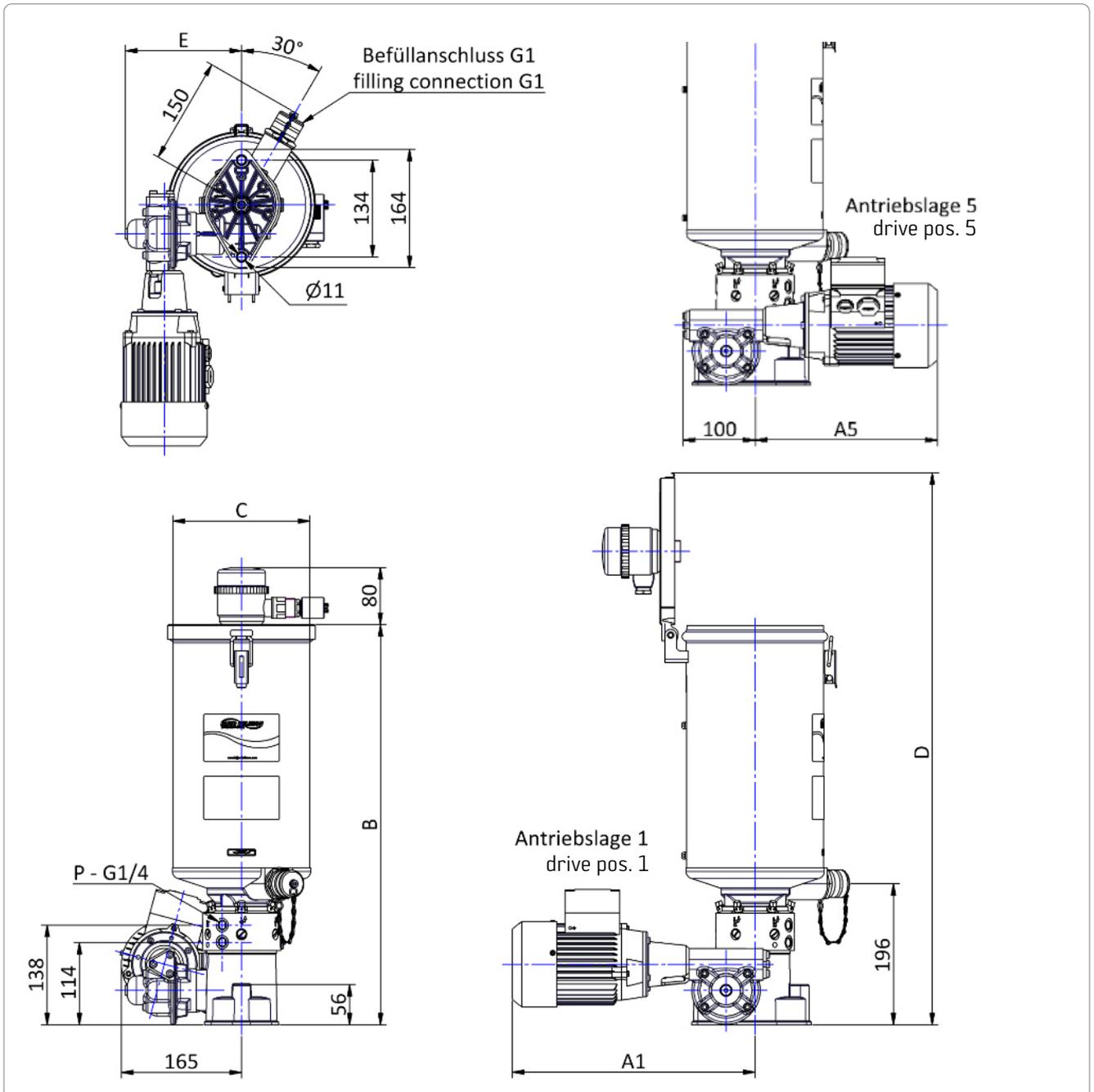
Example: FZB01A13AA00 (old revision A) → FZB01B13AA00 (current revision B)

3.3 Technical data

Operation principle:	Central piston pump, positively driven															
Use:	progressive systems															
Outlets:	1-2															
Reservoir:	2.5 l; 8 l; 15 l; 30 l (with support as an option, recommended for 15 l and 30 l)															
Reservoir filling:	Using the reservoir lid or filling connection															
Operating pressure:	Max. 200 bar (160 bar pressure limitation optional)															
Drive:	Mechanical or electrical, any direction of rotation															
Electric drive:	<p>Standard motor: Three-phase motor 230 V (D) / 400 V (Y) 50 Hz; IMB14-C90- size 63; 0.18 kW - 1,360 rpm* (☞ also see separate motor data sheet) Operating mode: S1</p> <p>Reduction gear with 4 gear ratios as standard:</p> <p>ratio (max. delivery vol.* for 1 outlet version) or (2 outlet version):</p> <ul style="list-style-type: none"> ○ 215:1 (ca. 7,59 cm³/min, → ca. 455 cm³/h) or (2x 3,79 cm³/min, → ca. 2x 227 cm³/h) ○ 345:1 (ca. 4,73 cm³/min, → ca. 283 cm³/h) or (2x 2,36 cm³/min, → ca. 2x 141 cm³/h) ○ 710:1 (ca. 2,29 cm³/min, → ca. 137 cm³/h) or (2x 1,14 cm³/min → ca. 2x 68 cm³/h) ○ 1420:1 (ca. 1,15 cm³/min, → ca. 69 cm³/h) or (2x 0,57 cm³/min → ca. 2x 34 cm³/h) <p>* Deviations possible when using a different motor (special motors on request) ☞ The delivery volumes for 60 Hz operation are listed in section 3.7.8</p>															
Mechanical drive: (interface to the driving machine - provided by the customer):	<p>Free shaft end or pendulum lever with different gear ratios</p> <p>Permissible feed piston rotation speed:</p> <ul style="list-style-type: none"> ○ With the drive running: max. 10 rpm ○ With the pendulum lever drive: max. 6 rpm <p>Number of pendulum strokes: max. 300 rpm; please enquire for higher rotation speeds, rotation speeds < 1 and downstream distributors. ☞ Please refer to section 3.7.10 for further details and ratio-dependent maximum rotation speeds.</p>															
Sound pressure level:	< 70 dB(A)															
Approved lubricants:	Grease up to NLGI grade 2 (DIN 51818), oil with an operating viscosity from ISO VG 68															
Temperature range:	<ul style="list-style-type: none"> ○ Mechanical drive (provided by the customer) without level monitoring: -20°C - +80°C ○ Mechanical drive (provided by the customer) with level monitoring: -20°C - + 60°C ○ Electric drive with flange-mounted standard motor: -20°C - +40°C (higher temperatures possible with special motor on request) 															
Protection class:	<ul style="list-style-type: none"> ○ Pump: IP54 ○ Motor: see type plate or data sheet, standard motor = IP55 ○ Level switch: IP65 															
Outlet thread:	G1/4" for pipe Ø 10 mm (max.)															
Filling connection:	G1" (filling valve optional)															
Coating and colour:	C2-M (120 µm acc. to DIN 12944), RAL 7004 - signal grey  special coating and colour on request															
Weight (not including lubricant):	<table border="0"> <tr> <td><u>Drive</u></td> <td><u>2.5 l reservoir</u></td> <td><u>8 l reservoir</u></td> <td><u>15 l reservoir</u></td> <td><u>30 litre reservoir</u></td> </tr> <tr> <td>with motor</td> <td>approx. 14 kg</td> <td>approx. 15 kg</td> <td>approx. 17 kg</td> <td>approx. 21 kg</td> </tr> <tr> <td>without motor</td> <td>approx. 9 kg</td> <td>approx. 10 kg</td> <td>approx. 12 kg</td> <td>approx. 16 kg</td> </tr> </table>	<u>Drive</u>	<u>2.5 l reservoir</u>	<u>8 l reservoir</u>	<u>15 l reservoir</u>	<u>30 litre reservoir</u>	with motor	approx. 14 kg	approx. 15 kg	approx. 17 kg	approx. 21 kg	without motor	approx. 9 kg	approx. 10 kg	approx. 12 kg	approx. 16 kg
<u>Drive</u>	<u>2.5 l reservoir</u>	<u>8 l reservoir</u>	<u>15 l reservoir</u>	<u>30 litre reservoir</u>												
with motor	approx. 14 kg	approx. 15 kg	approx. 17 kg	approx. 21 kg												
without motor	approx. 9 kg	approx. 10 kg	approx. 12 kg	approx. 16 kg												
Optional accessories:	<ul style="list-style-type: none"> ○ Pressure limitation valve(s) (recommended) with 160 or 200 bar ○ Ultrasonic level switch with 3 switching points 															

3.4 Dimensions

Pump's basic dimensions:



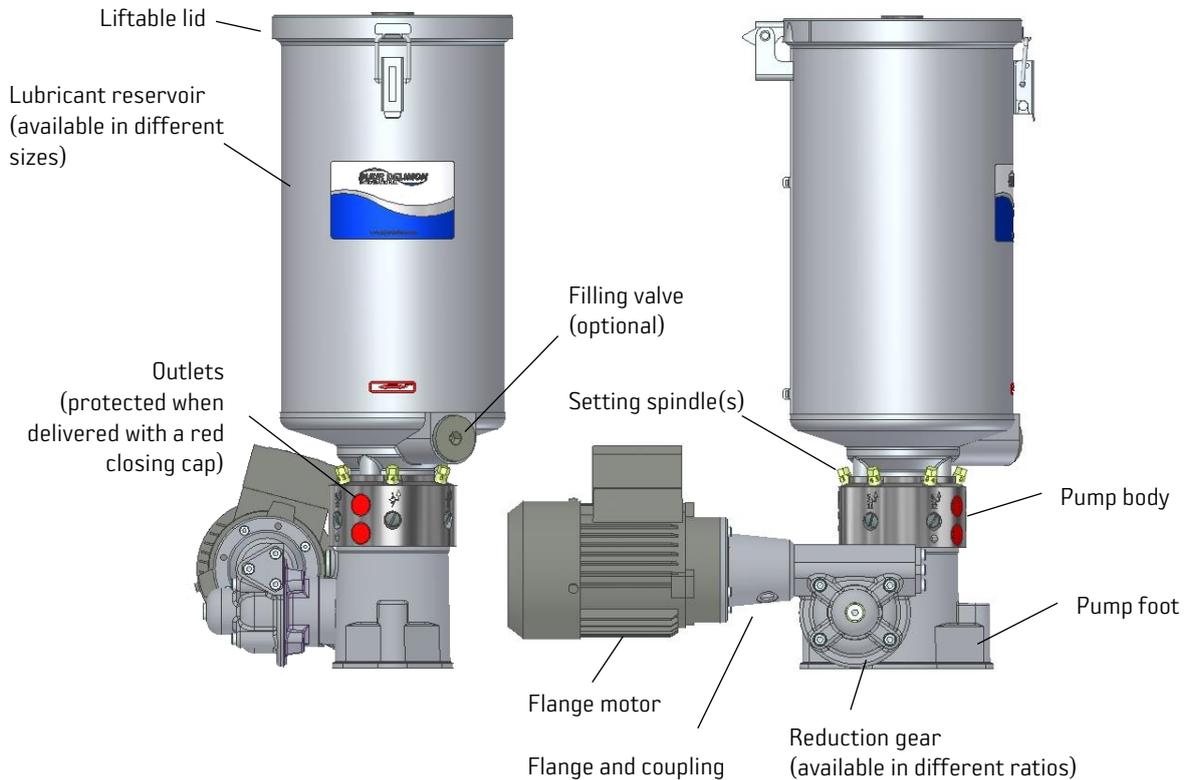
Dimensions in mm:

Reservoir	B	C	D	Drive	A1	A5	E
2.5 litres	321	188	529	Reduction gear and motor, 230 - 260 V / 400 - 460 V / 50 or 60 Hz	334	254	
8 litres	559	188	764	Reduction gear and motor, 290 or 500 V / 50 Hz	335	255	
15 litres	582	280	855	Reduction gear and motor flange (coupling Ø: 11)	154	74	
30 litres	651	309	995	Reduction gear (shaft diameter: 16)	130	50	
				Reduction gear			160
				Pendulum lever			141
				Free shaft end (shaft Ø: 20)			141

Detailed dimensions for the individual drive variants can also be found section 3.

3.5 Setting up the pump

Pump's external main components, using the example of the reduction gear with motor drive variant:



3.6 Overview of variants

Different pump bodies, drive variants and reservoir sizes can be combined due to the modular pump design. This section provides an overview of the different variants. Technical details can be found in the section below.

3.6.1 Pump body variants

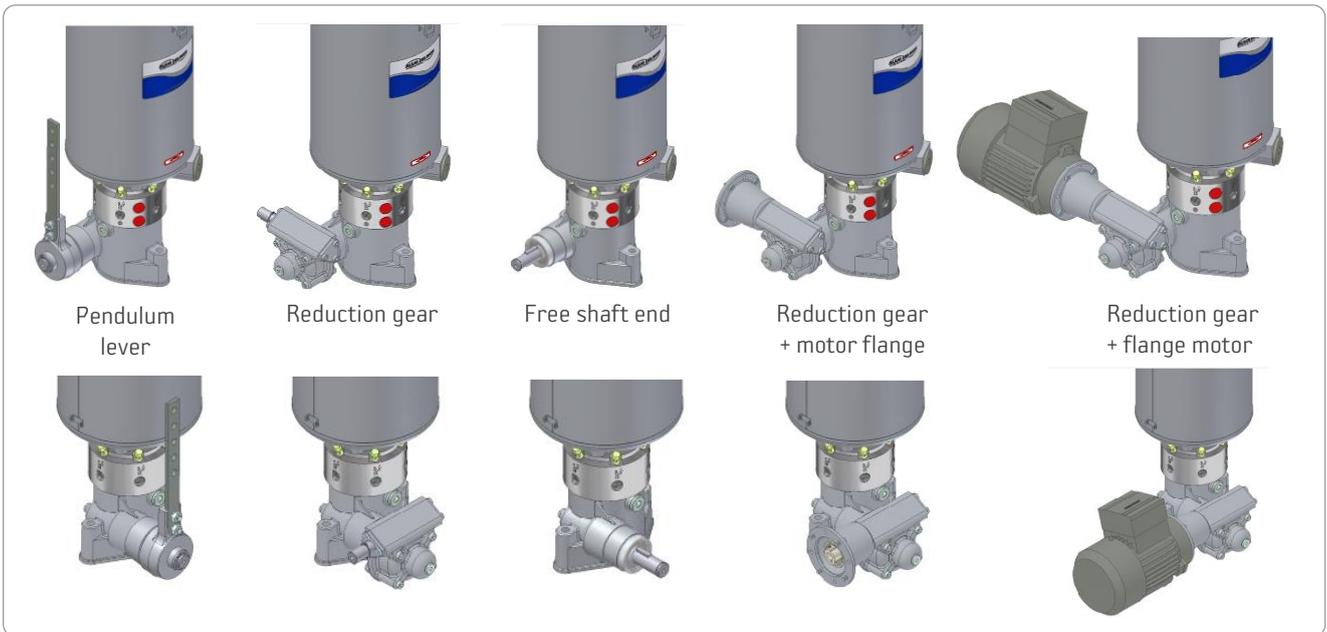
In contrast to the FZ-A, the FZ-B pump only has one pump body variant for 1 or 2 outlets.



