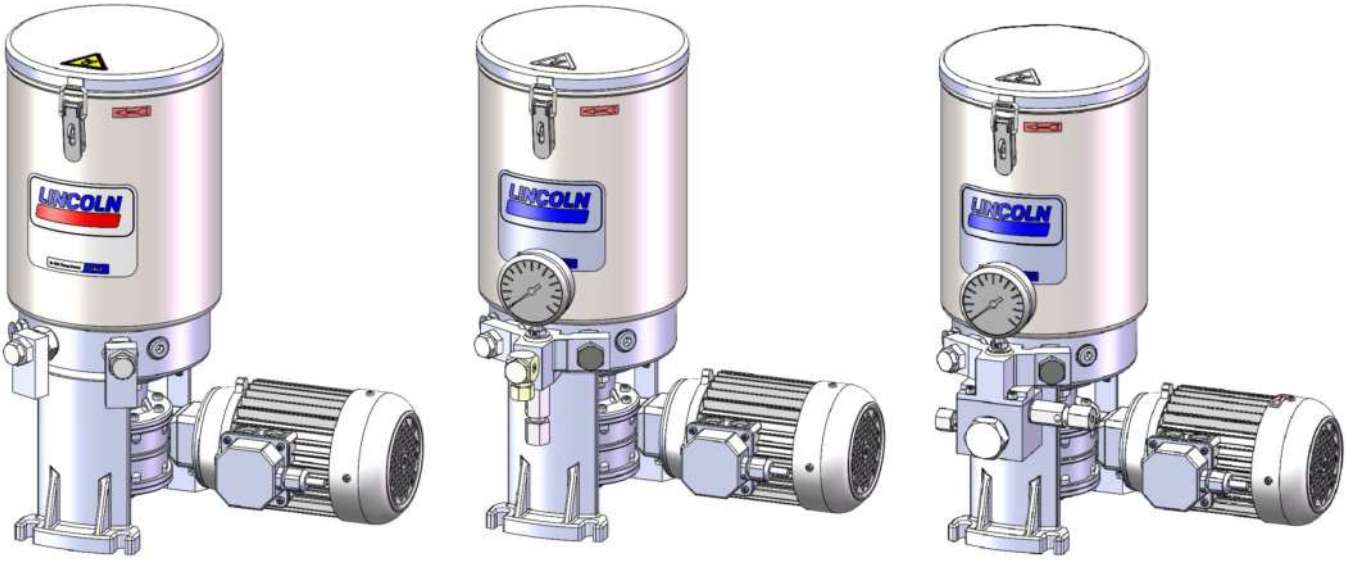
Lubricant feed pump ZPU 01 and ZPU 02



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Version:	**06**

Read these instructions before installation or start-up of the product and keep them readily available for consultation.

Original EC Declaration of Incorporation in accordance with Directive 2006/42/EC, Appendix II Part 1 B

The manufacturer hereby declares at its sole responsibility that the partly completed machinery conforms to the essential health and safety requirements of the Machinery Directive 2006/42/EC, Annex I, marked in the Annex to the EC Declaration of Incorporation as applicable and fulfilled at the time of placing on the market.
The special technical documents were prepared following Annex VII part B. Upon justifiable request, these special technical documents can be forwarded electronically to the respective national authorities. The authorized company for the compilation of the technical documentation is the manufacturer.

Designation: Electrically operated pump for the supply of lubricants within a centralized lubrication system
Type: ZPU 01 / ZPU 02
Item number: 661-XXXXX-X, 6610-XXXXXXXX

Furthermore, the following directives and standards were applied in the respective applicable areas:
2014/30/EU: Electromagnetic Compatibility
2011/65/EU: RoHS II
EN ISO 12100:2010 EN 809:1998+A1:2009/AC:2010 EN 60204-1:2018
EN 60947-5-1:2004/A1:2009 EN IEC 60947-5-2:2020
EN IEC 63000:2018

The partly completed machinery must not be put into service until it has been established that the machinery into which it is to be incorporated is in compliance with the provisions of the Machinery Directive 2006/42/EC and all other applicable Directives.

Walldorf, 10.05.2023
Jürgen Kreutzkämper
Manager, R&D
Germany

Stefan Schürmann
Manager, PD
Germany South

Manufacturer: SKF Lubrication Systems Germany GmbH, Heinrich-Hertz-Str. 2-8, 69190 Walldorf, Germany

Original UK Declaration of incorporation according to the Supply of Machinery (Safety) Regulations 2008 No. 1597 Annex II

The manufacturer hereby declares under sole responsibility that the partly completed machinery complies with the essential health and safety requirements of UK legislation Supply of Machinery (Safety) Regulations 2008 No. 1597 Annex I, marked in the Annex to the EC Declaration of Incorporation as applicable and fulfilled at the time of placing on the market.
The special technical documents were prepared following Annex VII part B. Upon justifiable request, these special technical documents can be forwarded electronically to the respective national authorities. The authorized company for the compilation of the technical documentation is SKF (U.K.) Limited, 2 Canada Close, Banbury, Oxfordshire, OX16 2RT, GBR.

Designation: Electrically operated pump for the supply of lubricants within a centralized lubrication system
Type: ZPU 01 / ZPU 02
Item number: 661-XXXXX-X, 6610-XXXXXXXX

Furthermore, the following regulations and standards were applied in the respective applicable areas:
Electromagnetic Compatibility Ordinance 2016 No. 1091
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 No. 3032
EN ISO 12100:2010 EN 809:1998+A1:2009/AC:2010 EN 60204-1:2018
EN 60947-5-1:2004/A1:2009 EN IEC 60947-5-2:2020
EN IEC 63000:2018

The partly completed machinery must not be put into service until it has been established that the machinery into which it is to be incorporated is in compliance with the provisions of UK legislation Supply of Machinery (Safety) Regulations 2008 No. 1597 and all other applicable Directives.

Walldorf, 10.05.2023
Jürgen Kreutzkämper
Manager, R&D
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Stefan Schürmann
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Manufacturer: SKF Lubrication Systems Germany GmbH, Heinrich-Hertz-Str. 2-8, 69190 Walldorf, Germany

NOTE

The **product variants without electrical components** do **not** fall within the scope of application of the EMC Directive (2014/30/EU) or the "Electromagnetic Compatibility Regulations 2016 No. 1091," nor the scope of the RoHS Directive (2011/65/EU) or the "Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 No. 3032."

Appendix to Declaration of Incorporation in accordance with 2006/42/EC, Annex II, No. 1 B

Description of the essential health and safety requirements according to 2006/42/EC, Annex I, which have been applied and fulfilled:

Table 1

Appendix to Declaration of Incorporation
Piston pumps with reservoir, with/without external motor, without control unit
Types: P205, P208, P212, P215, P230, ZPUxx, JM, FF, FB, FK, RA, TA, TB

No.:	Essential health and safety requirement	Applicable:	Fulfilled:
1.1	Principles		
1.1.2	Principles of safety integration	Yes	Yes
1.1.3	Materials and products	Yes	Not completely fulfilled [1]
1.1.5	Design of machinery to facilitate its handling	Yes	Yes
1.1.6	Ergonomics	Yes	Not completely fulfilled [2]
1.2	Control systems		
1.2.1	Safety and reliability of control systems	Yes	Yes
1.2.3	Starting	Yes	Yes
1.2.6	Failure of the power supply	Yes	Yes
1.3	Protection against mechanical hazards		
1.3.1	Risk of loss of stability	Yes	Yes
1.3.2	Risk of break-up during operation	Yes	Not completely fulfilled [3]
1.3.4	Risks due to surfaces, edges or angles	Yes	Yes
1.3.7	Risks related to moving parts	Yes	Yes
1.3.9	Risks of uncontrolled movements	Yes	Yes
1.5	Risks due to other hazards		
1.5.1	Electricity supply	Yes	Yes
1.5.6	Fire	Yes	Yes
1.5.8	Noise	Yes	Yes
1.5.13	Emissions of hazardous materials and substances	Yes	Yes
1.5.15	Risk of slipping, tripping, or falling	Yes	Not completely fulfilled [4]
1.6	Servicing		
1.6.1	Machinery maintenance	Yes	Yes
1.6.2	Access to operating positions and servicing points	Yes	Not completely fulfilled [5]
1.6.4	Operator interventions	Yes	Yes
1.7	Information		
1.7.1	Information and warnings on the machinery	Yes	Yes
1.7.1.1	Information and information devices	Yes	Yes
1.7.2	Warning of residual risks	Yes	Yes
1.7.3	Marking of machinery	Yes	Yes
1.7.4	Operating instructions/assembly instructions	Yes	Yes
1.7.4.1	General principles for the drafting of operating instructions/assembly instructions	Yes	Yes
1.7.4.2	Contents of the operating instructions/assembly instructions	Yes	Yes
1.7.4.3	Sales literature	Yes	Yes

[1] The product is designed for operation with non-hazardous media. The owner-operator must check whether the lubricant used has certain hazardous effects (such as sensitization). The installation of a drip pan could be required. Pressure-relief valves must also be used.
[2] The operator must ensure that the pump is integrated into the higher-level machine in such a way that the pump can be operated and filled ergonomically.
[3] The operator must protect the lubrication system against excessive pressure. This should be done by fitting every pump element with a pressure limiting valve with suitable opening pressure (see the “Technical data” for the pump in question).
[4] Not relevant inside the incomplete machine (pump), only outside the partially completed machine. The machine's owner or operator is responsible here.
[5] The owner-operator must ensure that the pump is integrated into the main machine in such a way that it can be operated without danger.