3.6.2 Drive variants

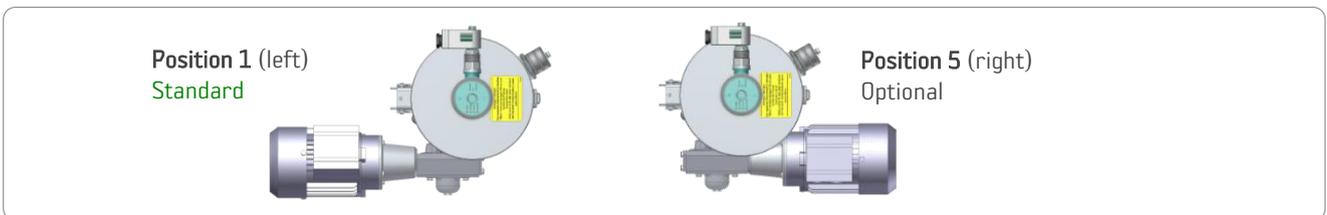
The FZ pump is configured with a flange-mounted three-phase motor as standard. If the drive is to be provided by the customer, the FZ pump offers additional options with interfaces to external mechanical drives.

Drive type overview:



As soon as at least the reduction gear is mounted, there are two different drive positions to choose from:

Drive position:



For variants without a reduction gear / motor, the pump is configured 'without a drive position'.

3.6.3 Reservoir variants

Selection of the correct reservoir size depends primarily on the expected lubricant consumption. This should take the effort required for topping up, which would be reduced by larger reservoir volumes, into account. On the other hand, the lubricant's dwell time in the reservoir must also be taken into consideration. An insufficient lubricant replacement frequency may have a negative effect on the lubricating and feeding properties. The available installation space is also a selection criterion.



For 15 and 30 litre reservoirs, we advise using a reservoir support if the pump is exposed to vibrations or acceleration.

3.6.4 Accessories

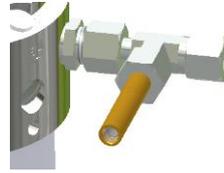
The FZ pump can be equipped with a level monitoring system with 3 switching points on request. Automatic filling e.g. with an external drum pump can be achieved by combining a level switch and filling valve. We generally recommend pressure limitation at each outlet to protect the pump and downstream components, which may only be approved for 160 bar.



Filling valve



Ultrasonic level switch



Pressure limitation valve (160 or 200 bar)

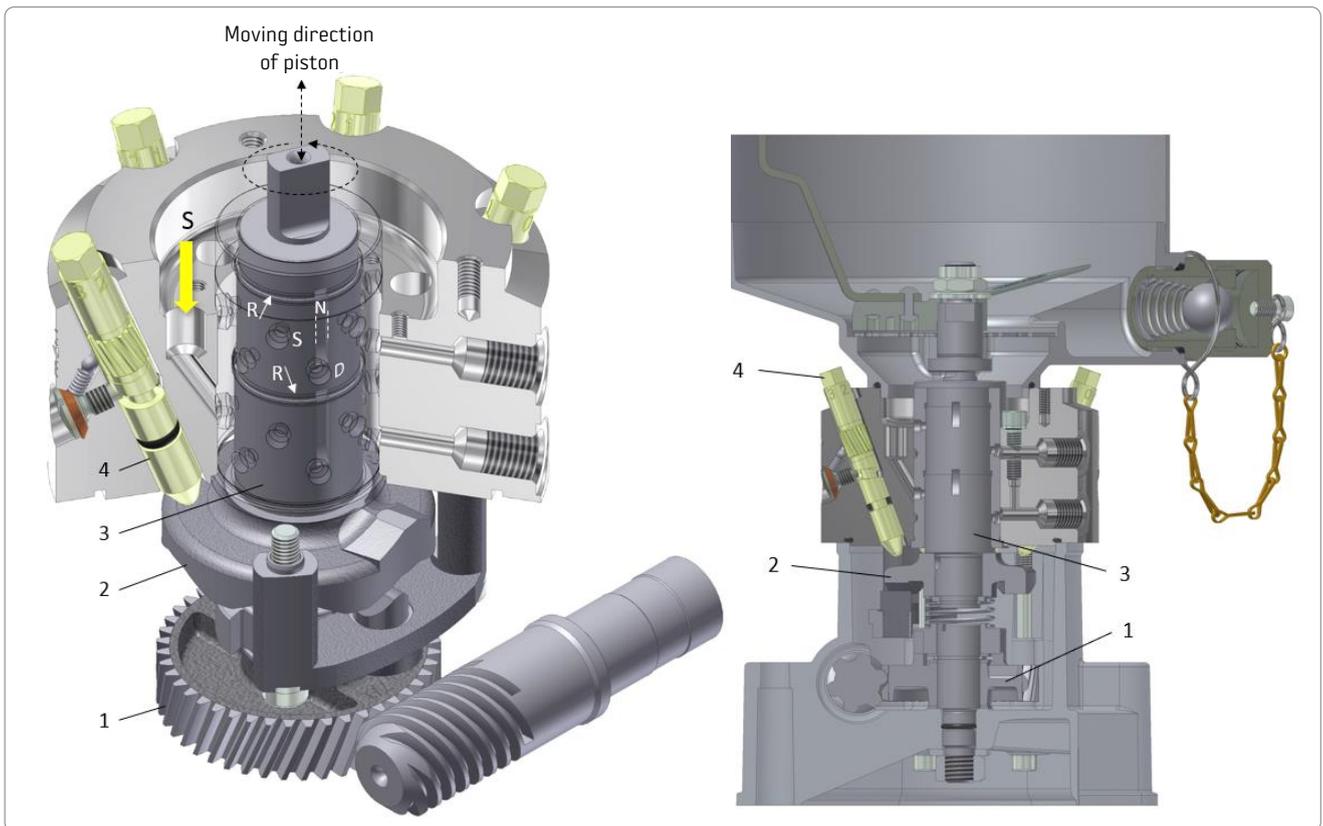
3.7 Technical details

3.7.1 Functionality

The FZ pump is a positively driven piston pump. The centrally arranged piston (3) is driven by a worm wheel (1). It performs both axial movements (stroke) and rotary movements around its own axis simultaneously. The piston's rotational speed depends on the selected gear ratio.

The lifting disc (2) has a cam on the top which successively strikes against the six setting spindles (4) arranged on the pump's circumference. It is causing a piston suction stroke each time. The stroke movement and thus the delivery volume can be adjusted at each setting spindle.

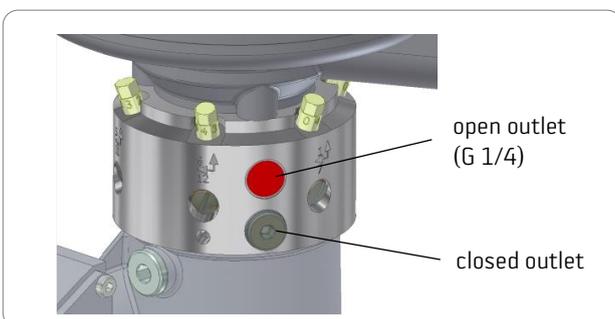
During the suction stroke, the lubricant flows from the suction chamber (S) into the piston's vertical grooves and into the ring channels (R). During the pressure stroke, the lubricant is fed from the ring channel and into the pressure channel (D) and then into the outlet openings via a vertical groove.



3.7.2 Outlet location and labelling

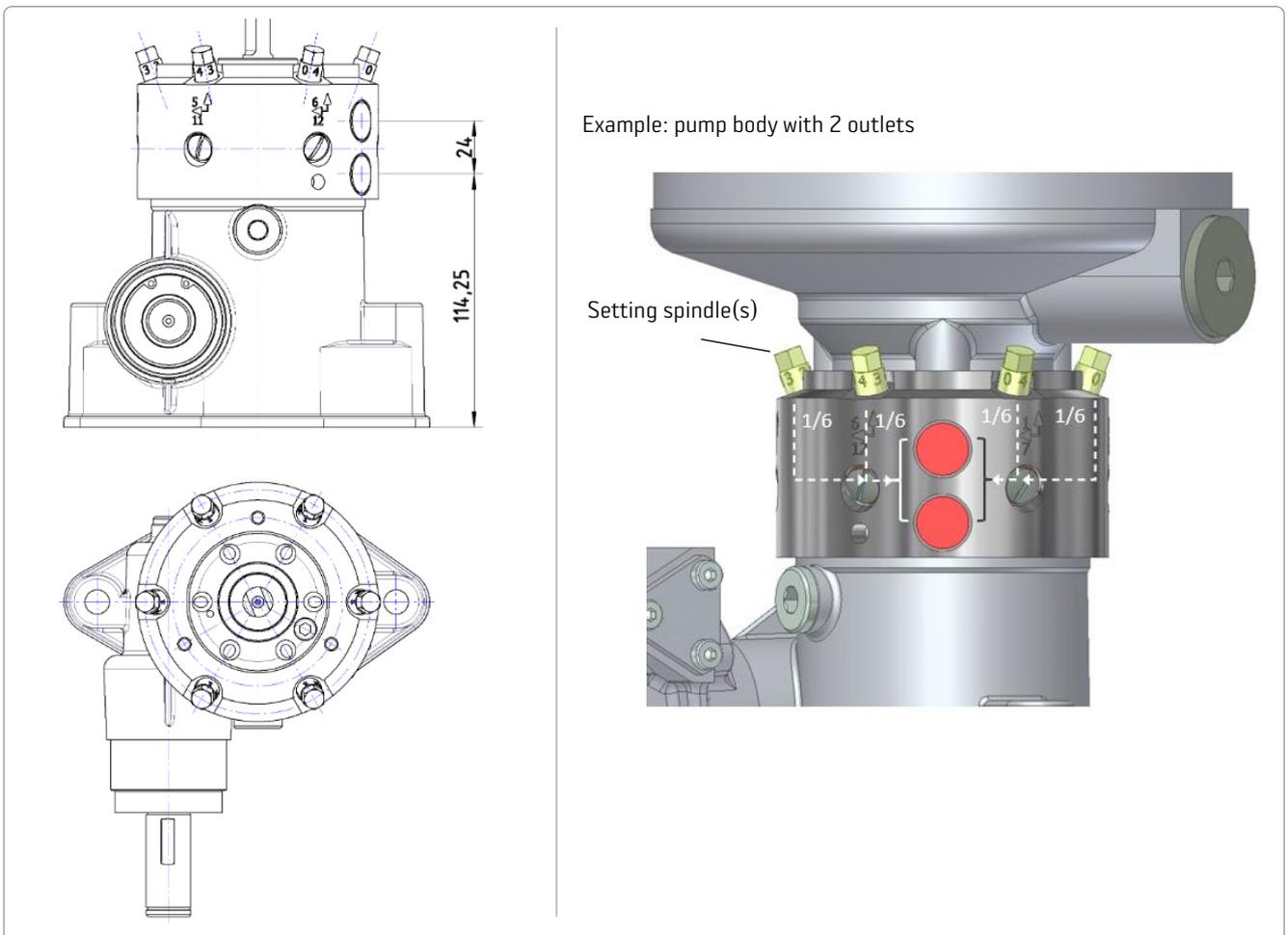
The FZ-B pump can be configured with 1 or 2 outlets. Open outlets are protected with a red plug on delivery. If the FZ-B pump is configured with 1 outlet, the upper outlet is open as standard and the lower one is shut down and closed with a screw plug.

Example of outlet assignment:



ATTENTION	
	<p>Pump damage possible</p> <p>The outlets' assignment must not be changed!</p> <p>Do not close the factory-made outlets!</p>

The outlets of the FZ-B pump are arranged as a pair below one another. The inside of the pump body corresponds to that of the FZ-A for 12 outlets. That means the delivery piston makes 6 strokes per revolution and the resulting delivery rates are summarized internally. This is why there are 6 adjusting spindles on the circumference, all of which have an effect on the total delivery rate. The marking (1/7, 2/8 etc.) is taken from the FZ-A pump. As the flow rate can only be regulated in pairs, no different flow rates can be set for each outlet with 2 outlets.



3.7.3 Delivery volume per outlet:

The guaranteed pump delivery volume when using grease is 0.1 cm^3 per piston stroke. With low-viscosity lubricants such as oil, the delivery volume can also be higher and reach max. $0.15 \text{ cm}^3/\text{stroke}$. However, all subsequent volume calculations refer to 0.1 cm^3 . The delivery volume per outlet is independent of the total number of outlets.

The pump's total delivery volume is then the sum of all outlets:

1 outlet	$12 \times 0.1 \text{ cm}^3 / \text{piston stroke}$	Total: $1.2 \text{ cm}^3 / \text{piston rotation}$
2 outlets	$6 \times 0.1 \text{ cm}^3 / \text{piston stroke}$	Total: $0.6 \text{ cm}^3 / \text{piston rotation}$

The effective delivery volume / time is determined by the choice of drive. More detailed information and calculations are provided in the sections below for the relevant drive versions. The maximum possible delivery volume is 1.0 cm^3 per outlet / min (10 revolutions or strokes / min $\times 0.1 \text{ cm}^3$).

3.7.4 Adjusting the delivery volume:

The FZ-B pump always has 6 setting spindles. All together influence the total flow rate. As described in the previous chapter, if there are 2 outlets, only one uniform regulation is possible for both outlets. Numbers 1-4 are engraved on the spindles (4 = maximum delivery volume)

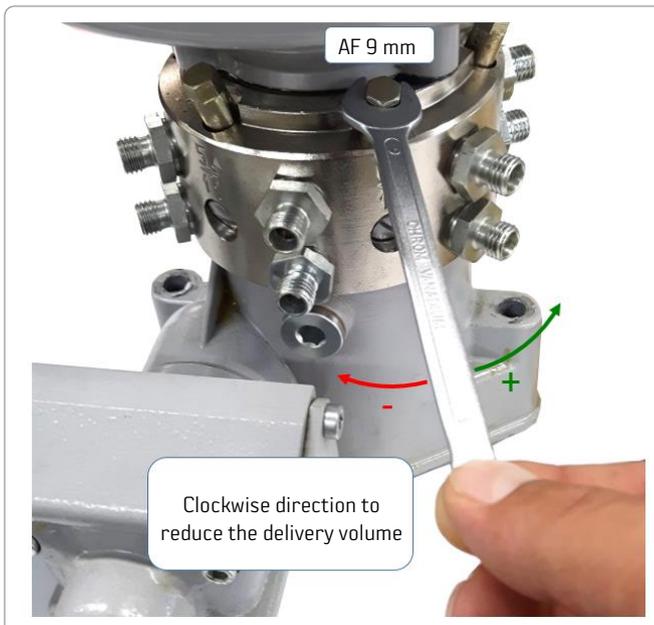
Important:

The spindle positions 1 – 4 do not cause a proportional change in volume, i.e. position 2 is not the same as 50%, for example. The actual change in the delivery volume very much depends on the lubricant used (suction behaviour) and must be tested under the given conditions. **If grease is used, the delivery volume may no longer be available when the spindle is turned to a position <2.**

Example:

In order to reduce the total flow rate by 50%, all spindles should be regulated uniformly. The same result could be achieved if 3 spindles are set to a minimum. **However, this variant leads to higher wear and we strongly advise against it.**

Please proceed as follows to subsequently adjust the delivery volume:



(The figure shows an example of an FZ-A pump body)

3.7.5 Drive types in general

The FZ pump offers a large variety of drive variants. First of all, it has to be decided whether the pump should be completely equipped with its own drive (flange motor) or whether a machine / motor provided by the customer should be used as a drive. The second selection criterion is the desired delivery volume.