Masthead

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Authorized local distributors
- Great Britain -
SKF (U.K.) Limited,
2 Canada Close, Banbury, Oxfordshire,
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- North America -
SKF Lubrication Business Unit
Lincoln Industrial
5148 North Hanley Road, St. Louis,
MO. 63134 USA

- South America -
SKF Argentina Pte. Roca 4145,
CP 2001 Rosario, Santa Fe

Warranty
The instructions contain no statements regarding the warranty or liability for defects. That information can be found in our General Terms of Payment and Delivery.

Training
We conduct detailed training in order to enable maximum safety and efficiency. We recommend taking advantage of this training. For further information, contact your authorized SKF dealer or the manufacturer.

Table of contents

Safety alerts, visual presentation, and layout

While reading these instructions, you will encounter various symbols, illustrations, and text layouts intended to help you navigate and understand the instructions. Their meaning is explained below.

Safety alerts:
Activities that present specific hazards (to life and limb or possible damage to property) are indicated by safety alerts. Always be sure to follow the instructions given in the safety alerts.

⚠ DANGER
These safety alerts indicate an imminent danger. Ignoring them will result in death or serious injury

⚠ WARNING
These safety alerts indicate potentially imminent danger. Ignoring them could result in death or serious injury

⚠ CAUTION
These safety alerts indicate potentially imminent danger. Ignoring them could result in minor injury

NOTICE
These safety alerts indicate a potentially harmful situation. Ignoring them could result in damage to property or malfunctions

Illustrations:
The illustrations used depict a specific product. For other products, they may have the function of a diagram only. This does not alter the basic workings and operation of the product.

Text layout:
- **First-order bulleted lists**: Items on a bulleted list start with a solid black dot and an indent.
  – **Second-order bulleted lists**: If there is a further listing of subitems, the second-order bulleted list is used.

1 **Legend:** A legend explains the numbered contents of an illustration, presented as a numbered list. Items in a legend start with a number (with no dot) and an indent.
  – **Second-order legend**: In some cases, the numbered contents of an image represent more than just one object. A second-order legend is then used.

1. Instruction steps: These indicate a chronological sequence of instruction steps. The numbers of the steps are in bold and are followed by a period. If a new activity follows, the numbering starts again at "**1.**"
  – **Second-order instruction steps**: In some cases, it is necessary to divide up a step into a few substeps. A sequence of second-order instruction steps is then used.

1 Safety instructions

1.1 General safety instructions

- Putting the products into operation or operating them without having read the instructions is prohibited. The operator must ensure that the instructions are read and understood by all persons tasked with working on the product or who supervise or instruct such persons. Retain the instructions for further use.
- The product may only be used in awareness of the potential dangers, in proper technical condition, and according to the information in this manual.
- Any faults that could affect safety must be remedied according to responsibility. The supervisor must be notified immediately in case of malfunctions outside one's individual scope of responsibility.
- Unauthorized modifications and changes can have an unpredictable effect on safety and operation. Unauthorized modifications and changes are therefore prohibited. Only original SKF spare parts and SKF accessories may be used.
- Any unclear points regarding proper condition or correct assembly/operation must be clarified. Operation is prohibited until issues have been clarified.
- The components used must be suitable for the intended use and the applicable operating conditions, e.g. max. operating pressure and ambient temperature range, and must not be subjected to torsion, shear, or bending.

1.2 General electrical safety instructions

- Electrical devices must be kept in proper condition. This must be ensured by periodic inspections in accordance with the relevant applicable standards and technical rules. The type, frequency, and scope of the inspections must be determined in accordance with the risk assessment to be carried out by the operator. Work on electrical components may be performed only by qualified electricians. Connect the electrical power only in accordance with the valid terminal diagram and in observance of the relevant regulations and the local electrical supply conditions.
- Work on electrical components may be performed only in a voltage-free state and using tools suitable for electrical work. Do not touch cables or electrical components with wet or moist hands.
- Fuses must not be bridged. Always replace defective fuses with fuses of the same type.
- Ensure proper connection of the protective conductor for products with protection class I. Observe the specified enclosure rating.
- The operator must implement appropriate measures to protect vulnerable electrical devices from the effects of lightning during use. The electrical device is not furnished with a grounding system for the dissipation of the respective electric charge and does not have the voltage strength necessary to withstand the effects of lightning.

1.3 General behaviour when handling the product

- Familiarize yourself with the functions and operation of the product. The specified assembly and operating steps and their sequences must be observed.
- Keep unauthorized persons away.
- Wear personal protective equipment always.
- Precautionary operational measures and instructions for the respective work must be observed.
- In addition to these Instructions, general statutory regulations for accident prevention and environmental protection must be observed.
- Precautionary operational measures and instructions for the respective work must be observed. Uncertainty seriously endangers safety.
- Safety-related protective and safety equipment must not be removed, modified or affected otherwise in its function and is to be checked at regular intervals for completeness and function.
- If protective and safety equipment has to be dismantled, it must be reassembled immediately after finishing the work, and then checked for correct function.
- Remedy occurring faults in the frame of responsibilities. Immediately inform your superior in the case of faults beyond your competence.
- Never use parts of the centralized lubrication system or of the machine as standing or climbing aids.

1.4 Intended use

Supply of lubricants.
The product is intended solely for installation in another machine.
Use is only permitted within the scope of commercial or economic activity by professional users, in compliance with the specifications, technical data, and limits specified in this manual.

1.5 Persons authorized to use the product

Operator
A person who is qualified by training, knowledge and experience to carry out the functions and activities related to normal operation. This includes avoiding possible hazards that may arise during operation.

Specialist in electrics
Person with appropriate professional education, knowledge and experience to detect and avoid the hazards that may arise from electricity.

Specialist in mechanics
Person with appropriate professional education, knowledge and experience to detect and avoid the hazards that may arise during transport, installation, start-up, operation, maintenance, repair and disassembly.

1.6 Foreseeable misuse

Any usage of the product other than as specified in this manual is strictly prohibited. Particularly prohibited are:

- Use of non-specified consumables, contaminated lubricants, or lubricants with air inclusions.
- Use of C3 versions in areas with aggressive, corrosive substances (e.g., high salt load).
- Use of plastic parts in areas with high exposure to ozone, UV light, or ionizing radiation.
- Use to supply, convey, or store hazardous substances and mixtures as defined in the CLP Regulation (EC 1272/2008) or GHS with acute oral, dermal, or inhalation toxicity or substances and mixtures that are marked with hazard pictograms GHS01-GHS06 and GHS08.
- Use to supply, convey, or store Group 1 fluids classified as hazards as defined in the Pressure Equipment Directive (2014/68/EU) Article 13 (1) a).
- Use to supply, convey, or store gases, liquefied gases, dissolved gases, vapors, or fluids whose vapor pressure exceeds normal atmospheric pressure (1013 mbar) by more than 0.5 bar at their maximum permissible operating temperature.
- Use in an explosion protection zone.
- Use without proper securing against excessively high pressures, in the case of pressurized products.
- Use outside of the technical data and limits specified in this manual.

1.7 Referenced documents

In addition to this manual, the following documents must be observed by the respective target group:

- Company instructions and approval rules

If applicable:

- Safety data sheet of the lubricant used
- Project planning documents
- Supplementary information regarding special designs of the pump. This you will find in the special system documentation.
- Instructions for other components for setting up the centralized lubrication system.

1.8 Prohibition of certain activities

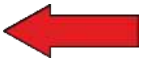
- Replacement of or modifications to the pistons of the pump elements
- Repairs or modifications to the drive.

1.9 Painting plastic components and seals

The painting of any plastic components and seals of the products described is prohibited. Completely mask or remove plastic components before painting the main machine.

1.10 Safety markings on the product

Fig. 1

	Risk of dangerous electrical voltage (on the motor terminal box)
	Risk of wrapping, pinching, crushing, or shearing when the reservoir lid is open (only for reservoirs with filling from above)
	Direction of rotation of the pump (stirring paddle)

Possible safety markings on the product

NOTE
Further to the findings of the workplace risk evaluation the operating company has to attach additional markings (e. g. warnings, signs giving orders, prohibition signs or labelling as specified by CLP / GHS), where appropriate.

1.11 Note on the type plate

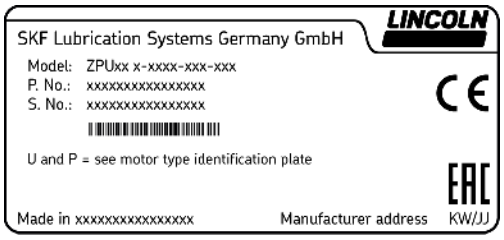
The type plate provides important data such as the type designation, order number, and sometimes regulatory characteristics. To avoid loss of this data in case the type plate becomes illegible, it should be entered in the manual.

Table 2

Table for copying out the type plate

Model:	
P-No. :	
S-No. :	

Fig. 2



Type plate (example)

1.12 Notes on CE marking

CE marking is effected following the requirements of the applied directives requiring a CE marking:

- 2014/30/EC Electromagnetic Compatibility
- 2011/65/EU Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS II)

NOTE

For **product variants with electrical components** (e.g., filling level sensors), the following directives and regulations apply (see also the original declarations of incorporation on page 2):

- EMC Directive (2014/30/EU) and "Electromagnetic Compatibility Regulations 2016 No. 1091"
- RoHS Directive (2011/65/EU) and "Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 No. 3032."

For this reason, these product variants bear CE, UKCA, and China RoHS marks.

1.13 Note on UKCA marking

The UKCA conformity marking confirms the product's conformity with the applicable legal provisions of Great Britain.

1.14 Note on EAC marking

The EAC conformity marking confirms the product's conformity with the applicable legal provisions of the Eurasian customs union.

1.15 Note on China RoHS mark

The China RoHS mark confirms that there is no danger to persons or the environment from the regulated substances contained within for the intended period of use (year number shown in the circle).

1.16 Emergency shutdown

This is done by a course of action to be defined by the operator.

1.17 Assembly, maintenance, fault, repair

Prior to the start of this work, all relevant persons must be notified of it. At a minimum, the following safety measures must be taken before any work is done:

- Unauthorized persons must be kept away
- Mark and secure the work area
- Cover adjacent live parts
- Dry any wet, slippery surfaces or cover them appropriately
- Cover hot or cold surfaces appropriately

Where applicable:

- Depressurize
- Isolate, lock and tag out
- Check to ensure live voltage is no longer present
- Ground and short-circuit.

The product should be protected as much as possible from humidity, dust, and vibration, and should be installed so that it is easily accessible. Ensure an adequate distance from sources of heat or cold. Any visual monitoring devices present, such as pressure gauges, min./max. markings, or oil level gauges must be clearly visible. Observe the mounting position requirements.

Drill required holes only on non-critical, non-load-bearing parts of the operator's infrastructure. Use existing holes where possible. Avoid chafe points. Immobilize any moving or detached parts during the work. Adhere to the specified torques.

If guards or safety devices need to be removed, they must be reinstalled immediately following conclusion of work and then checked for proper function.

Check new parts for compliance with the intended use before using them.

Avoid mixing up or incorrectly assembling disassembled parts. Label parts. Clean any dirty parts.

1.18 First start-up, daily start-up

Ensure that:

- All safety devices are fully present and functional
- All connections are properly connected
- All parts are correctly installed
- All warning labels on the product are fully present, visible, and undamaged
- Illegible or missing warning labels are immediately replaced.

1.19 Residual risks

Table 3

Residual risks

Residual risk	Possible in lifecycle	Avoidance / Remedy
Personal injury / property damage due to falling of hoisted parts	A B C G H K	• Unauthorized persons must be kept away. Nobody is allowed to be present below hoisted parts. Lift parts using suitable and tested lifting gear.
Personal injury/property damage due to tilting or falling product due to non-compliance with specified torques	B C D E F G	• Adhere to the specified torques • Mount the product only on components with a sufficient load-carrying capacity. • If no torques are specified, use those specified for the screw size for screws of strength class 8.8.
Personal injury / property damage due to electric shock	B C D E F G H	• Inspect power cables for damage prior to initial use and then at regular intervals. • Before connecting the pump unit, de-energize all relevant electrical components. Observe any discharge times. • Do not install the cable on moving parts or wearing spots. If this cannot be avoided, use anti-kink coils and/or conduits.
Personal injury / property damage due to spilled, leaked lubricant	B C D E F G H K	• Be careful when filling the reservoir and then connecting or disconnecting the lubricant lines. • Use only hydraulic screw unions and lubrication lines suitable for the specified pressure. • Do not install lubrication lines on moving parts or chafe points. If this cannot be avoided, use flexible hose lines or anti-kink coils and/or conduits. • Promptly apply suitable binding agents and then remove the spilled or leaked lubricant. • Follow operational instructions for handling the lubricants and contaminated parts.
Injury from contact with the stirring paddle when filling the pump	C D F	• Preferably fill via the fill connection. Fill from the top, only when the paddle is motionless, and with the pump de-energized. Do not reach into the reservoir while filling.
Objects falling into the motor vent	C D E F	• If the motor is installed vertically and there is a risk of objects (such as stones, metal chips, etc.) falling into the motor vent, a suitable canopy must be fitted.
Injury from hot/faulty motor	E F G	• Switch off the pump. Let parts cool off; remedy the cause.

Lifecycle phases: A = Transport, B = Assembly, C = First start-up, D = Operation, E = Cleaning, F = Maintenance, G = Malfunction, repair, H = Shutdown, K = Disposal

2 Lubricants

2.1 General information

Lubricants are selected specifically for the relevant application. The manufacturer or operator of the machine should ideally make the selection in consultation with the supplier of the lubricant. If you have no or little experience in selecting lubricants for lubrication systems, please contact us. We would be happy to assist you in selecting suitable lubricants and components to build a lubrication system optimized for your particular application. Consider the following points when selecting/using lubricants. This will spare you potential downtime and damage to the machine or lubrication system.

2.2 Material compatibility

The lubricants must generally be compatible with the following materials:

- Plastics: ABS, CR, FPM, NBR, NR, PA, PET, PMMA, POM, PP, PS, PTFE, PU, PUR
- Metals: steel, gray cast iron, brass, copper, aluminum.

2.3 Temperature properties

The lubricant used must be suitable for the specific ambient temperature of the product. The viscosity approved for proper functioning must neither be exceeded at low temperatures nor fall too low at high temperatures. For the approved viscosity, see the “Technical data” chapter.

2.4 Aging of lubricants

Based on past experience with the lubricant used, checks should be conducted at regular intervals defined by the operator, to determine whether the lubricant needs to be replaced due to aging processes (oil separation). In case of doubt regarding the continued suitability of the lubricant, it must be replaced before the system is started up again. If you do not yet have any experience with the lubricant used, we recommend conducting a check after just one week.

2.5 Avoidance of faults and hazards

To avoid faults and hazards, please observe the following:

- When handling lubricants, observe the relevant safety data sheet (SDS) and any hazard labeling on the packaging.
- Due to the large number of additives, some lubricants that meet the pumpability requirements specified in the manual are not suitable for use in centralized lubrication systems.
- Whenever possible, always use SKF lubrication greases. They are ideal for use in lubrication systems.
- Do not mix lubricants. This can have unpredictable effects on the properties and usability of the lubricant.
- Use lubricants containing solid lubricants only after technical consultation with SKF.
- The lubricant’s ignition temperature has to be at least 50 kelvin above the maximum surface temperature of the components.

2.6 Solid lubricants

Solid lubricants may only be used after prior consultation with SKF. When solid lubricants are used in lubrication systems, the following rules generally apply:

Graphite:

- Maximum graphite content 8%
- Maximum grain size 25 µm (preferably in lamellar form).

MoS2:

- Maximum MoS2 content 5%
- Maximum grain size 15 µm.

Copper:

- Lubricants containing copper are known to lead to coatings forming on pistons, bore holes, and mating surfaces. This can result in blockages in the centralized lubrication system.

Calcium carbonate:

- Lubricants containing calcium carbonate are known to lead to very heavy wear on pistons, bore holes, and mating surfaces.

Calcium hydroxide:

- Lubricants containing calcium hydroxide are known to harden considerably over time, which can lead to failure of the centralized lubrication system.

PTFE, zinc, and aluminum:

- For these solid lubricants, it is not yet possible to define any limit values for use in lubrication systems on the basis of existing knowledge and practical experience.

3 Overview, functional description

3.1 Overview

Fig. 3

Overview

1 Reservoir with stirring paddle
2 Pump element
3 Pump housing
4 Gearbox
5 Motor
6 Button-head lubricating nipple
7 Plug screw / Fill connection (optional)

Pumps of the type ZPU 01/ ZPU 02 are comprised essentially of the following main components:

Reservoir with stirring paddle
The reservoir contains the lubricant and possibly a sensor for sending a low-level signal.
The stirring paddle turns while the pump is running, homogenizing the lubricant and removing air from it.
The lower part of the stirring paddle presses the lubricant toward the pump elements, thus improving its pumpability.

Pump element
This feeds the lubricant into the lubricant line.

Gearbox
The gearbox reduces the speed of the motor to the speed required for the eccentric shaft of the pump.

Motor
The motor drives the pump and is connected to the gearbox.

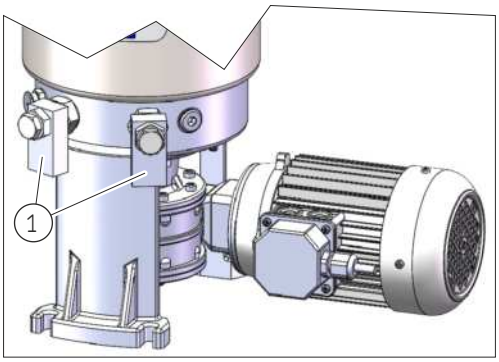
Button-head lubricating nipple
The button-head lubricating nipple can be used to fill the pump with lubricant.

Fill connection (optional)
The optional fill connection can be used to fill the pump with lubricant (in the standard design, it is closed off with a plug screw).

3.2 Designs

3.2.1 Design "E"

Fig. 4



Overview of design E

1 One or two pump elements

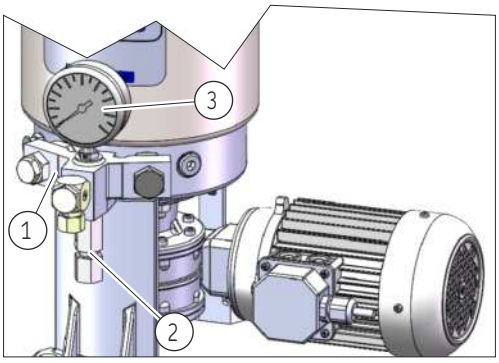
The “E” design contains one or two pump elements that are installed directly in the pump housing.

ZPU 01 / ZPU 02 pumps of the “E” design are mainly used for progressive lubrication systems with one or two lubrication circuits.

NOTE
“E” design pumps must be safeguarded by the owner-operator with suitable pressure limiting valves to prevent excessive pressure.