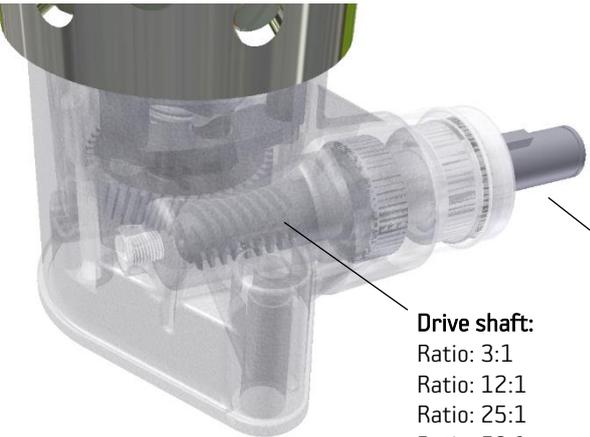
Drive provided by the customer			Pre-assembled drive
Pendulum lever	Free shaft end (with reduction gear)	Motor flange with reduction gear	Flange motor
Different gear ratios with an effect on the delivery volume			

The drive can rotate either in a clockwise or an anti-clockwise direction with the same power. Depending on the drive, different ratios are required to obtain the desired delivery volume and to maintain the feed piston's maximum rotation speed. There are four different drive shafts with different ratios that can also be combined with a reduction gear. This is necessary, for example, for a high flange motor drive speed.

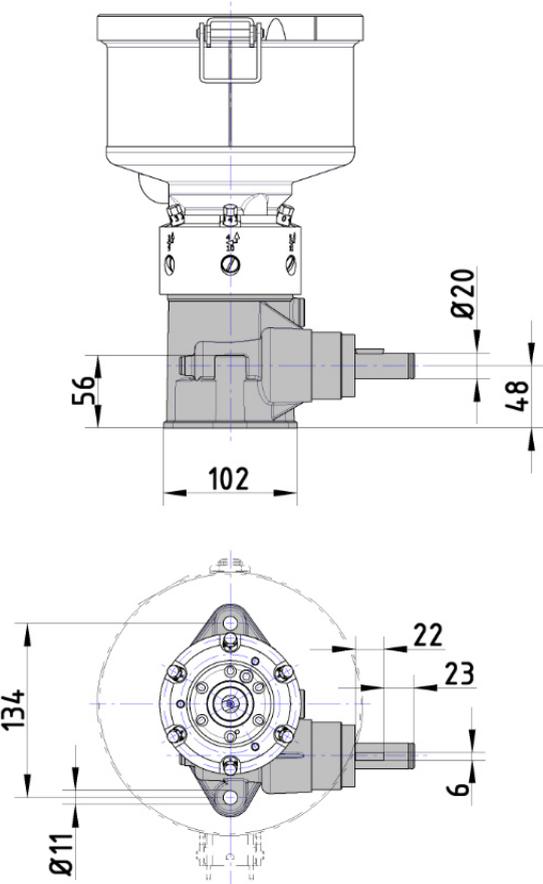
3.7.6 Drive with a free shaft end (without a reduction gear)

This assembly contains the gearbox housing with a drive shaft and worm gear. The drive shaft is mounted on ball bearings. Depending on the main gear's ratio, the drive speed may be 30 to 500 rpm.

Example: FZB02B060D00

Detailed dimensions:



Drive shaft:	Max. drive speed:
Ratio: 3:1	-> 30 rpm
Ratio: 12:1	-> 120 rpm
Ratio: 25:1	-> 250 rpm
Ratio: 50:1	-> 500 rpm

3.7.7 Drive with a free shaft end (with a reduction gear)

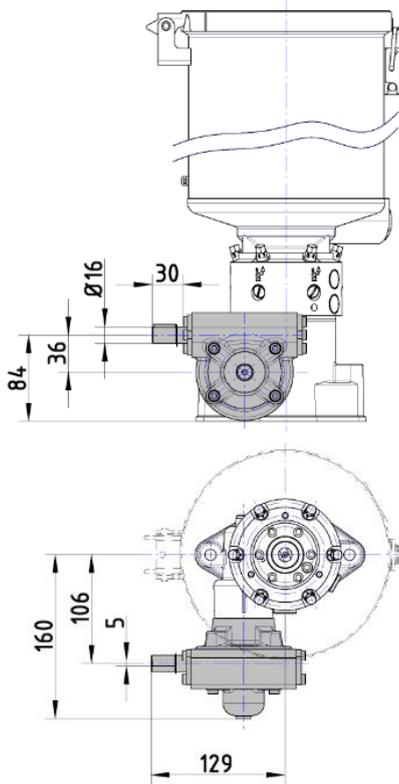
When using a drive with higher rotation speeds (e.g. three-phase motor) or to reduce the delivery volume, the FZ pump can be configured with a second worm gear.

Example: FZB02B11AA00



Drive shaft:	Max. drive speed:
Ratio: 95:1	-> 950 rpm
Ratio: 215:1	-> 2,150 rpm
Ratio: 345:1	-> 3,450 rpm

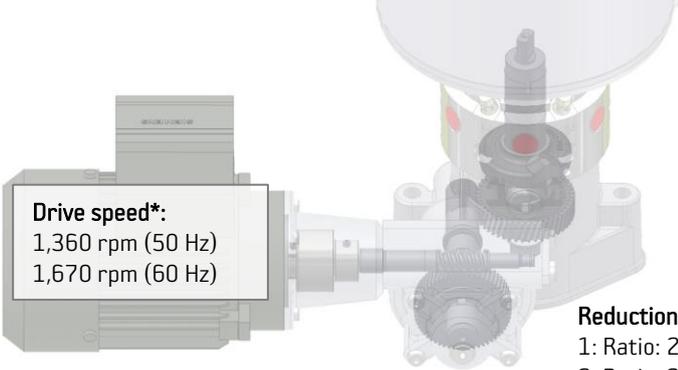
Detailed dimensions:



3.7.8 Drive with a flange motor and reduction gear

The pump configuration with its own flange-mounted drive is the most common. A reduction gear is always required to reduce the motor's rotation speed to the feed piston's permissible rotation speed. A 4-pole asynchronous motor whose shaft speed is slightly below that of the electric drive rotating field (1,500 rpm) due to functional slip is used as standard.

Depending on the make of the motor, the shaft speed range can be between 1,300 and 1,380 rpm, which has a minor effect on the delivery volume. Our standard motor's relevant shaft speed for our calculation example is **1,360 rpm** (at 50 Hz) and **1,670 rpm** (at 60 Hz), with which the following volume calculations were carried out.



Drive speed*:
1,360 rpm (50 Hz)
1,670 rpm (60 Hz)

* May vary slightly in the range of 1,300 - 1,380 rpm when using other motors

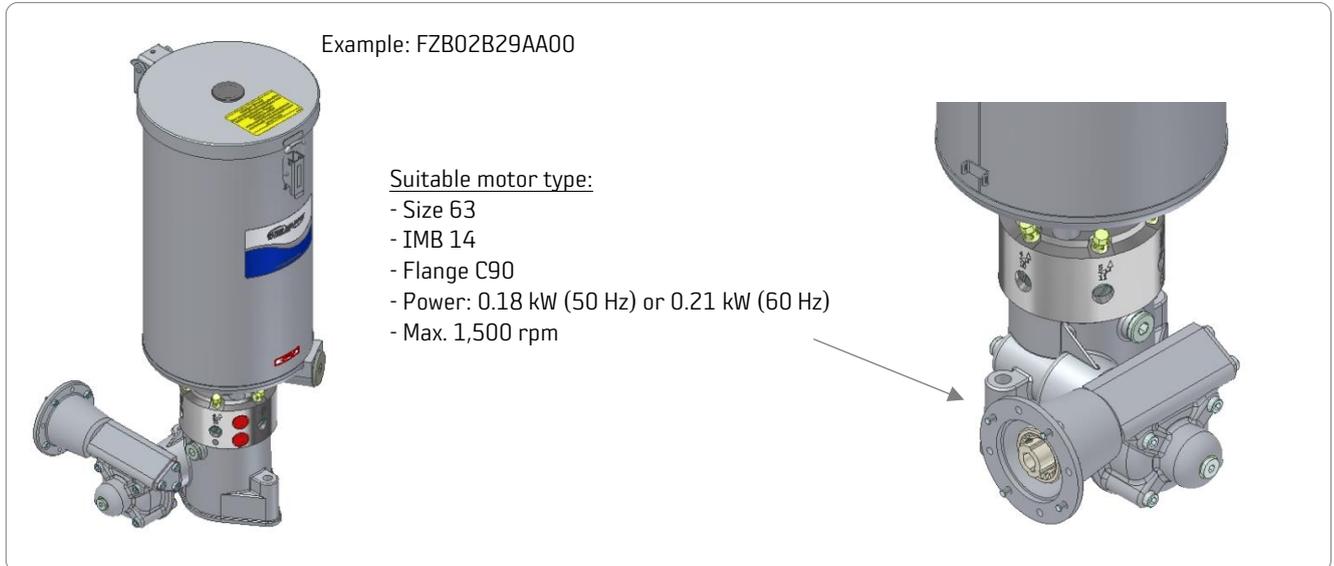
** half delivery volume with 2 outlets

Reduction gear:	Max. delivery vol. / 1 outlet (60 Hz)**:
1: Ratio: 215:1	1: ca. 9,32 cm ³ / min -> ca. 559 cm ³ /h
2: Ratio: 345:1	2: ca. 5,80 cm ³ / min -> ca. 348 cm ³ /h
3: Ratio: 710:1	3: ca. 2,82 cm ³ / min -> ca. 169 cm ³ /h
4: Ratio: 1420:1	4: ca. 1,41 cm ³ / min -> ca. 84 cm ³ /h
	Max. delivery vol. / 1 outlet (50 Hz)**:
	1: ca. 7,59 cm ³ / min -> ca. 455 cm ³ /h
	2: ca. 4,73 cm ³ / min -> ca. 283 cm ³ /h
	3: ca. 2,29 cm ³ / min -> ca. 137 cm ³ /h
	4: ca. 1,15 cm ³ / min -> ca. 69 cm ³ /h

(calculation example: 1.360 min⁻¹ : 215 = 6,32 rpm x 0,1 cm³ x 12 outlets (combined) = 7,59 cm³ / min)

3.7.9 Drive with a motor flange and reduction gear

Separately purchased special motors, for example, can be used with this variant. A motor is not included in the scope of delivery. The correct size and flange dimensions must be taken into account, as well as the approved motor performance data.



The motors are fixed with four M5x12 screws. **Tightening torque: 4 Nm**

ATTENTION	
	<p>Pump damage possible</p> <p>Using a motor with a higher power or rotation speed can cause damage to the pump! If in doubt, please contact Delimon for motor testing and approval.</p>

Motors with lower power ratings lead to a reduction in the pump's performance data.

3.7.10 Drive with pendulum lever

The version with a pendulum lever extends the possibilities for coupling the drive to a customer's superior machine. If the design prerequisites are met, the FZ pump can be synchronised to the running times of the machine / system to be lubricated without an electrical control unit. The pendulum lever is moved back and forth by a suitable component of the machine to be lubricated using an eccentric tappet, crank and rod, whereby the worm wheel is always rotated in the same direction using the switching mechanism regardless of the driving shaft's direction of rotation.

Note:

The connection between the drive unit and the pump's pendulum lever must be designed or procured by the customer.

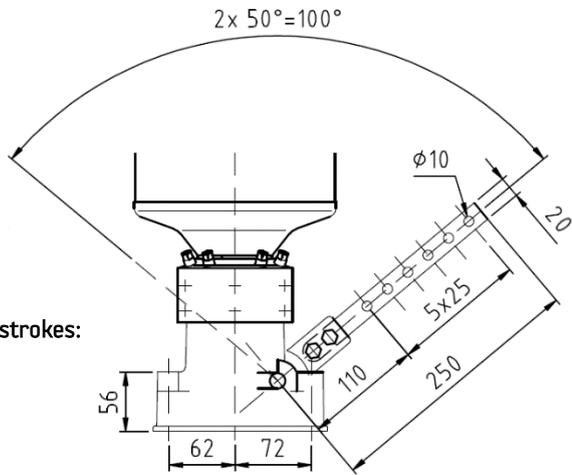
 WARNING	
	<p>Risk of injury due to the pendulum lever</p> <p>Never reach into the pendulum lever's working area and its drive fixture while the machine is running.</p>

The fixture for pendulum lever operation must be designed so that the pendulum lever is moved equally and max. 50° in both directions.

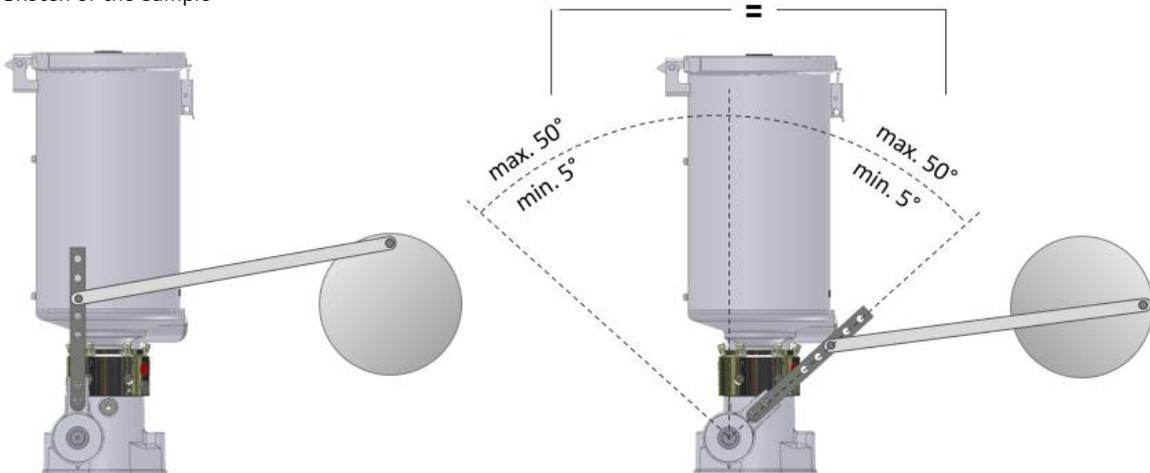
Example: FZB01B01AA00



Drive shaft: **Max. pendulum strokes:**
 Ratio: 3:1 → 18 / min
 Ratio: 12:1 → 72 / min
 Ratio: 25:1 → 150 / min
 Ratio: 50:1 → 300 / min



Sketch of the sample



ATTENTION	
	<p>Pump damage possible</p> <p>The feed piston's maximum rotation speed with the pendulum lever drive is: 6 rpm</p>

3.7.11 Reservoir

The FZ pump offers a wide range of reservoir sizes, so it can be adapted to the lubricant consumption. All reservoir variants are made of metal and are powder-coated in the standard colour RAL 7004 (C2-M). The reservoir lid can be opened on all variants as an option for filling with lubricant. On request, an ultrasonic level switch can be installed in the reservoir lid (see the section entitled 'Accessories').