3.2.2 Design "V"

Fig. 5



Overview of design “V“

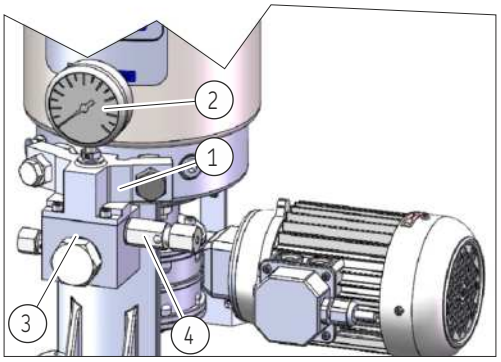
1 Bridge
2 Pressure limiting valve
3 Pressure gauge

The “V” design includes a bridge to merge the lubricant flow, a pressure limiting valve, and a pressure gauge.

ZPU 01 / ZPU 02 pumps of the V design are mainly used for progressive lubrication systems with one lubrication circuit.

3.2.3 Design "F"

Fig. 6



Overview of design “F“

1 Bridge
2 Pressure gauge
3 Filter block
4 Pressure limiting valve

The “F” design includes a bridge to merge the lubricant flow, a filter block, a pressure gauge, and a pressure limiting valve.

ZPU 01 / ZPU 02 pumps of the F design are mainly used for dual-line systems with one lubrication circuit.

3.2.4 Fill level monitoring (XYBU)

Low-level and full signals using a digital ultrasonic sensor (optional)
Ultrasonic sensor for monitoring the fill level in the reservoir. Two LEDs are used to display the respective fill level. (See the "Technical data" of the ultrasonic sensor). The switching points are set at the factory according to the reservoir size.

4 Technical data

4.1 Pump ZPU 01 … 02

Table 4

Technical data of the pump

Parameter	ZPU 01	ZPU 02
Number of pump elements	1	2
Delivery rate • With transmission ratio 1:490 (M490): • With transmission ratio 1:100 (M100): • With transmission ratio 1:049 (M049):	 160 cm^3/h 800 cm^3/h 1600 cm^3/h	 320 cm^3/h 1600 cm^3/h 3200 cm^3/h
Operating pressure • With transmission ratios 1:100 and 1:490: • With transmission ratio 1:049:	 Max. 350 bar [5076.3 psi] Max. 400 bar [5801.5 psi]	 Max. 350 bar [5076.3 psi] Max. 400 bar [5801.5 psi]
Operating temperature [1]	-25 to +70 °C [-13 to +158 °F]	
Permissible drive speed [2] (for pumps without motor and gearbox)	Lubrication oil: 2.5 to 35 rpm Lubrication grease: 2.5 to 30 rpm	
Weight of the empty pump	Approx. 19 kg	Approx. 19 kg
Filling the pump	• Via the reservoir cover • Via button-head lubricating nipple • Via fill connection (optional)	
Enclosure rating	IP55	
Lubricant	Mineral oils (base oils) or environmentally friendly oils from ISO VG 46 to greases of NLGI Grade 2: dynamic viscosity (oils) ≥ 50 mm^2/s	
Reservoir capacity	10 or 30 liters [2.64 or 7.93 gal.]	
Drive motor	See section Drive motors, Page 17	
Sound pressure level	< 70 db(A)	
Mounting position	Upright, i.e., with the reservoir upward. Deviation ±5°	

[1] The specified operating temperature range of the pump requires that the lubricant used be suitable for the actual operating temperature present. Using a lubricant that is unsuitable for the actual operating temperature may result in damage or pump failure at low temperatures due to excessive lubricant viscosity.

[2] Compliance with the specified speeds must be ensured by selecting a suitable motor and gearbox.

NOTE

In the case of drive motors with a power supply frequency of 60 Hz, the speed and thus also the delivery rate are 20% higher.

In the case of lubricating greases of Grade NLGI 2 or NLGI 3 and very low temperatures, the actual delivery rate can be below the calculated theoretical rate.

4.2 Drive motors

4.2.1 Motors 380 – 480 V AC

Table 5

Technical data

Parameter		For gearboxes M100, M490		For gearbox M049	
Item number		245-13913-1		245-13914-1	
Manufacturer, model		See the name plate on the motor or ask us			
Operating mode		S1		S1	
Voltage	[V]	230 / 400	265 / 460	230 / 400	265 / 460
Circuit		△ / Y	△ / Y	△ / Y	△ / Y
Frequency f	[Hz]	50	60	50	60
Rated capacity P	[kW]	0.18	0.21	0.25	0.29
Rated speed n	[rpm]	1380	1656	1334	1600
Rated current I_N	[A]	1.22	0.7	2.5	1.4
Starting current		2.5 x I_N		2.5 x I_N	
Power factor cos φ		0.69		0.55	
Efficiency η	[%]	62		62	
Type		B14		B14	
Frame size		63		63	
Enclosure rating		IP55		IP55	
Insulation class		F		F	
Flange	[mm / in]	Ø 90 [3.5]		Ø 90 [3.5]	
Shaft extension	[mm / in]	Ø 11 × 23 [0.4 × 0.9]		Ø 11 × 23 [0.4 × 0.9]	

4.2.2 Motors 380 – 480 V AC with gearbox

Table 6

Technical data

Parameter		Gearbox M100		Gearbox M049		Gearbox M490	
Item number		245-13915-1		245-13916-1		245-13918-1	
Manufacturer, model		See the name plate on the motor or ask us					
Operating mode		S1		S1		S1	
Voltage	[V]	230 / 400	265 / 460	220 / 420	250 / 480	230 / 400	265 / 460
Circuit		△ / Y	△ / Y	△ / Y	△ / Y	△ / Y	△ / Y
Frequency f	[Hz]	50	60	50	60	50	60
Rated capacity P	[kW]	0.18	0.21	0.25	0.29	0.18	0.21
Rated speed n	[rpm]	1360	1630	1500	1800	1380	1656
Rated current I_N	[A]	1.2	0.7	2.07 / 1.2	2.07 / 1.2	1.22	0.7
Starting current		2,5 x I_N		3,6 x I_N		2,6 x I_N	
Power factor cos φ		0.7		0.77		0.68	
Efficiency η	[%]	54		65		54.3	
Type		B14		B14		B14	
Frame size		63		63		63	
Enclosure rating		IP55		IP55		IP55	
Insulation class		F		F		F	
Flange	[mm / in]	Ø 90 [3.5]		Ø 90 [3.5]		Ø 90 [3.5]	
Shaft extension	[mm / in]	Ø 11 × 23 [0.4 × 0.9]		Ø 11 × 23 [0.4 × 0.9]		Ø 11 × 23 [0.4 × 0.9]	
Ratio	[i]	1:100		1:49		1:490	

4.2.3 Motors 500 V AC

Table 7

Technical data

Parameter		For gearboxes M100, M490	For gearbox M049
Item number		245-13919-1	245-13920-1
Manufacturer, model		See the name plate on the motor or ask us	
Operating mode		S1	S1
Voltage	[V]	290 / 500	290 / 500
Circuit		△ / Y	△ / Y
Frequency f	[Hz]	50	50
Rated capacity P	[kW]	0.18	0.25
Rated speed n	[rpm]	1360	1400
Rated current I_N	[A]	1.0 / 0.6	2.0 / 1.2
Starting current		2,5 x I_N	2,5 x I_N
Power factor cos φ		0.69	0.55
Efficiency η	[%]	62	62
Type		B14	B14
Frame size		63	63
Enclosure rating		IP55	IP55
Insulation class		F	F
Flange	[mm / in]	Ø 90 [3.5]	Ø 90 [3.5]
Shaft extension	[mm / in]	Ø 11 × 23 [0.4 × 0.9]	Ø 11 × 23 [0.4 × 0.9]

4.2.4 Motors 500 V AC with gearbox

Table 8

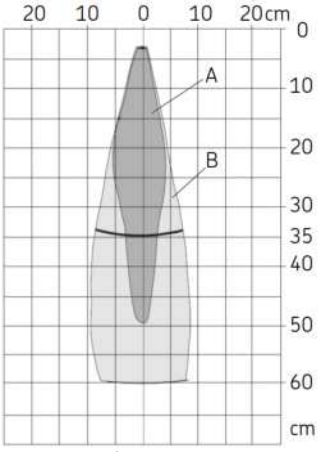
Technical data

Parameter		Gearbox M100	Gearbox M049	Gearbox M490
Item number		245-13921-1	245-13922-1	245-13923-1
Manufacturer, model		See the name plate on the motor or ask us		
Operating mode		S1	S1	S1
Voltage	[V]	290 / 500	290 / 500	290 / 500
Circuit		△ / Y	△ / Y	△ / Y
Frequency f	[Hz]	50	50	50
Rated capacity P	[kW]	0.18	0.25	0.18
Rated speed n	[rpm]	1360	1360	1360
Rated current I_N	[A]	1.0 / 0.6	1.1 / 0.64	1.0 / 0.6
Starting current		2,5 x I_N	2,5 x I_N	2,5 x I_N
Power factor cos φ		0.68	0.69	0.68
Efficiency η	[%]	54	38	54
Type		B14	B14	B14
Frame size		63	63	63
Enclosure rating		IP55	IP55	IP55
Insulation class		F	F	F
Flange	[mm / in]	Ø 90 [3.5]	Ø 90 [3.5]	Ø 90 [3.5]
Shaft extension	[mm / in]	Ø 11 × 23 [0.4 × 0.9]	Ø 11 × 23 [0.4 × 0.9]	Ø 11 × 23 [0.4 × 0.9]
Ratio	[i]	1:100	1:49	1:490