A feed insert with scraper, which rotates while the pump is running, is installed in the reservoir base. The rotation speed corresponds to the piston speed (max. 10 rpm). The scraper ensures regular mixing of the lubricant and prevents deposits (when grease is used) on the inner wall of the reservoir, which can occur especially if the lubricant remains in the reservoir for a long time.

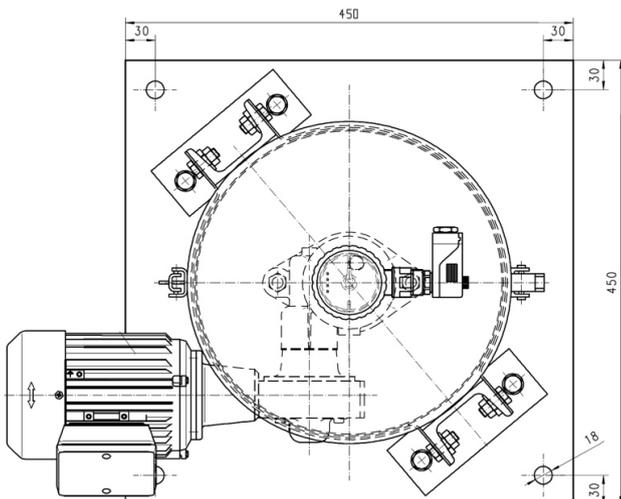
A screen plate is installed in the reservoir base to protect the pump suction chamber against coarse dirt.

	WARNING	
 	<p>Hand injury due to the rotating scraper Never reach into the reservoir while the pump is running. There is a risk of hands and fingers being crushed and cut off. Top up the lubricant only when the pump is at a standstill and secured against being switched back on again! No unauthorised access! If possible, secure the reservoir lid with a padlock.</p>	
	CAUTION	
	<p>Injury due to crushing at the reservoir lid Take care when closing the reservoir lid. Wear PPE.</p>	



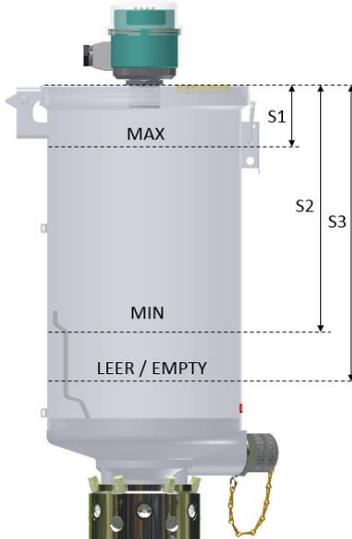
Note: The reservoir lids can be secured with a padlock (not included in the scope of delivery) to prevent opening by unauthorised individuals. On the one hand, this is a safety measure to prevent anyone from reaching in during operation. On the other hand, it protects against contamination or foreign objects in the lubricant.

The 15 l and 30 l versions are available with a reservoir support and a base plate as an option. They have following dimensions and mounting sizes:



3.7.12 Level switches (accessories)

An ultrasonic level switch with up to 3 switching points is available to indicate the filling level. An optical indicator on the sensor indicates the switching points that the current level is in between. The signal can be evaluated with a control unit and automatic filling using an external (drum) pump can be implemented with the 'Max. filling level pre-warning' setting in the delivery state.



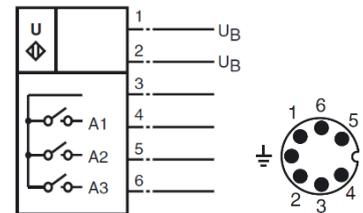
If the FZ pump is configured with a level switch, this is already taught-in for the selected reservoir size. Adjustment is not necessary.

The level switch can also be ordered separately under the code number [769516011](#) and retrofitted. In this case, the switching points may need to be adjusted according to the table below:

Switching points:

Reservoir	S1	S2	S3
2.5 l	No monitoring possible		
8 l	60 mm	240 mm	290 mm
15 l	60 mm	265 mm	315 mm
30 l	60 mm	335 mm	385 mm

Wiring diagram:



Electrical data:

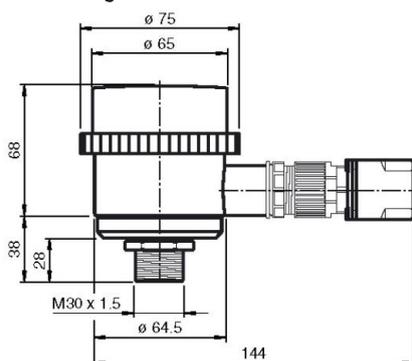
Operating voltage U_B :	20 V - 252 V DC / AC, 47 Hz - 63 Hz
Power consumption	Approx. 70 mA at 30 V DC (all relays in the operating position)
Switching output 1- 3	Relay
Contact material	Gold-plated silver alloy
Max. switching voltage	150 V DC, 252 V AC
Max. switching current	3 A, ohmic
Min. switching current	0.1 mA, 100 mV DC
Switching capacity	90 W at 30 V DC, 750 W (250 V AC)

General data:

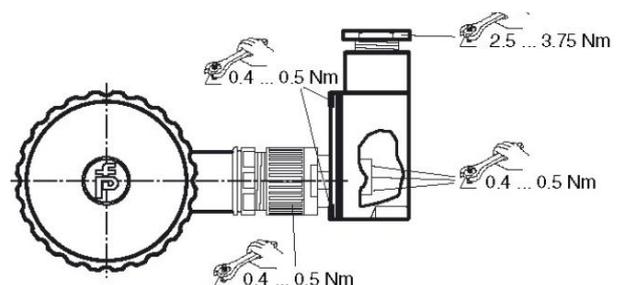
Detection range	60 mm - 550 mm
Reference value	100 mm x 100 mm
Sound beam's opening angle	Approx. 5° at -6 dB sound pressure
Converter frequency	Approx. 380 kHz
Repeatability	< 0.5%, < 0.5 mm
Relay contacts' response time and release time	Approx. 10 s
Ambient temperature	-20°C - +60°C
Protection class	IP65

Approvals: Certified by China Compulsory Certification (CCC)

Dimensioned drawing:



Tightening torques:



A separate operating manual with programming instructions and additional technical details with the code: [OM_20XX_X_E_76951_6011](#) is supplied with the level switch when ordered.

3.7.13 Pressure limitation (accessories)

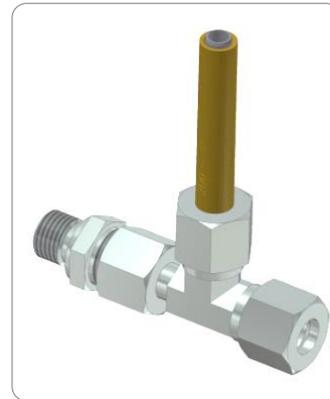
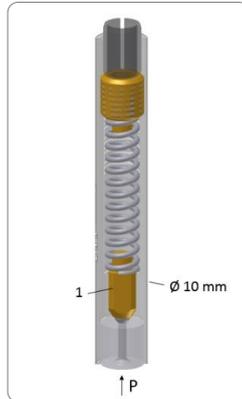
The FZ pump should only be operated with pressure limitation valve(s). In the event of overpressure (e.g. due to blocking distributors or clogged lines), both the pump and connected system components are protected against damage and any resulting hazards are avoided.

If the customer / operating company does not provide any suitable overpressure protection, we recommend selecting the appropriate accessory option. The FZ pump is then supplied with pre-assembled pressure limitation valves (type: 'NU-A'). These are available in two pre-set pressure levels (in stainless steel too as an option):

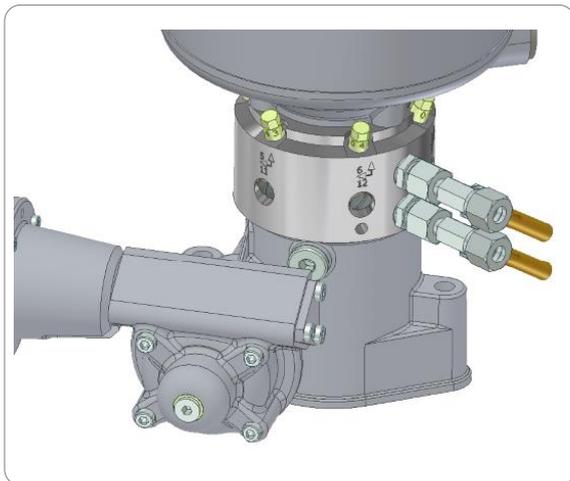
- 160 bar (valve code no.: 38132-1211, assembly w. screw connections: 38132-1711)
- 200 bar (valve code no.: 38132-1241, assembly w. screw connections: 38132D009)

NU-A mode of operation

If pressure in the central lubrication system exceeds the set value, a spring-loaded piston (1) is lifted, causing the lubricant to escape into the open or to flow back to the pump reservoir via a return line or to the pump's suction chamber.



Example: FZ-B pump with 2 pre-installed pressure limitation valves



ATTENTION		
	<p>Pump and system component damage possible</p> <p>The maximum operating pressure for the FZ pump is 200 bar.</p> <p>When selecting or setting the pressure limitation valve, the maximum permissible operating pressure of <u>all connected system components</u> must be taken into account.</p>	

Note: In the event of overpressure, lubricant escapes at high pressure from the pressure limitation valve's opening. Especially when using oil or other low-viscosity lubricants, it must be expected that a small volume (drops) of oil will splash out in the near-distance range.

WARNING		
	<p>Risk of injury due to lubricant splashing out The pressure limitation valves must be positioned so that the opening is not directed at people, workstations, machines or hot surfaces.</p> <p>If necessary, suitable protective covers must be installed.</p> <p>Wear PPE during maintenance or adjustment work!</p>	

CAUTION	
	<p>Risk of slipping due to leaking lubricant Clean up residues of leaked lubricant immediately.</p>

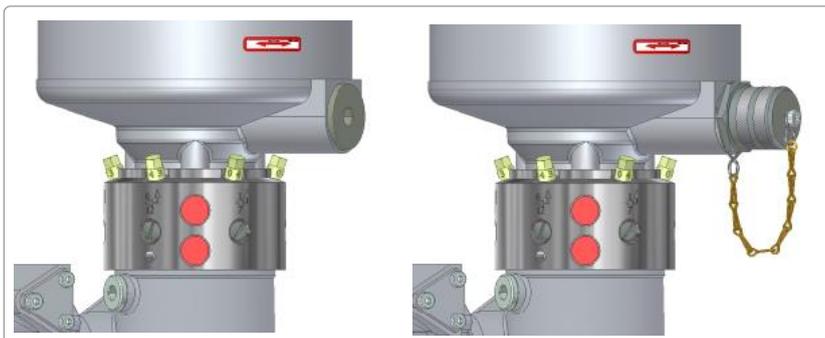
If the valve triggering remains undetected for an extended period of time (> 1 day in continuous operation), it is possible that the entire contents of the reservoir may escape via the valve. The pump operating company must ensure that suitable collection or recirculation precautions are taken to prevent any risks to people and the environment. The valve can be connected to a 10 mm recirculation line, for example. An inspection option must still be guaranteed.

Note: If the FZ pump is used for a progressive system, overpressure can be detected early on by exceeding a programmed monitoring time using a downstream monitored lubricant distributor.

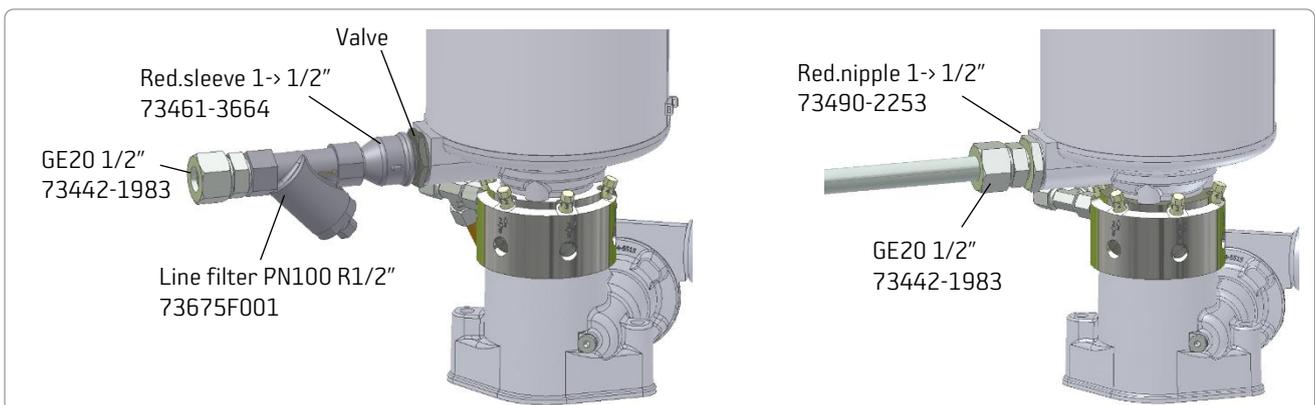
A separate operating manual with the code: PL_20XX_X_E_38132 is supplied with the pressure limitation when ordered.

3.7.14 Filling valve (accessories)

Each variant of the reservoir has a 1" filling connection at the bottom. A sealing plug (left image) is screwed into this as standard, or a 1" filling valve (right image) is screwed in as an option.



With the help of the filling valve, a filling line can be easily connected without a ball valve or solenoid valve, since the screwed-in valve prevents the reservoir from leaking. Below is one example each of a filling connection with a valve and line filter (not included in the scope of delivery) and direct pipe connection without a valve.



Further instructions for filling the reservoir can be found in the section entitled 'Commissioning'.

3.8 Coding and order sample

Pump type

FZ-B pump

Number of outlets

Outlets: 1 / 2

Revision

Level B

Drive type: pendulum lever

Ratio: 3:1 / 12:1 / 25:1 / 50:1

Drive type: free shaft end

Ratio: 3:1 / 12:1 / 25:1 / 50:1

Drive type: reduction gear

Ratio: 95:1 / 215:1 / 345:1

Drive type: reduction gear and motor, 400 - 460 V / 50 or 60 Hz

Ratio: 215:1 / **345:1 (default)** / 710:1 / 1420:1

Drive type: reduction gear and motor, 500 V / 50 Hz

Ratio: 215:1 / 345:1 / 710:1 / 1420:1

Drive type: reduction gear and motor flange

Ratio: 215:1 / 345:1 / 710:1 / 1420:1

Drive position

Without drive position (for free shaft end and pendulum lever)

Drive position 1 left (default)

Drive position 5 right

Reservoir

Reservoir **8 l (default)** / 15 l / 30 l / 2.5 l

30 l reservoir + reservoir support with base plate, 450 x 450 mm

15 l reservoir + reservoir support with base plate, 450 x 450 mm

Accessories

Without accessories

Level switch ultrasonic

Filling valve

Level switch ultrasonic + filling valve

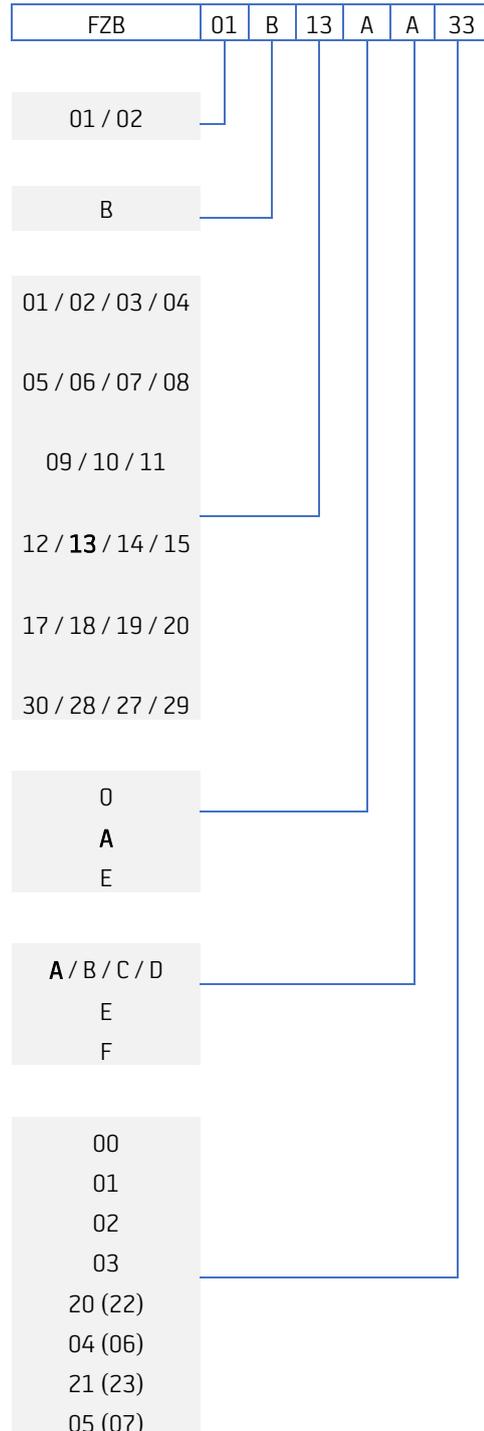
1 x pressure limitation 160 (200) bar, d=10 mm

2 x pressure limitation 160 (200) bar, d=10 mm

1 x pressure limitation 160 (200) bar, level switch and filling valve

2 x pressure limitation 160 (200) bar, level switch and filling valve

Code:



4. Transport, handling and storage

4.1 Checking the delivery

Before installation, check the delivery to ensure it is complete and in a good visual condition. Recognisable transport damage must be reported to the carrier immediately. No installation / commissioning may take place in this case. If the delivery is incomplete, please contact our Customer Service immediately!

4.2 Tools for transport and handling

Always use suitable lifting equipment for transport and handling. Wear PPE (gloves, safety boots).

 CAUTION		
	<p>Risk of slipping due to leaking lubricant Ensure that no lubricant leaks while the pump is being transported.</p> <p>Transport the pump vertically (reservoir lid at the top)!</p>	 

4.3 Storage conditions

- Storage: preferably in original packaging
- Store vertically (reservoir lid at the top)
- Use an oil-tight base or reservoir
- Select a storage location that is protected against dust, moisture, extreme temperature fluctuations, vibrations and other mechanical effects
- Observe the approved temperature range

5. Assembly, installation and commissioning

Check the delivery before installation (see 4.1.) Installation and commissioning may only be carried out by qualified personnel and in compliance with this operating manual.

5.1 Suitable installation locations

- Keep a sufficient distance from moving parts and sources of heat or cold.
- If necessary, take precautions according to the pump's and the attached components' IP protection class and permissible ambient temperature.
Note: On request, the FZ pump can be supplied as a pump unit with protective housing.
- Comply with legal regulations, specifications and safety distances.
- Choose a solid mounting surface that is as free as possible from vibrations or movements and has high acceleration.
- Ensure access to the pump for safe maintenance, inspection (of monitoring equipment) and filling.
- Ensure protection against severe contamination or moisture to ensure that the type plate and warning notices are permanently legible.
- If all of the above conditions are met, a central installation location is preferred for short line distances.

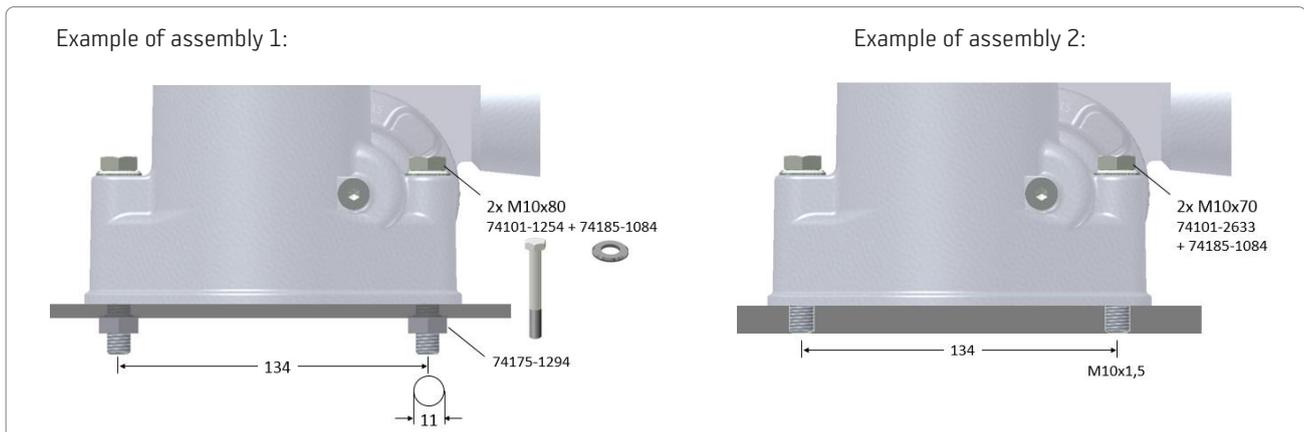
5.2 Minimum installation dimensions

The pump's basic dimensions are given in section 3.4. Where space is limited, it is particularly important to ensure that the height is sufficient. In addition to the heights specified in the table below, we recommend adding an extra min. 300 mm for filling and visually inspecting the inside of the reservoir.

Reservoir	Pump height with the lid open
2.5 litres	529 mm
8 litres	764 mm
15 litres	855 mm
30 litres	995 mm

5.3 Fixation options

The pump must be mounted vertically, on a flat surface, so that it is free of stress. Two screws are required for fixation, according to the following examples of assembly below. Assembly can be carried out with commercially available tools.



The tightening torque for M10x1.5 (8.8) screws is 49 Nm.

5.4 Assembling lubrication lines and system components

Before commissioning the pump, the outlet lines and, if necessary, other system components such as lubricant distributors are installed. Please note the following in this respect:

- The pipe installation may only be carried out by qualified specialists using suitable standard tools.
- Long lines, especially lubrication point lines between the distributor outlet and lubrication point, should be installed pre-filled. This speeds up commissioning and ensures that the lubrication points are supplied immediately.
- All system components' operating manuals must be observed.
- The recommended tightening torques for the pipe fittings used must be observed.

ATTENTION	
	<p>Damage or blockages in the lubrication system possible</p> <p>It is essential to check and clean (e.g. by blowing out) pipelines for dirt and chips before assembly and after each sawing or cutting operation.</p> <p>Protect stored pipe lengths from contamination with closing caps.</p>

5.5 Electrical connection

The motor must be connected according to the circuit diagram. Suitable motor protection is required according to the motor's performance data and local regulations. If no Delimon electrical control unit is included in the scope of delivery, the motor protection must be installed by the customer. Only then may the pump be connected and put into operation.

 DANGER	
	<p>Danger of death due to electric shock</p> <p>The pump may only be connected to the electrical system by a qualified electrician.</p> <p>Connect the protective earthing conductor correctly!</p> <p>Take notice of the motor data sheet and documentation!</p>
	 

5.6 Filling the pump reservoir and lubrication lines

The FZ pump is preferably filled using the filling connection at the reservoir base (with an optional filling valve) or alternatively using the open reservoir lid.

When filling the pump for the first time, we recommend filling it with oil up to the screen plate at the reservoir base. This speeds up the bleeding process. To reduce air pockets, lubricant should be filled directly at the screen. This is done automatically using the filling connection.

Proceed as follows when filling using the reservoir lid:

- Use a suitable filling pump with a hose (Ø: 10)
- With the pump switched off, push the hose into the reservoir close to the screen plate in the reservoir base
- Fill the reservoir to 1/4 full.
- Remove the hose
- Switch on the pump and let it run with the max. delivery volume (setting spindle stage 4)
- Let the pump run until the lubricant escapes evenly and air-free at each outlet
- Switch off the pump and connect the lubrication lines. Before assembly, the lubrication lines must be cleaned by tapping and blowing out and pre-filled using a grease gun. Pre-filling speeds up the commissioning process and ensures the supply of lubricant to the lubrication points after commissioning.
- Switch on the pump and let it run until lubricant emerges air-free at the end of the lines.
- With the pump running, fill the reservoir completely from above using the filling hose



Example of filling using the reservoir lid

ATTENTION	
	<p>Malfunction possible due to contamination in the lubricant</p> <p>Check the lubricant reservoir, lubricant and filling aids for contamination and clean them if necessary.</p>
	<p>Bearing damage due to undersupply possible</p> <p>Manually fill the bearings and lubrication line before assembly to ensure the lubricant supply after commissioning</p>

	<p>Level switch malfunction possible</p> <p>If the pump is equipped with an ultrasonic level switch, it must not come into contact with lubricant.</p> <p>The minimum distance between the level switch and lubricant in the reservoir must be at least 60 mm!</p>
-----------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Filling using the filling connection:

Connect the filling line to the filling connection and pump lubricant into the reservoir using a suitable pump. At the same time, let the pump run (with free outlets) until the grease escapes without bubbles.

Important: The filling process should always be carried out under observation, with two people if possible.

If the bearings to be connected are also pre-filled with lubricant, the pipelines can be connected to the lubrication points. The system can then be put into operation.

Procedure if the wrong lubricant was accidentally added:

- Switch off the pump and secure it against being switched on again.
- Empty / clean the reservoir as good as possible.
- Add the correct lubricant.
- If necessary, run the pump with free outlets to pump lubricant out of the inaccessible pump body.

5.7 Commissioning the pump or lubrication system

Once professional mechanical and electrical installation has been carried out in full with pre-filled lines and a filled pump, controlled system commissioning can take place.

5.7.1 Manufacturer's settings

The pump is delivered with the following settings:

- Maximum delivery volume (all setting spindles in position 4)
- Pre-set level switch switching points (if the level switch is available), suitable for the selected reservoir size
- Pre-set pressure limitation valves according to the order (160 or 200 bar)

5.7.2 Checks before commissioning for the first time

Checklist before commissioning:

- Is there visible damage, or is assembly improper or unfinished (loose parts)?
- Are there visible leaks?
- Are all components' documents and data sheets available and known to the commissioning personnel?
- Is the safety equipment (e.g. pressure limitation valves, emergency shutdown switches) present and correctly installed?
- Has the electrical connection been made correctly?
- Is the intended use of all the components ensured?
- Are all security precautions taken?
- Has the correct lubricant been added, free from contamination?
- Does the system comply with the project planning specifications?
- Are all the responsibilities regulated?
- Are the operating personnel trained?

5.7.3 Measures during commissioning

- During commissioning, the pump and the entire system are checked for leaks and other defects. Any defects discovered must be reported immediately to the responsible person and repaired by a qualified specialist.
- Vent the system (see 5.6). If lubricant distributors are used, please refer to the information in the relevant assembly manual.
- Predefined lubrication intervals must be verified and maybe corrected, based on the actual delivery volumes (also see 5.8).
- Safety equipment installed by the customer (e.g. emergency shutdown switches) must be tested during commissioning.

- Factory pressure limitation valves on the pump only open in the event of overpressure, which is usually caused by blockages in the system. A blockage must be simulated to test whether a valve is working. A pressure gauge or pressure switch behind the pump is necessary for testing. Please also observe the safety instructions in section 3.7.13
- Any corrections to the system layout or setting values must be updated in the system documentation after commissioning.

5.8 Determining running and break times

In many applications, lubricant is distributed as evenly as possible to the lubrication points at short intervals. Accordingly, the pump running and break times can be regulated using a higher-level control unit (in case there is no mechanical drive regulating the running times).

After commissioning, there may be deviations from calculated lubricant volumes and running times. This is due to many influencing factors, such as lubricant, system size, pipe dimensions and ambient conditions. This is why the values must be determined under given conditions during commissioning and why the programming must be adjusted if necessary.

A separate system description is available for further details about controlling progressive systems.

5.9 Examples of applicable lubrication systems

The FZ pump is suitable for directly supplying up to 2 lubrication points (multi-line system), or for use with progressive distributors (progressive system).

5.9.1 Multi-line system

The FZ pump in a multi-line system:

- Direct connection of the lubrication points to the pump outlets
- For up to 2 lubrication points in close proximity
- Suitable for identical or similar proportions

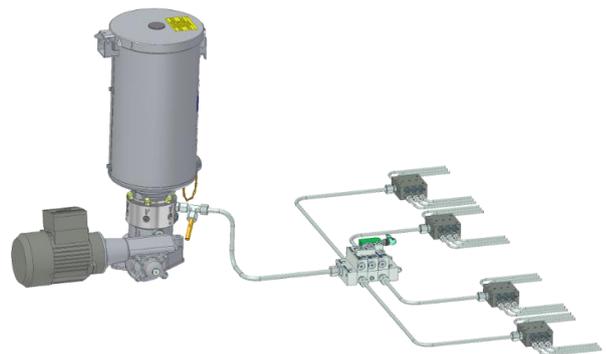


For multi-line systems the FZ-A pump should be preferred.

5.9.2 Progressive system

The FZ pump in a **progressive system** with downstream distributors:

- Usually a single pump outlet that supplies one distributor and potentially several downstream sub-distributors
- Efficient piping
- Volume control and monitoring possible
- Suitable for a large number of lubrication points
- Large proportions can be achieved



Suitable distributors for progressive systems:

M2500



PVB



ZP-A



ZP-B



The QR code on the left takes you to the Download area for the relevant product documentation.

6. Operation

6.1 Operating safety

The safety instructions according to section 2 apply to operating the pump. The operating company is responsible for compliance with the safety instructions.

6.2 Operating modes

The pump (incl. standard drive) is designed for continuous operation. The normal case, however, is interval operation, which is specified by the operating company. After commissioning, the lubrication intervals should be checked regularly and adjusted if necessary.

6.3 The pump's or lubrication system's control unit

The pump's control unit depends on the drive variant.

- If there is a mechanical drive (e.g. via a pendulum lever), the pump runs automatically, synchronously with a driving machine.
- If an electric drive is used, a power supply is required to start the pump. In the simplest case, this can be implemented with a switch and suitable motor protection. As a rule, an electrical control unit (e.g. Delimon pCo, Siemens LOGO or S7-1200) is used for the purpose of automating and processing monitoring electronics.

 Further information about controlling progressive systems can be found in our system description.

6.4 Topping up the lubricant

Following commissioning, lubricant must always be topped up in good time before the reservoir is emptied. Otherwise air may enter the system which in turn will lead to malfunctions. There is also a risk of the bearings being undersupplied undetected.