4.3 Ultrasonic sensor 664-853xx-x

Table 9

Technical data

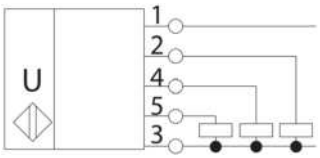
Parameter	Value
Blind zone	0-65 mm
Sensing range	600 mm
Ultrasonic frequency	Approx. 400 kHz
Sonic frequency	3.7 Hz
Resolution	0.18 mm
Accuracy	± 1 %
Reproducibility	± 15 %
Sensing range in centimeters	 The dark gray areas (A) indicate the range in which the standard reflector (a tube) is reliably detected. The light gray areas (B) represent the range in which a large reflector (such as the lubricant surface) is still detected provided that it is optimally aligned to the sensor. No evaluation is possible outside the light gray area.
Operating voltage U_B	9-30 VDC (reverse polarity resistant)
Residual ripple	± 10%
No-load power consumption	≤ 60mA
Connection type	M12 connector, 5-pin
Response delay	272 ms
Readiness delay	< 300 ms
Enclosure rating per EN 60529	IP65 / IP67 (depending on the cable box used)
Operating temperature range	- 40 °C to + 70 °C
Switching points	Full signal D1; low-level signal D2 according to the reservoir size; pre-empty signal D3 programmable upon customer request, preset to 10 mm above the low-level signal (use is optional)
Conformity with standards	DIN EN IEC 60947-5-2
Display elements	LED green/LED orange Switching output set/not set
Housing material	PBT, polyester, ultrasonic transducer: PUR, epoxy resin with glass contents
Switching output	3x pnp; UB-2V; Imax = 3 x 200 mA; NO contact, short-circuit proof

NOTE

The specified enclosure rating is contingent on the use of connection sockets and cables suitable for that enclosure rating. If connection sockets and cables with a lower protection rating are used, the lowest of those protection ratings will apply.

Table 10

Electrical connection



		Cable colors in accordance with IEC 60757
1	+ U_B	Brown (BN)
3	- U_B	Blue (BU)
4	D2	Black (BK)
2	D1	White (WH)
5	D3 / Com	Gray (GY)

Table 11

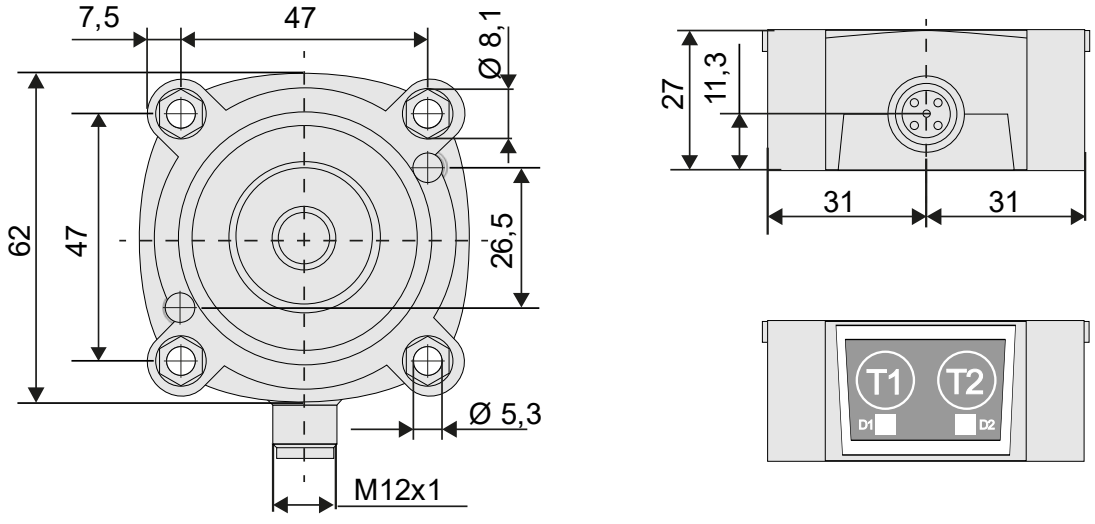
Display of the circuit states

Parameter	Switching points			Display of the LEDs				
	D1	D2	D3	D1 (up to 10/21)	D1 (from 10/21)	D2 (up to 10/21)	D2 (from 10/21)	--
Full signal (high level)	A	A	B	Orange	Green	Orange	Green	C
Between full signal and pre-empty signal	B	A	B	Green	Orange	Orange	Green	C
Pre-empty signal	B	A	A	Green	Orange	Orange	Green	D
Low-level signal	B	B	B	Green	Orange	Green	Orange	C

A = switched, B = not switched, C = steady, D = flashing

Dimensions:

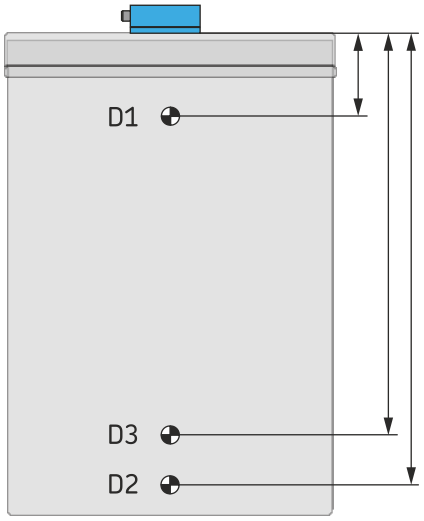
Fig. 7



Dimensions

4.3.1 Switching points of ultrasonic sensor for reservoir design XYBU

Fig. 8



Switching points of ultrasonic sensor

Table 12

Switching points

Reservoir size liters [gal.]		D1 Full mm	D2 Low-level mm	D3 Pre-empty signal mm
10	[2.6]	65	210	200
30	[7.9]	65	420	410

4.4 Tightening torques

NOTE

Adhere to the specified torques.
If no torques are specified for threaded connectors, use torques according to screw/bolt size for grade 8.8 screws/bolts.

Table 13

All pump designs

Component	Tightening torque	
	Nm	ft.lb.
Reservoir with pump housing	8 ±0.8	5.9 ±0.6
Ultrasonic sensor	1.5 ±0.2	1.1 ±0.1

Table 13

All pump designs

Component	Tightening torque	
Plug screw for housing	30 ±3	22.1 ±2.2
Button-head lubricating nipple	20 ±3	14.8 ±2.2
Fill connection (optional)	30 ±3	22.1 ±2.2

Table 14

Pump design E

Component	Tightening torque	
	Nm	ft.lb.
Pump element on pump housing	30 ±3	22.1 ±2.2

Table 15

Pump design F

Component	Tightening torque	
	Nm	ft.lb.
Pump cylinder with pump housing	30 ±3	22.1 ±2.2
Check valve with pump cylinder	30 ±3	22.1 ±2.2
Pressure gauge with bridge	55 ±5	40.6 ±3.7
Bridge with filter block	10 ±1	7.4 ±0.7
Pressure limiting valve with filter block	30 ±3	22.1 ±2.2
Screw union for delivery line with filter block	30 ±3	22.1 ±2.2
Banjo bolt for filter block	100 ±10	73.8 ±7.4

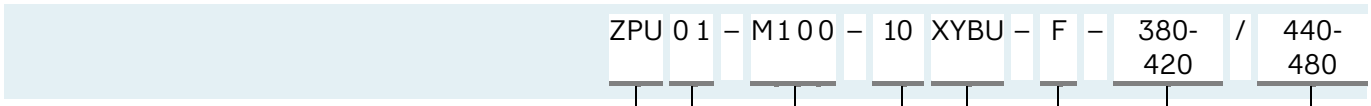
Table 16

Pump design V

Component	Tightening torque	
	Nm	ft.lb.
Pump cylinder with pump housing	30 ±3	22.1 ±2.2
Check valve with pump cylinder	30 ±3	22.1 ±2.2
Holding screw with pump cylinder	30 ±3	22.1 ±2.2
Pressure gauge with bridge	55 ±5	40.6 ±3.7
Pressure limiting valve with bridge	30 ±3	22.1 ±2.2
Screw union for delivery line with filter block	30 ±3	22.1 ±2.2
Banjo bolt for filter block	100 ±10	73.8 ±7.4

4.5 Pump type identification code ZPU 01...02

4.5.1 Basic parameters and reservoir design



Type designation:
ZPU Centralized lubrication pump

Number of pump elements:
01 1 pump element
02 2 Pump elements

Drive assembly:
M Gearbox for attaching a three-phase flange-mounted motor of size 63, type B14, flange D90, shaft D11x23
100 Transmission ratio i = 1:100*
049 Transmission ratio i = 1:049*
490 Transmission ratio i = 1:490*

Container contents:
10 10 liters [2.6 gal.]
30 30 liters [7.9 gal.]

Reservoir design:
XYBU Reservoir for grease and oil with full and low-level signals - ultrasonic sensor
XYN Reservoir for grease and oil without full and low-level signals

Pump design:
E Pump element(s) only
V Bridge with pump element(s) and pressure gauge
F Bridge with pump element(s), filter block. Pressure gauge and pressure limiting valve

Additional motor specifications:
000 Pump without motor, but with flange Ø 90 mm
500 Motor 500 V AC / 50 Hz
380-420 / 440-480 Motor for 380-420 V AC / 50 Hz and 440-480 V AC / 60 Hz

* With transmission ratios i = 1:100 and i = 1: 490, the working pressure is max. 350 bar. With transmission ratio i = 1:049, the working pressure is max. 400 bar.

5 Delivery, returns, storage

5.1 Delivery

After receipt of the shipment, it must be inspected for any shipping damage and for completeness according to the shipping documents. Immediately inform the transport carrier of any shipping damage. The packaging material must be preserved until any discrepancies are resolved.