Topping-up time:

When using a level switch and control unit (recommended), an automatic warning is issued when the defined minimum level is reached. The empty signal is a signal to stop the pump to prevent complete emptying.

If the pump is not equipped with a level switch, the graphic in section 3.7.12 with measuring points provides guidance for determining the refilling time or MIN level.

ATTENTION	
	<p>Malfunction possible due to contamination in the lubricant</p> <p>Only use clean lubricant!</p> <p>Check the lubricant reservoir, lubricant and filling aids for contamination and clean them if necessary.</p> <p>Observe the tips below!</p>

Tips for avoiding contamination in the lubricant:

- Keep the pump and its surrounding area as clean as possible!
- Before each filling process, remove any contamination from the pump using the reservoir lid!
- Use a filling pump!
- Store the lubricant under clean conditions!
- Regulate access to lubricant supplies and responsibility for filling!
- If necessary, clean auxiliary manual filling aids (e.g. shovel, trowel) after each filling process to prevent dirt from sticking!
- Do not leave the reservoir lid open!

6.5 Shutting down the pump

In the event of temporary shutdown, the following measures are to be implemented:

- Disconnect the pump from the power supply
- Release the residual pressure in the downstream lubrication system (see section 7.2)
- Empty the reservoir and dispose of lubricant residues properly
- Clean the pump

 WARNING		
	<p>Hand injury due to the rotating scraper Never reach into the reservoir while the pump is running. There is a risk of hands and fingers being crushed and cut off. Empty the reservoir only when the pump is disconnected from the power supply.</p>	

Also observe the safety instructions in the section entitled 'Cleaning'.

In the event of final decommissioning, please observe section 10 entitled 'Disassembly, decommissioning and disposal'.

7. Inspection, testing and maintenance

The FZ pump is largely maintenance-free.

However, we advise performing a regular visual inspection of the pump, as well as the electrical and mechanical connections, e.g. during each filling process, or at least every three months. It must also always be ensured that the signage is legible and that heavy contamination is removed in good time.

Gears:

The gears are filled with lubricant grease (Gearmaster LX00 (Lubritech) or similar) by the manufacturer. The filling must only be replaced when disassembling and cleaning the gears. To do this, open the sealing plugs shown in green in the figure below.



7.1 Testing the pressure

To check the FZ pump's pressure build-up, you need:

- 1x pressure gauge up to 250 bar (or electronic pressure switch)
- 1x adjustable pressure limitation valve (e.g. SA-G)

Procedure:

- Loosen and remove the outlet screw connection with pipeline and, if necessary, the NU-A pressure limitation valve.
- Let the pump run without pressure for approx. 30 s (collect lubricant) until the lubricant emerges without any bubbles.
- Switch off the pump.
- Connect the pressure gauge and, behind it, the adjustable pressure limitation valve.
- Set the pressure limitation valve to 200 bar.
- Switch on the pump and monitor the pressure. The pressure should reach 200 bar after a few seconds of operation. Lubricant must then slowly escape from the downstream pressure limitation valve at the outlet.

If the pump does not reach the pressure, you will find potential causes in section 9 ('Troubleshooting') below. Once the pressure test has been completed successfully, reconnect the pump to the system and allow it to run normally.

ATTENTION	
	<p>Pump damage possible</p> <p>Carry out this test only under constant supervision and with direct access to shutdown equipment.</p> <p>If the pressure limitation valve does not open and the pressure rises above 200 bar, switch off the pump <u>immediately</u>. 250 bar must never be exceeded under any circumstances.</p>

7.2 Relieving the system pressure

When checking the connection screw connections at pump outlets and all downstream system components, you must expect residual pressure in the system, e.g. due to blockages in the system.

Process for relieving system pressure:

- Wear PPE
- Switch off the pump and secure it against being switched back on again
- Provide a base or a collection basin for lubricant (drops) escaping for a short time
- Carefully loosen the union screw(s) at each pump outlet until lubricant escapes (make gradual half-turns with brief interruptions).
- Carefully loosen the union screw(s) until no further lubricant escapes

Important:

Only small volumes of lubricant escape during the relief process. Depending on the system pressure and the medium's viscosity, sudden escape cannot be ruled out even over close distances. PPE is therefore absolutely essential.

The following safety instructions apply to all maintenance and inspection activities:

 WARNING		
  	<p>Risk of injury Before performing any inspection work, disconnect the pump from the power supply and secure it against being switched on again.</p> <p>Wear PPE!</p> <p>Observe potential residual pressure in the system and relieve it in a controlled manner if necessary.</p> <p>Remove any leaked lubricant immediately.</p>	  

 CAUTION		
	<p>Skin irritation possible Avoid contact between the skin and lubricants at all costs.</p> <p>Wear PPE.</p> <p>Following contact with the skin, wash lubricant off immediately.</p> <p>Observe the lubricant manufacturer's safety data sheet.</p>	 

ATTENTION	
	<p>Loss of warranty claims possible</p> <p>Do not independently disassemble the pump within the warranty period.</p> <p>Always contact Delimon's Customer Service first if malfunctions occur.</p>

8. Cleaning

Always keep the FZ pump in good condition. This means that the warning notices and type plate must be legible at all times. The pump function and inspection must not be affected by contamination. Particular attention must be paid to cleanliness when the pump is being filled manually using the reservoir lid.

Only material-compatible, solvent-free cleaning agents may be used for cleaning.

 DANGER		
	<p>Danger of death due to electric shock</p> <p>Disconnect the pump from the power supply and secure it against being switched back on again before starting cleaning!</p> <p>Electrical and live parts may only be cleaned by a qualified electrician!</p> <p>Do not touch electrical or live parts with wet hands or cloths!</p> <p>Wear PPE!</p>	

 WARNING	
	<p>Fire hazard</p> <p>Do not use flammable substances for cleaning.</p>

 CAUTION		
	<p>Skin irritation possible</p> <p>Avoid contact between the skin and lubricants at all costs.</p> <p>Wear PPE.</p> <p>Following contact with the skin, wash lubricant off immediately.</p>	

ATTENTION	
	<p>Pump damage and functional impairment possible</p> <p>Do not use high-pressure cleaners or steam cleaners for cleaning (observe the IP protection class!)</p> <p>Keep the reservoir closed during cleaning. The cleaning agent or cleaning water must not mix with lubricant in the reservoir.</p> <p>Do not use aggressive cleaning agents.</p>

The inside of the reservoir does not need to be cleaned regularly when it is used as intended.

9. Troubleshooting, fault elimination and repair

Fault	Potential cause(s)	Remedy
The pump motor is not running	Level switch empty signal	Check the filling level or, if necessary, that the level switch is working
	Fault message issued by a higher-level control unit	Check the control unit for faults, possibly triggered by other system components
The motor is running, but the pump is not delivering	The lubricant is used up	Top up the lubricant (in this case, observe the instructions for commissioning for the first time in section 5.6)
	There are air bubble(s) in the lubricant	Vent the pump (see section 5.6)
	The delivery volume is set too low (position 1 when using grease)	Turn the setting spindle up to position 4 and then, while observing the delivery volume, adjust it down to max. level 2
	Damage inside the pump e.g. due to too high a back pressure	Contact Customer Service; send the pump to Delimon. If the scraper in the reservoir does not rotate when the motor is running, the problem can be isolated to the coupling on the motor.
The motor is running, but the pump does not build up any pressure, or only builds up a little pressure	Only low back pressure in the system	No action necessary; only the required pressure that may be further below the pump's operating pressure is built up
	Leakage in the system	Check the entire lubrication system for leaks and eliminate them if necessary
	Setting spindle(s) or feed piston(s) worn	Contact Customer Service; send the pump in
Level switch malfunction	Lubricant residues on the level switch	Clean the level switch
	Too much lubricant in the reservoir	Keep a minimum distance of 60 mm between the sensor and lubricant filling
The pressure limitation valve opens	The system pressure is too high e.g. due to blockages, often caused by contamination	Loosen the line upstream of the lubrication point or (if present) the first lubricant distributor and systematically limit blockages
	The pressure limitation valve is defective	Check the system pressure using a pressure gauge. If necessary, replace the valve if there is no other possible cause.

If a problem with the pump cannot be solved using the measures described, please get in touch with your contact at Delimon. The pump can be sent in for inspection and repair.

Important:

- Before returning the pump, empty the reservoir and clean the outside of the pump!
- Pack the pump properly and take suitable measures to prevent the operating equipment from leaking!

Alternatively, you can place an order for a Delimon service technician to check the pump on your premises.

ATTENTION	
	<p>Loss of warranty claims possible</p> <p>Do not independently disassemble the pump within the warranty period.</p> <p>Always contact Delimon's Customer Service first if malfunctions or damage occur(s).</p>

Numerous spare parts kits are available for the FZ pump (see the overview in the annex). A stock of suitable spare parts speeds up repair measures on site and minimises downtimes where necessary.

10. Disassembly, decommissioning and disposal

Decommissioning the pump requires professional disassembly (mechanical and electrical), which may only be carried out by qualified specialists wearing PPE. No special tools are required for disassembly.

 DANGER		
	<p>Danger of death due to electric shock</p> <p>Disconnect the pump from the power supply and secure it against being switched on again before starting disassembly!</p> <p>Electrical disassembly may only be carried out by a qualified electrician.</p>	
 WARNING		
	<p>Hand injuries possible</p> <p>Only reach into the reservoir when the power is off.</p> <p>Wear PPE.</p>	
	<p>Risk of falling due to leaking lubricant</p> <p>Clean up leaked lubricant immediately.</p>	 

The following procedure must be followed for decommissioning:

- Have a collection basin for escaping lubricant ready.
- Disconnect the pump from the power supply and secure it against being switched back on again.
- Disconnect the electrical connection cables.
- If necessary, relieve residual pressure in the system (see section 5.2).
- Disassemble the connecting lines at the outlets and secure them against leakage.
- Loosen the pump's fixing screws and prepare the pump for transport (if necessary, roughly empty the reservoir, ensure that no lubricant escapes during transport).
- When transporting the pump, observe the safety instructions in section 2 under all circumstances.
- Remove lubricant residues in the pump at a suitable place and take precautions for proper disposal.
- Dismantle electrical components (when disposing of them, follow instructions according to the locally applicable regulations and guidelines, e.g. [2012/19/EU - WEEE2](#)).



- Dispose of the pump (or have it disposed of) according to local regulations and guidelines.

11. Documents and drawings

Depending on the pump design and equipment, the following separate documents also apply:

- Motor data sheet and documentation (required for pumps with a flange-mounted motor)
- Description and programming instructions for the ultrasonic level switch (required for the level switch accessory option)
- Drawings of the individual spare parts kits (if required)

If required documents are not available, please get in touch with our Customer Service. Otherwise, the pump documentation is considered to be incomplete.

12. Annexes

12.1 Declaration of conformity

12.2 Overview of the spare parts kits

12.3 Illustration of the FZ pump's symbols according to DIN ISO 1219-1/-2/-3

**EC-Declaration of conformity
according to 2006/42/EC**

The manufacturer:

Delimon GmbH, Arminstraße 15, 40227 Düsseldorf

Tel.: 0049 211 7774 285

herewith declares that the following product:

Product description: Lubrication pump, type FZ-B
Article number: FZB __ B _____
Serial number: >293 ____

is in conformity with the relevant provisions of the EC-Machinery Directive 2006/42/EC

The machinery is also in conformity with the provisions of the:
EMC Directive 2014/30 / EU and the Low Voltage Directive 2014/35 / EU

The following European harmonized standards have been used:

DIN EN 12100 : 2010 Safety of machinery - Basic terms, general principles of design,
basic terminology, methodology, risk assessment

DIN ISO 10763 : 1994 Fluid technology - Seamless and welded precision steel tubes,
dimensions and nominal pressures

DIN EN 60204-1: 2006 + Safety of machinery - Electrical equipment of machinery,
A 1:2009+AC2010 Part 1: General requirements

DIN EN ISO 14123-1 : 2015
EN 809 : 1998+A1:2009
TBRS 1151

We further declare that the specific technical documentation on request to be
transmitted to the market surveillance authorities.

Authorized representative for the technical documentation: Head of quality department

Düsseldorf; 08.04.2020

Ort, Datum



John Pearce
Geschäftsführer

DELIMON GmbH
Arminstraße 15
40227 Düsseldorf
Germany
Telephone: +49 211 7774 0
Fax: +49 211 7774 210

Branch Office
Am Bockwald 4
08344 Grünhain-Beierfeld
Germany
kontakt@bijurdelimon.com
www.bijurdelimon.com

Amtsgericht (Local Court) Düsseldorf
HRB 40813
Managing Director:
John Pearce
David Pantazi

J.P. Morgan AG, Frankfurt am Main
Bank account no.: 6161 509 788, BLZ 501 108 00
IBAN: DE33501108006161509788
SWIFT BIC: CHASDEFX
Ust.-IdNr.: DE 813 228 741
Tax ID.: 133/5814/0866

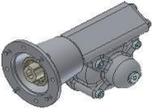
Annex 12.2: Overview of the spare part kits

item no.	denomination		FZ-A		FZ-B	
			Rev. A	Rev. B	Rev. A	Rev. B
FZAETA0001	SP-kit loose parts pendulum lever oder reduction gear		✓		✓	
FZAETA0002	SP-kit for pump body FZ		✓		✓	
FZAETB0002				✓		✓
FZAETA0003	SP-kit drive option free shaft end		✓		✓	
FZAETB0004	SP-kit drive option mit pendulum lever		✓	✓	✓	✓
FZAETB0005	SP-kit pump body FZ-A 1 outlet, 0,1 cm3		✓	✓		
FZAETB0006	SP-kit pump body FZ-A 2 outlets, 0,1 cm3		✓	✓		
FZAETB0007	SP-kit pump body FZ-A 3 outlets, 0,1 cm3		✓	✓		
FZAETB0008	SP-kit pump body FZ-A 4 outlets, 0,1 cm3		✓	✓		
FZAETB0009	SP-kit pump body FZ-A 5 outlets, 0,1 cm3		✓	✓		
FZAETB0010	SP-kit pump body FZ-A 6 outlets, 0,1 cm3		✓	✓		
FZAETB0011	SP-kit pump body FZ-A 7 outlets, 0,1 cm3		✓	✓		
FZAETB0012	SP-kit pump body FZ-A 8 outlets, 0,1 cm3		✓	✓		
FZAETB0013	SP-kit pump body FZ-A 9 outlets, 0,1 cm3		✓	✓		
FZAETB0014	SP-kit pump body FZ-A 10 outlets, 0,1 cm3		✓	✓		
FZAETB0015	SP-kit pump body FZ-A 11 outlets, 0,1 cm3		✓	✓		