5.2 Return shipment

Before return shipment, all contaminated parts must be cleaned. If this is not possible or practical, e.g. if it would impede fault detection in the case of complaints, the medium used must always be specified. In the case of products contaminated with hazardous substances as defined by GHS or CLP regulations, the safety data sheet (SDS) must be sent with the product and the packaging must be labelled in accordance with GHS/CLP. There are no restrictions for land, air, or sea transport. The choice of packaging should be based on the specific product and the stresses to be expected during transport (e.g., necessary anti-corrosion measures in the case of shipment by sea). In the case of wooden packaging, the applicable import regulations and the IPPC standards must be observed. Required certificates must be included in the shipping documents. The following information, as a minimum, must be marked on the packaging of return shipments.

Fig. 9

Marking of return shipments

5.3 Storage

The following conditions apply to storage:

- Dry, low-dust, vibration-free, in closed rooms
- No corrosive, aggressive substances at the storage location (e.g., UV rays, ozone)
- Protected against animals (insects, rodents)
- If possible, keep in the original product packaging
- Protected from nearby sources of heat or cold
- In the case of large temperature fluctuations or high humidity, take appropriate measures (e.g., heating) to prevent the condensation of water
- Before usage, check products for damage that may have occurred during storage. This applies in particular to parts made of plastic (due to embrittlement).

5.4 Storage temperature range

For parts not filled with lubricant, the permitted storage temperature is the same as the permitted ambient temperature range (see “Technical data”).

5.5 Storage conditions for products filled with lubricant

For products filled with lubricant, the permitted storage temperature range is:

minimum	+ 5 °C	[+41 °F]
maximum	+ 35 °C	[+95 °F]

If the storage temperature range is not maintained, the following steps for replacing the lubricant may not lead to the desired result under certain circumstances.

5.5.1 Storage period up to 6 months

Filled products can be used without implementing additional measures.

5.5.2 Storage period between 6 and 18 months

Pump:

- Connect the pump to a power source
- Switch on the pump and run it until lubricant comes out of every outlet without air bubbles
- Disconnect the pump from the power source
- Remove and dispose of the lubricant that came out

Lines:

- Remove pre-installed lines
- Ensure that both ends of the line are open
- Fill the lines completely with fresh lubricant

Metering devices:

NOTE

Due to the large number of different metering devices, no universally valid statement can be made regarding the removal of the old lubricant and correct bleeding after filling with new lubricant. The instructions can be found in the technical documentation of the specific metering device used.

5.5.3 Storage period more than 18 months

To prevent faults, the manufacturer should be consulted before start-up. The basic procedure for removal of the old lubrication filling corresponds to that for storage periods between 6 and 18 months.

5.6 Declaration of decontamination

If the product came in contact with harmful substances, make sure to thoroughly clean the product before returning it to us. Due to statutory provisions and for the safety of our employees and operation facilities we further need a fully completed and signed “Declaration of decontamination”.

6 Assembly

6.1 General safety instructions

Observe the safety instructions and the technical data in this manual. Additionally, during assembly pay attention to the following:

- Only qualified and authorized technical personnel may install the products described in this manual.
- Adhere to safety distances and legal prescriptions on assembly and prevention of accidents.
- Possibly existing visual monitoring devices, e.g. pressure gauges, MIN/MAX markings, oil inspection glasses must be clearly visible.
- Protect the product against humidity, dust and vibrations.
- Install the product in an easily accessible position. This facilitates other installations, control and maintenance work.

- Other units must not be damaged by the installation work.
- The product must not be installed within range of moving parts.
- The product must be installed at a sufficiently large distance from sources of heat or cold.
- Observe the IP enclosure rating of the product.
- Follow the mounting position requirements in the “Technical data” chapter.

6.2 Internal transportation

⚠ WARNING

Risk of injury due to heavy weight
Improper handling of heavy components can lead to injuries and damage.

- Use suitable equipment to lift and transport heavy loads.
- Always secure loads to prevent unintended movement.
- Wear safety shoes.
- Keep an adequate safe distance away from suspended loads.
- Never walk under a suspended load.

⚠ WARNING

Risk of injury due to transportation devices
Improper use of transportation devices can lead to injuries and damage.

- Transportation devices, such as forklifts and cranes, may only be used by authorized personnel.

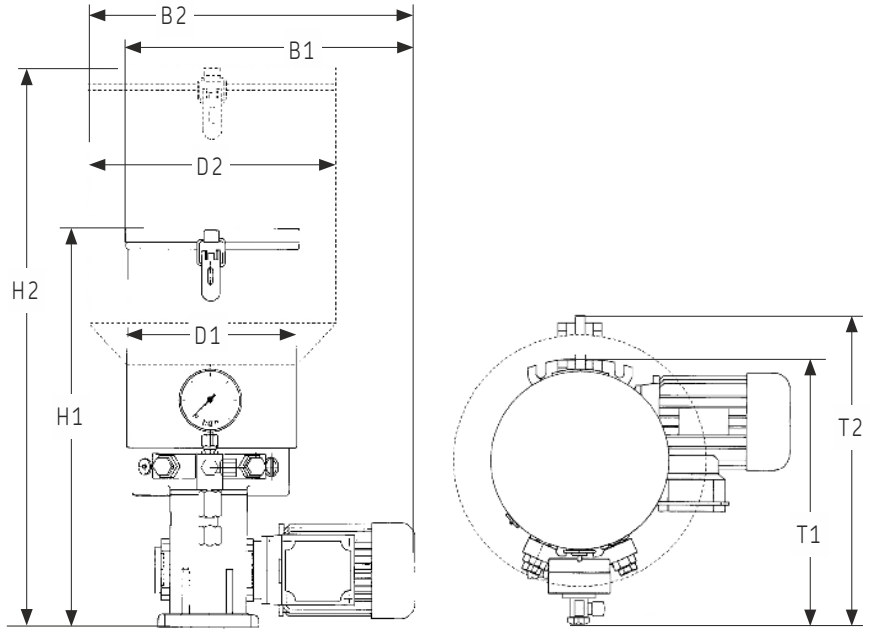
Observe the following points for internal transportation of the pump:

- SKF recommends that the customer use a height-adjustable pallet jack or a forklift for transport to the installation or storage location.
- During transportation, use at least two ratchet straps to secure the pump against the tipping over.
- The lifting equipment provided by the customer, such as forklifts, pallet jacks, ratchet straps, transport nets, etc. must be designed for the total weight of the pump plus a safety margin.

6.3 Mechanical connection

6.3.1 Minimum mounting dimensions

Fig. 10



Minimum mounting dimensions

To ensure sufficient space for maintenance work or clearance for possible disassembly of the product, clearance of at least 100 mm [3.9 in.] should be provided in every direction in addition to the dimensions specified.

Table 17

Minimum mounting dimensions in mm [in.]

	Pump design E	V	F
10 liter [2.6 gal] reservoir			
H1 [1]	514 [20.2]	513 [20.2]	514 [20.2]
B1 [2]	380 [15.0]	380 [15.0]	380 [15.0]
T1	280 [11.0]	343 [13.5]	330 [13.0]
D1	Ø 220 [8.7]	Ø 220 [8.7]	Ø 220 [8.7]
30 liter [7.9 gal] reservoir			
H2 [1]	754 [29.7]	754 [29.7]	754 [29.7]
B2 [2]	440 [17.3]	440 [17.3]	440 [17.3]
T2	330 [13.0]	390 [15.4]	377 [14.8]
D2	Ø 324 [12.8]	Ø 324 [12.8]	Ø 324 [12.8]

[1] Additional space required as clearance for the air inlet of the motor = +40 mm [+1.6 in.]
[2] Additional space required to open the housing cover:
10 liter [2.6 gal] reservoir: +110 mm [4.3 in.]
30 liter [7.9 gal] reservoir: +170 mm [6.7 in.]

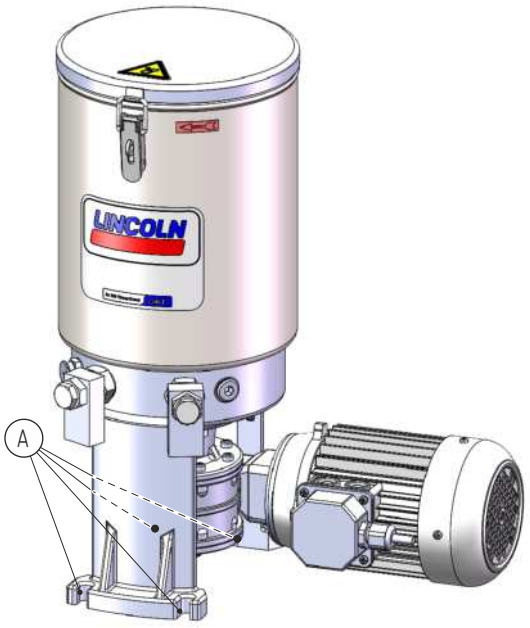
6.3.2 Assembly holes

NOTICE

Possible damage to the main machine and the pump

The assembly holes should be created only on non-load-bearing parts of the main machine. Do not fasten on two parts which move in opposite directions to one another (e.g., machine base and machine assembly).

Fig. 11



Assembly holes

The product is fastened to a flat surface using the 4 assembly holes (A) on the pump housing.
It is secured using 4 M8 screws (strength class 8.8).

6.4 Electrical connection

⚠ WARNING

Electric shock

Work on electrical components may be performed only by qualified electricians.