Annex 12.2: Overview of the spare part kits

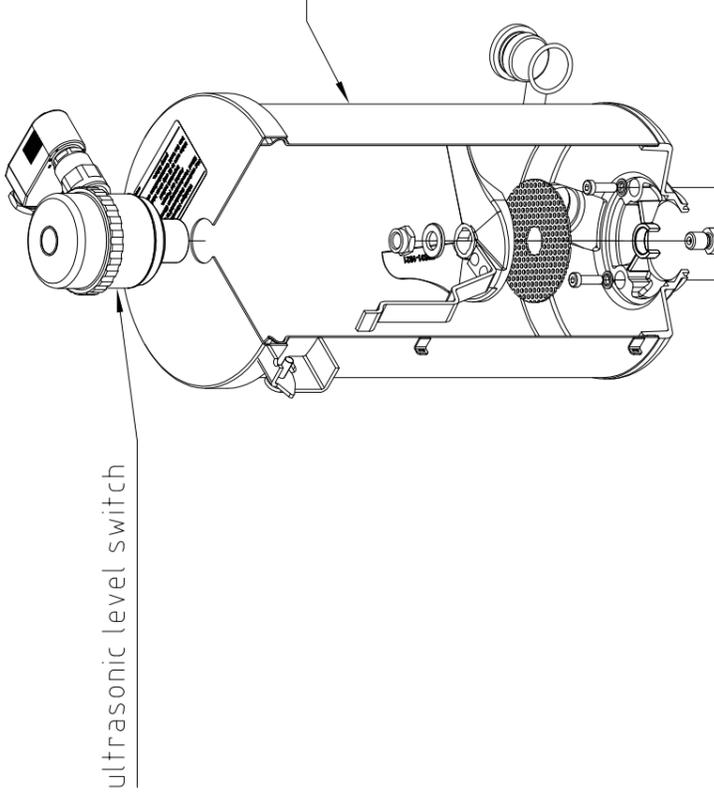
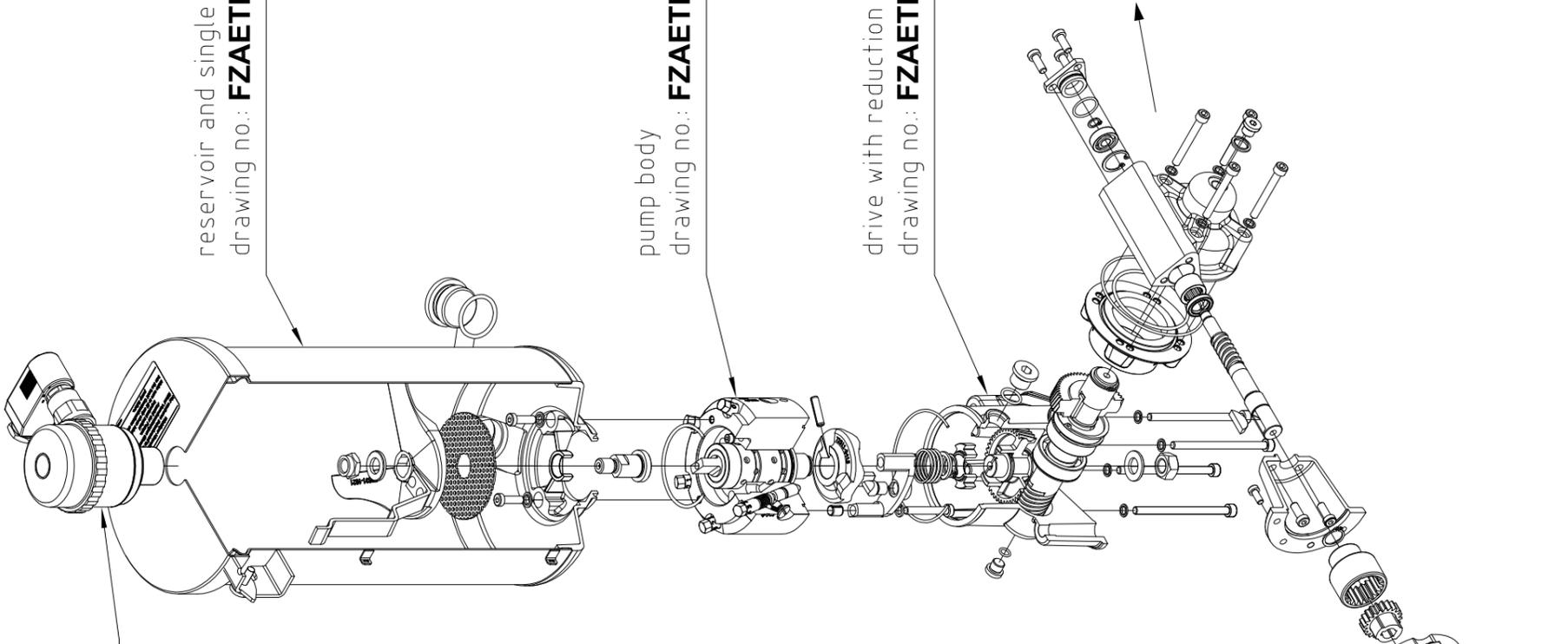
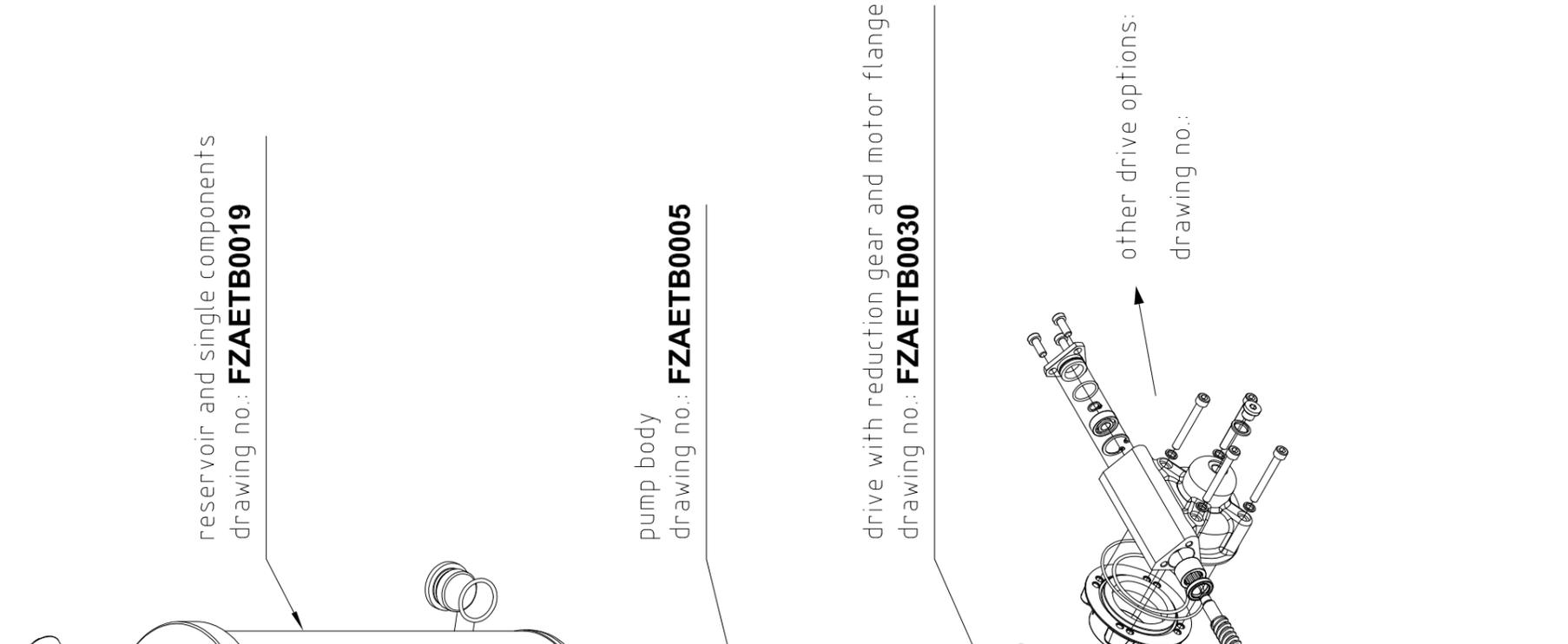
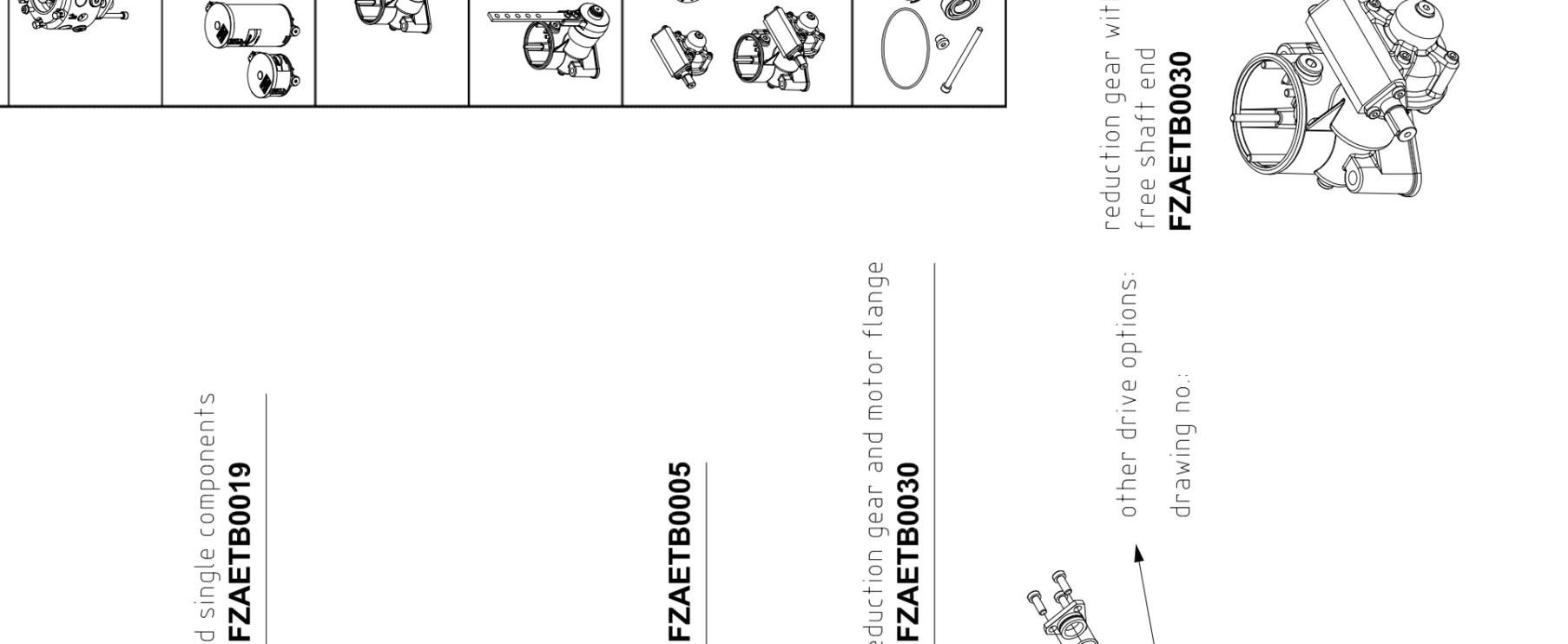
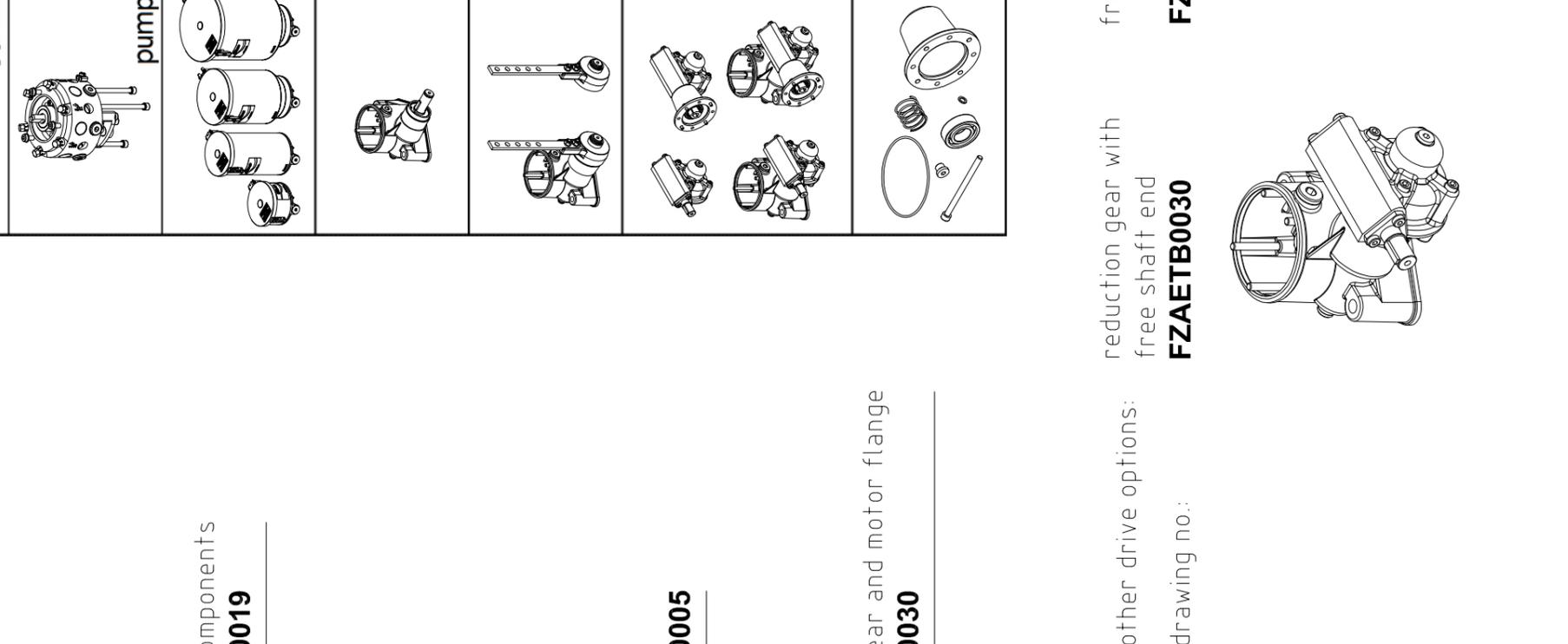
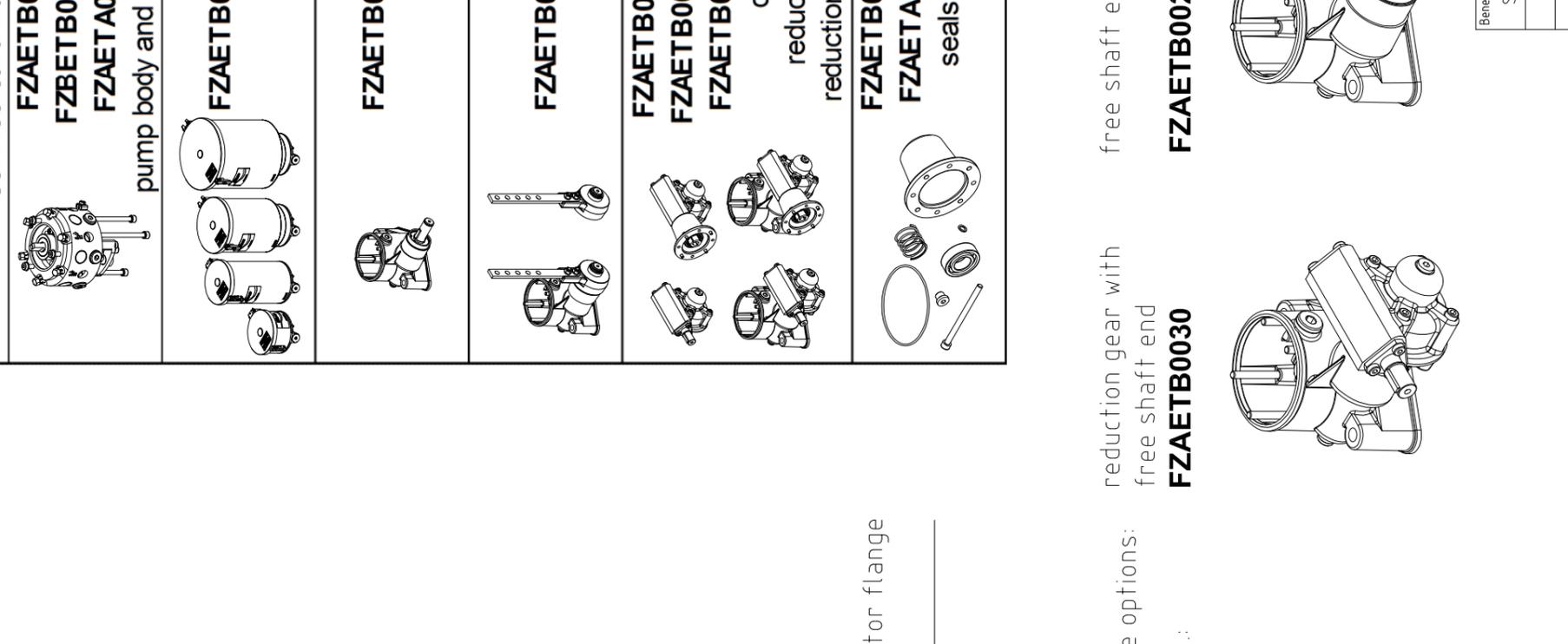
item no.	denomination		FZ-A		FZ-B	
			Rev. A	Rev. B	Rev. A	Rev. B
FZAETB0016	SP-kit pump body FZ-A 12 outlets, 0,1 cm ³		✓	✓		
FZAETB0017	SP-kit pump body FZ-A 6 outlets, 0,2 cm ³		✓	✓		
FZAETB0018	SP-kit reservoir 2,5 liter		✓	✓	✓	✓
FZAETB0019	SP-kit reservoir 8 liter		✓	✓	✓	✓
FZAETB0020	SP-kit reservoir 15 liter		✓	✓	✓	✓
FZAETB0021	SP-kit reservoir 30 liter		✓	✓	✓	✓
FZAETB0022	SP-kit drive option free shaft end i 3:1		✓	✓	✓	✓
FZAETB0023	SP-kit drive option free shaft end i 12:1		✓	✓	✓	✓
FZAETB0024	SP-kit drive option free shaft end i 25:1		✓	✓	✓	✓
FZAETB0025	SP-kit drive option free shaft end i 50:1		✓	✓	✓	✓
FZAETB0026	SP-kit drive option pendulum lever i 3:1			✓	✓	✓
FZAETB0027	SP-kit drive option pendulum lever i 12:1	✓		✓	✓	✓
FZAETB0028	SP-kit drive option pendulum lever i 25:1	✓		✓	✓	✓
FZAETB0029	SP-kit drive option pendulum lever i 50:1	✓		✓	✓	✓
FZAETB0030	SP-kit drive option/reduction gear/free shaft end/AL1-i 95:1		✓	✓	✓	✓
FZAETB0031	SP-kit drive option/reduction gear/free shaft end/AL1-i 215:1		✓	✓	✓	✓
FZAETB0032	SP-kit drive option/reduction gear/free shaft end/AL1-i 345:1		✓	✓	✓	✓
FZAETB0033	SP-kit drive option/reduction gear/free shaft end/AL1-i 710:1		✓	✓	✓	✓
FZAETB0034	SP-kit drive option/reduction gear/free shaft end/AL1-i 1420:1		✓	✓	✓	✓
FZAETB0035	SP-kit drive option/reduction gear/free shaft end/AL1-i 2880:1		✓	✓	✓	✓
FZAETB0036	SP-kit reduction gear i 60:1-drive option pos. 1,2,4			✓		✓

Annex 12.2: Overview of the spare part kits

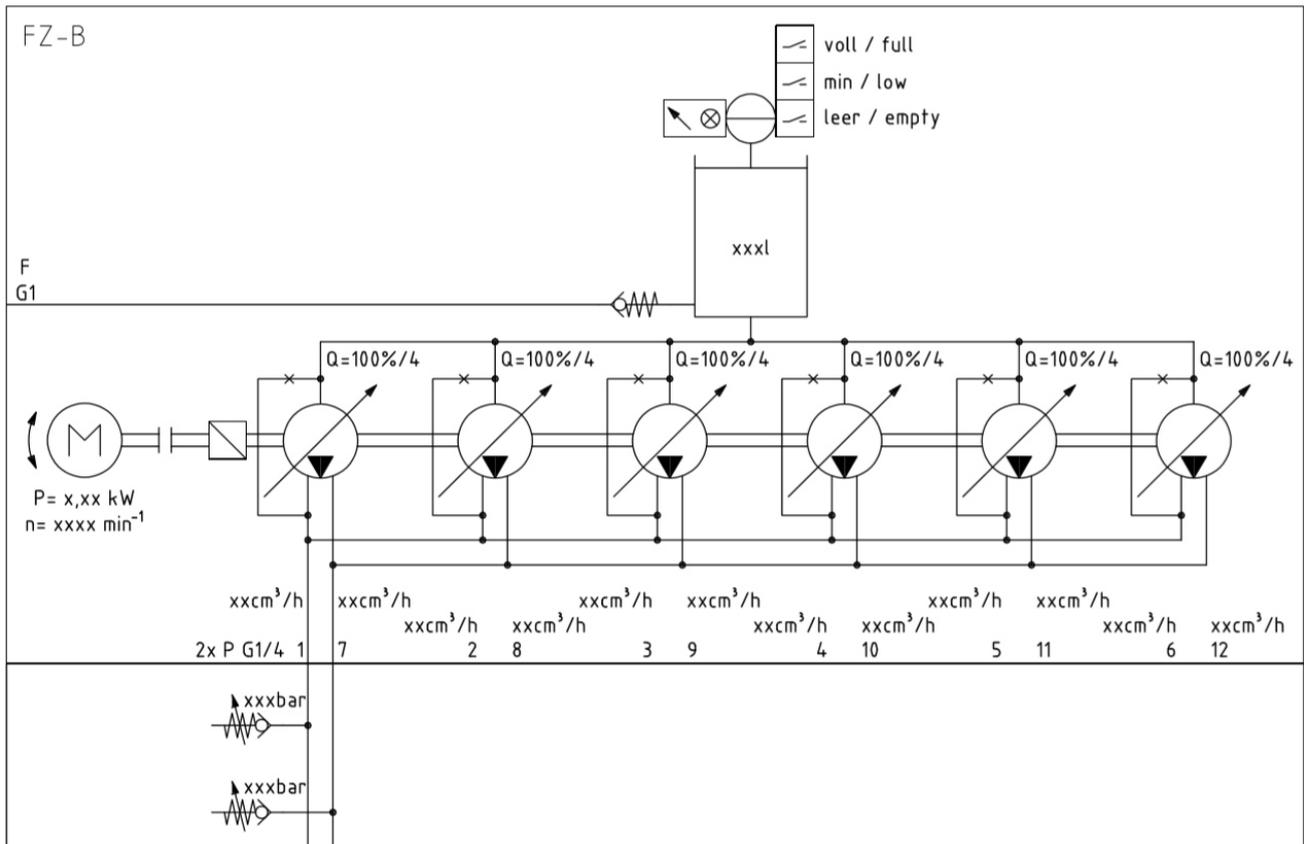
item no.	denomination		FZ-A		FZ-B	
			Rev. A	Rev. B	Rev. A	Rev. B
FZAETB0037	SP-kit reduction gear i 30:1 - drive option pos. 5			✓		✓
FZAETB0041	SP-kit reduction gear i 30:1 - drive option pos. 1,2,4			✓		✓
FZAETB0044	SP-kit reduction gear i 60:1 - drive option pos. 5			✓		✓
FZAETB0051	SP-kit reduction gear/motor flange 30:1-drive option pos. 1			✓		✓
FZAETB0052	SP-kit reduction gear/motor flange 60:1-drive option pos. 1			✓		✓
FZAETB0053	SP-kit reduction gear/motor flange 30:1-drive option pos. 5			✓		✓
FZAETB0054	SP-kit reduction gear/motor flange 60:1-drive option pos. 5			✓		✓
FZAETB0055	SP-kit drive option/reduction gear/motor flange/AL1 - i 95:1		✓	✓	✓	✓
FZAETB0056	SP-kit drive option/reduction gear/motor flange/AL1-i 215:1		✓	✓	✓	✓
FZAETB0057	SP-kit drive option/reduction gear/motor flange/AL1-i 345:1		✓	✓	✓	✓
FZAETB0058	SP-kit drive option/reduction gear/motor flange/AL1-i 710:1		✓	✓	✓	✓
FZAETB0059	SP-kit drive option/reduction gear/motor flange/AL1-i 1420:1		✓	✓	✓	✓
FZAETB0060	SP-kit drive option/reduction gear/motor flange/AL1-i 2880:1		✓	✓	✓	✓
FZAETB0061	SP-kit drive option/reduction gear/motor flange/AL5 - i 95:1		✓	✓	✓	✓
FZAETB0062	SP-kit drive option/reduction gear/motor flange/AL5-i 215:1		✓	✓	✓	✓
FZAETB0063	SP-kit drive option/reduction gear/motor flange/AL5-i 345:1		✓	✓	✓	✓
FZAETB0064	SP-kit drive option/reduction gear/motor flange/AL5-i 710:1		✓	✓	✓	✓
FZAETB0065	SP-kit drive option/reduction gear/motor flange/AL5-i 1420:1		✓	✓	✓	✓
FZAETB0066	SP-kit drive option/reduction gear/motor flange/AL5-i 2880:1		✓	✓	✓	✓
FZAETB0070	SP-kit motor flange und coupling		✓	✓	✓	✓
FZAETA0071	SP-kit maintenance kit - drive housing		✓		✓	
FZAETB0071				✓		✓
FZAETA0072	SP-kit maintenance kit - reduction gear		✓		✓	
FZAETB0072				✓		✓

Annex 12.2: Overview of the spare part kits

item no.	denomination		FZ-A		FZ-B	
			Rev. A	Rev. B	Rev. A	Rev. B
FZAETA0073	SP-kit maintenance kit - reservoir		✓		✓	
FZAETB0073				✓		✓
FZAETA0074	SP-kit maintenance kit - sealings		✓		✓	
FZAETB0074				✓		✓
FZBETB0001	SP-kit pump body FZ-B 1 outlet, 1,2 cm ³				✓	✓
FZBETB0002	SP-kit pump body FZ-B 2 outlets, 0,6 cm ³				✓	✓

A	 <p>ultrasonic level switch</p>	<p>reservoir and single components drawing no.: FZAETB0019</p>	<p>pump body drawing no.: FZAETB0005</p>	<p>drive with reduction gear and motor flange drawing no.: FZAETB0030</p>	<p>other drive options: drawing no.:</p>	<p>motor</p>	<p>example: FZB02B12AA01</p>																	
4																								
5																								
6																								
7																								
8																								
A	<p>service card number</p> <p>FZAETB0005-FZAETB0017 FZBETB0001, FZBETB0002 FZAETA0002, FZAETB0002</p> <p>pump body and single components</p>	<p>FZAETB0005</p>	<p>FZAETB0018-FZAETB0021 reservoir</p>	<p>FZAETB0022-FZAETB0025 free shaft end</p>	<p>FZAETB0004, FZAETB0026-FZAETB0028 pendulum lever</p>	<p>FZAETB0030-FZAETB0037, FZAETB0041, FZAETB0044, FZAETB0051-FZAETB0066 drive/reduction gear reduction gear/free shaft reduction gear/motor flange</p>	<p>FZAETB0070-FZAETB0074 FZAETA0071-FZAETA0074 seals, bearings, screws, attachments etc.</p>	<p>pendulum lever</p>	<p>FZAETB0026</p>															
B	<p>FZAETB0022-FZAETB0025 free shaft end</p>	<p>FZAETB0022</p>	<p>FZAETB0004, FZAETB0026-FZAETB0028 pendulum lever</p>	<p>FZAETB0030-FZAETB0037, FZAETB0041, FZAETB0044, FZAETB0051-FZAETB0066 drive/reduction gear reduction gear/free shaft reduction gear/motor flange</p>	<p>FZAETB0070-FZAETB0074 FZAETA0071-FZAETA0074 seals, bearings, screws, attachments etc.</p>	<p>free shaft end</p>	<p>FZAETB0022</p>	<p>FZAETB0022</p>	<p>FZAETB0022</p>															
C	<p>FZAETB0030-FZAETB0037, FZAETB0041, FZAETB0044, FZAETB0051-FZAETB0066 drive/reduction gear reduction gear/free shaft reduction gear/motor flange</p>	<p>FZAETB0030</p>	<p>FZAETB0030-FZAETB0037, FZAETB0041, FZAETB0044, FZAETB0051-FZAETB0066 drive/reduction gear reduction gear/free shaft reduction gear/motor flange</p>	<p>FZAETB0070-FZAETB0074 FZAETA0071-FZAETA0074 seals, bearings, screws, attachments etc.</p>	<p>free shaft end</p>	<p>FZAETB0030</p>	<p>FZAETB0030</p>	<p>FZAETB0030</p>																
D	<p>FZAETB0070-FZAETB0074 FZAETA0071-FZAETA0074 seals, bearings, screws, attachments etc.</p>	<p>FZAETB0070</p>	<p>FZAETB0070-FZAETB0074 FZAETA0071-FZAETA0074 seals, bearings, screws, attachments etc.</p>	<p>free shaft end</p>	<p>FZAETB0022</p>	<p>FZAETB0022</p>	<p>FZAETB0022</p>	<p>FZAETB0022</p>																
E	<p>reduction gear with free shaft end</p>	<p>FZAETB0030</p>	<p>reduction gear with free shaft end</p>	<p>free shaft end</p>	<p>FZAETB0022</p>	<p>FZAETB0022</p>	<p>FZAETB0022</p>	<p>FZAETB0022</p>																
F	<p>not drawn to scale</p>							<p>pendulum lever</p>	<p>FZAETB0026</p>															
<p>Benennung spare parts / service cards overview</p> <table border="1"> <tr> <td>Datum</td> <td>Name</td> <td>Erzeugnis</td> </tr> <tr> <td>05.07.2018</td> <td>Wagner</td> <td>FZ</td> </tr> <tr> <td>Datenname</td> <td>Revision</td> <td>Blatt</td> </tr> <tr> <td>FZAETB0000_0</td> <td></td> <td>1/1</td> </tr> <tr> <td></td> <td></td> <td>A3</td> </tr> </table>										Datum	Name	Erzeugnis	05.07.2018	Wagner	FZ	Datenname	Revision	Blatt	FZAETB0000_0		1/1			A3
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Annex 12.3: Illustration of the FZ pump's symbols according to DIN ISO 1219-1/-2/-3



Note: This drawing is also available as a .dwg file on request.