At a minimum, the following safety measures must be taken before any work on electrical components is done:

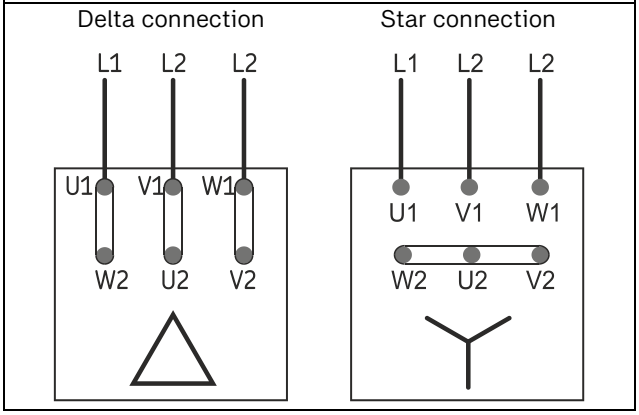
- Isolate, lock and tag out
- Check to ensure the absence of voltage
- Ground and short-circuit the product
- Cover any live parts in the surrounding area.

Observe the following instructions for a safe connection:

- The electrical connection must comply with the specifications of the standards of the DIN VDE 0100 series or the standards of the IEC 60364 series, as applicable.
- Connect the electrical lines in such a way that no mechanical forces are transferred to the product.
- The pump must be secured with a suitable external fuse (see terminal diagram).

Electrical connection of the drive motor:

Fig. 12



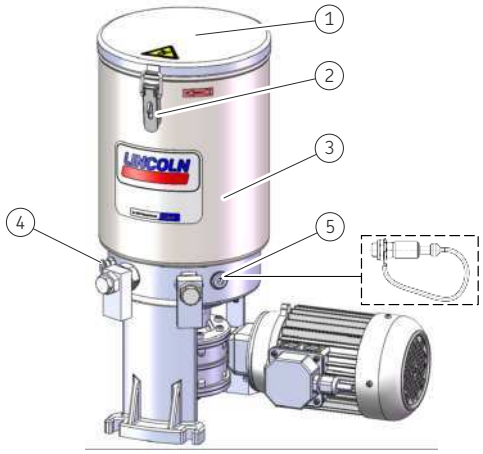
Types of electrical connection

The pump is connected electrically in accordance with the specifications of the motor manufacturer. For the technical data of the drive motors, see section Drive motors, Page 17 .
For the terminal diagram, see the terminal box of the motor.

Electrical connection of the ultrasonic sensor:
See section Ultrasonic sensor 664-853xx-x, Page 19 .

6.5 Filling with lubricant

Fig. 13



Filling with lubricant

1 Reservoir cover
2 Cover latch
3 Reservoir
4 Button-head lubricating nipple
5 Fill connection (optional)

⚠ WARNING

Crushing hazard

Crushing hazard on the rotating stirring paddle. Filling through the opening of the reservoir cover is permitted only if the pump has first been disconnected from the power supply. Never reach into the reservoir when the pump is running.

NOTICE

Contamination of the centralized lubrication system

When filling, carefully make sure that no dirt particles or other foreign substances get into the reservoir.

6.6 Filling via the reservoir cover

1. Switch off the pump.
2. Open the cover latch.
3. Open the reservoir cover.
4. Remove any contamination on the reservoir cover and (if present) on the ultrasonic sensor.
5. Fill the reservoir from above, up to about 20 mm below the reservoir rim. Take care to ensure while doing so that the lubricant is filled in without air inclusions if at all possible.

NOTE

For reservoirs with an ultrasonic sensor:
The ultrasonic sensor must not come into contact with the lubricant. The clearance between the lubricant and the ultrasonic sensor must be at least 60 mm.

6. Close the reservoir cover.
7. Close the cover latch.
8. Switch the pump back on.

6.7 Filling via the fill connection

Available fill connections:
- Button-head lubricating nipple
- Fill connection (optional)

6.7.1 Pumps with an ultrasonic sensor

1. If necessary, unscrew the protective cap on the fill connection in counterclockwise direction.
2. Connect the fill connection of the filling pump to the fill connection on the pump.
3. Switch on the filling pump and fill the reservoir until the LED of the ultrasonic sensor indicates that the reservoir is full (full signal). See also the "Technical data" section for the ultrasonic sensor.
4. Switch off the filling pump and remove it from the fill connection of the pump.
5. Screw the protective cap in clockwise direction back onto the fill connection of the pump.

6.7.2 Pumps without an ultrasonic sensor

1. If necessary, unscrew the protective cap on the fill connection in counterclockwise direction.
2. Open the cover latch on the reservoir cover.
3. Open up the reservoir cover and secure it to prevent it closing accidentally.
4. Connect the fill connection of the filling pump to the fill connection on the pump.
5. Switch on the filling pump and fill the reservoir up to about 20 mm below the reservoir rim.
6. Switch off the filling pump and disconnect it from the fill connection of the pump.
7. Close and lock the reservoir cover.
8. Screw the protective cap in clockwise direction back onto the fill connection of the pump.

6.8 Bleeding the pump

Before connecting the lubricant line, the pump must be bled.
To do this, switch on the pump (the direction of rotation of the drive shaft is not important) and allow it to run until the lubricant comes out of the pressure line connection without bubbles.

6.9 Connection of the lubrication line

⚠ CAUTION

Risk of slipping
Exercise caution when handling lubricants. Immediately remove and bind any leaked lubricants.

NOTICE

Damage to the higher-level machine caused by faulty planning of the centralized lubrication system
All parts for the construction of the centralized lubrication system must be designed for the maximum operating pressure that occurs, the permissible ambient temperature range, the required delivery volume, and the lubricant to be supplied.

Observe the following assembly information for safe and trouble-free operation:

- Generally valid regulations and company regulations regarding the laying of pressurized pipe and hose lines must be observed.
- Use only clean, pre-filled components and lubrication piping.
- Secure every lubricant line on the pump against excessive pressure through the use of a suitable pressure limiting valve (only in the case of pumps without an internal pressure limiting valve).
- The main lubricant line should be routed on a rising gradient and should be able to be bled at the highest point. Lubrication lines should always be arranged so that air inclusions cannot form anywhere.
- Install lubricant metering devices at the end of the main lubricant line such that the outlets of the lubricant metering devices point upwards wherever possible.
- If the system configuration requires that the lubricant metering devices be arranged below the main lubricant line, they should not be placed at the end of the main lubricant line.
- The flow of lubricant should not be impeded by the presence of sharp bends, angle valves, flap valves, seals protruding inward, or changes in cross-section (large to small). Unavoidable changes in the cross-section in lubrication lines must have smooth transitions.
- Connect the lubricant lines in such a way that no mechanical forces are transferred to the product (stress-free connection).
- Lubrication piping is to be positioned in such a way that they cannot become kinked, pinched or frayed.

7 First start-up

In order to warrant safety and function, a person assigned by the operator must carry out the following inspections. Immediately eliminate detected deficiencies. Deficiencies may be remedied by an authorized and qualified specialist only.

7.1 Inspections before first start-up

Table 18

Checklist: Inspections before first start-up

Inspections to be performed	YES	NO
Electrical connection established correctly.	☐	☐
Mechanical connection established correctly.	☐	☐
The performance characteristics for the aforementioned connections match the specifications in the “Technical data”.	☐	☐
All components, e.g. lubrication lines, are pre-filled with the correct lubricant and correctly installed.	☐	☐
No apparent damage, contamination, or corrosion.	☐	☐
Product is protected by a suitable pressure limiting valve.	☐	☐
Any dismantled protective and monitoring equipment is fully reinstalled and functional.	☐	☐
All warning labels on the product are present and in proper condition.	☐	☐
The lubricant used matches the permissible specifications of the pump and the intended use.	☐	☐

7.2 Inspections during first start-up

Table 19

Checklist: Inspections during first start-up

Inspections to be performed	YES	NO
No unusual noises, vibrations, moisture accumulation, or odors present.	☐	☐
No undesired discharge of lubricant at connections (leakage).	☐	☐
Lubricant is fed without bubbles.	☐	☐
The bearings and friction points requiring lubrication receive the planned lubricant volume.	☐	☐

8 Operation

SKF products operate largely automatically.
The activities required during normal operation are limited primarily to inspection of the fill level, timely refilling of lubricant, and cleaning the exterior of the product if contaminated.

8.1 Operating the pump

The pump is operated via the control of the centralized lubrication system. For information on pump operation, see the system documentation for the centralized lubrication system.

8.2 Top up lubricant

See section Filling with lubricant, Page 27 .

9 Maintenance

Careful and regular maintenance is required in order to detect and remedy possible faults in time. The operator must always determine the specific intervals according to the operating conditions, review them regularly, and adjust them where necessary. If necessary, copy the table for regular maintenance activities.

Table 20

Checklist: Maintenance activities

Activity to be performed	YES	NO
Mechanical and electrical system connections established correctly.	☐	☐
The performance characteristics for the aforementioned connections match the specifications in the “Technical data”.	☐	☐
All components such as lubrication lines and metering devices are correctly installed.	☐	☐
Product is protected by a suitable pressure limiting valve.	☐	☐
No apparent damage, contamination, or corrosion.	☐	☐
Any dismantled protective and monitoring equipment is fully reinstalled and functional.	☐	☐
All warning labels on the product are present and in proper condition.	☐	☐
No unusual noises, vibrations, moisture accumulation, or odors present.	☐	☐
No undesired discharge of lubricant (leakages) at connections.	☐	☐
Lubricant is fed without bubbles.	☐	☐
The bearings and friction points requiring lubrication receive the planned lubricant volume.	☐	☐

9.1 Maintenance of the gearbox

The gearboxes are largely maintenance-free and come filled with synthetic oil. To prevent damage, the following tasks should be carried out at the intervals specified.

Every 500 hours of operation:
Visual inspection for leakage (radial shaft seal)

Every 5 years:
Change the synthetic oil with new synthetic oil of the same specification.

9.1.1 Required oil quality

Synthetic oil according to ISO VG320 specification, suitable for the operating temperature range.

9.2 Maintenance of the motor

⚠ WARNING

Risk of electric shock/injury
At a minimum, the following safety measures must be taken before any work on the motor is done:

- Unauthorized persons must be kept away
- Mark and secure the work area
- Depressurize the product
- Electrically isolate the product and prevent it from being switched back on
- Check to ensure the absence of voltage
- Ground and short-circuit the product
- Cover any live parts in the surrounding area

9.2.1 Checking the bearings

Before a long period of downtime/storage, check the bearing grease of the motor before starting it up again, and replace it with new bearing grease if necessary.

9.2.2 Required grease quality

Lithium-based rolling bearing grease, suitable for the operating temperature range.

9.2.3 Replacing the bearing grease

Under normal loading (operation at rated speed, under normal environmental conditions), the bearing grease should be changed as follows.

- 2-pole motor: After 10,000 hours of operation
- Multi-pole motor: After 20,000 hours of operation

Under different conditions, such as operation with a frequency converter, the replacement interval is shorter, in proportion to the percentage deviation of the actual speed from the rated speed of the motor.

To replace the bearing grease, proceed as follows:

1. Switch off the pump and secure it to prevent it being switched back on (lock it out).
2. Access the bearing and remove the old grease from the bearing.
3. Clean the bearing with a suitable solvent.
4. Apply new grease to the bearing.

NOTICE

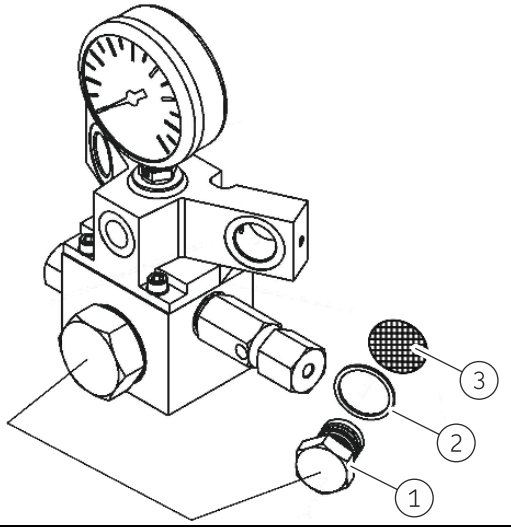
Damage to the bearing by overfilling with grease

Fill the bearing only two thirds with grease.
Filling the bearing and the bearing cap completely will increase the bearing temperature and result in increased wear.

5. Reinstall the bearing cap and other removed parts properly.

9.3 Cleaning/replacing the lubricant filter (pump design F)

Fig. 14



Cleaning/replacing the lubricant filter

Clean the lubricant filter:

1. Remove the plug screw (**1**).
2. Remove and clean the filter insert (**3**). If heavily clogged or damaged, replace it completely.
3. Check the O-ring (**2**) for damage and replace it if necessary.
4. Insert the filter insert.
5. Screw in the plug screw and tighten it.
   - Tightening torque = 30 Nm,± 3 Nm.

NOTE

The owner-operator must make sure that the lubricant filter is checked regularly. Clean or replace the lubricant filter, depending on the degree of clogging.

10 Cleaning

10.1 Basics

Cleaning should be carried out in accordance with the operator's own company rules, and cleaning agents and devices and the personal protective equipment to be used should likewise be selected in accordance with those rules. Only cleaning agents compatible with the materials may be used for cleaning. Completely remove any cleaning agent residue left on the product and rinse with clear water. Unauthorized persons must be kept away. Use signage to indicate wet areas.

10.2 Interior cleaning

The interior normally does not need to be cleaned. The interior of the product must be cleaned if incorrect or contaminated lubricant accidentally enters the product. Please contact our Service department.

10.3 Exterior cleaning

Do not allow any cleaning fluid to enter the interior of the product during cleaning.

⚠ WARNING

Risk of fatal electric shock

Cleaning work may only be performed on products that have been de-energized first. When cleaning electrical components, be mindful of the IP enclosure rating.

⚠ WARNING

Serious injury from contact with or inhalation of hazardous substances

Wear personal protective equipment. Observe the safety data sheet (SDS) of the hazardous substance. Avoid contaminating other objects or the environment during cleaning.

If products have ultrasonic sensors, the active sensor surface must be cleaned with a cloth when it becomes contaminated.

11 Faults, causes, and remedies

Table 21

Fault table

Fault	Possible cause	Remedy
Pump does not run	• Power supply to pump interrupted – Main machine is switched off – Pump power cable detached or defective – External fuse defective – The motor of the pump is faulty – Internal cable break	• Check whether one of the specified faults exists, and remedy it according to responsibility • Faults outside one's own scope of responsibility must be reported to the supervisor for initiation of further measures
Pump runs, but supplies either no lubricant at all or not enough	• Reservoir empty	• Fill the reservoir with clean lubricant. • Then run the pump until lubricant comes out of the pressure line connection without bubbles.
	• Lubricant filter is clogged (design F only) **NOTE** This is usually indicated by brief, sharp deflections (flickering) of the pointer on the pump's pressure gauge, and lubricant coming out at the pressure limiting valve.	• Check and clean the filter. If damaged, replace completely. • See section Cleaning/replacing the lubricant filter (pump design F), Page 33 .
	• Jam, malfunction within the centralized lubrication system	• Check the centralized lubrication system.
	• Pump element is damaged or worn	• Replace the pump element. • See the chapters for Pump design "E", Page 36 andPump designs F and V, Page 37 . **NOTE** The pump element cannot be repaired because the piston is fitted at the factory with extremely small tolerances.
	• Pressure limiting valve defective	• Replace the pressure limiting valve. • See the chapters for Pump design "V", Page 37 andPump design "F", Page 37 .
	• Check valve is dirty or defective	• Replace the check valve. • See the chapter for Pump designs F and V, Page 37 .

NOTE

Please contact our Customer Service if you cannot determine or resolve the error.

12 Repairs

⚠ WARNING

Risk of injury
At a minimum, the following safety measures must be taken before any repairs:

- Unauthorized persons must be kept away
- Mark and secure the work area
- Depressurize the product
- Isolate the product, and lock and tag it out
- Check to ensure live voltage is no longer present
- Ground and short-circuit the product
- Cover any adjacent live parts.

12.1 Replace pump element

12.1.1 General notes

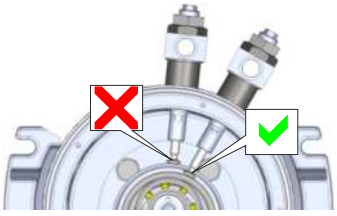
NOTICE

Damage to the pump

Damage to the pump from improper installation of the pump elements.

- Make sure that every pump element is sitting correctly in the groove on the driver ring (see Fig. 15).

Fig. 15



Pump element installation

NOTE

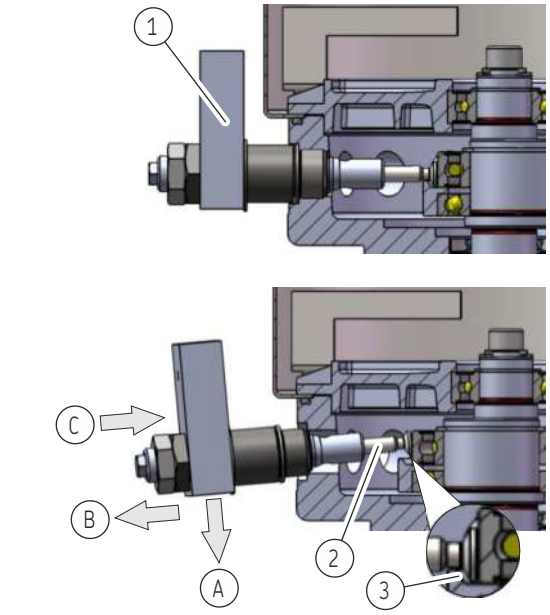
In the case of pumps with grease filling, it can remain in the reservoir. In the case of pumps with oil filling, a suitable container must be used to catch it when unscrewing the pump element.

NOTE

Turn the stirring paddle to the opposite side of the pump element. This makes it easier to install the piston in the groove of the driver ring.

12.1.2 Pump design "E"

Fig. 16



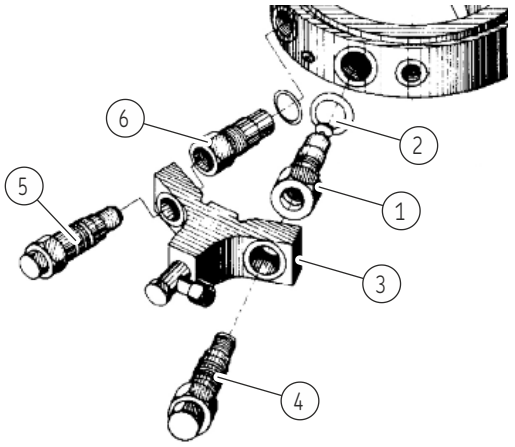
Installing pump elements of design E

1. Completely remove the pump element (**1**) from the pump by unscrewing on the hexagon of the pump element.
2. Push the pump element (**1**) down as shown (**A**) so that the piston (**2**) detaches from the groove (**3**) of the driver ring.
3. Remove the pump element (**1**) (**B**).
4. Pull the piston (**2**) of the new pump element about 30 mm out of the pump element (**1**).
5. Insert the pump element at an angle until the piston is above the driver ring.
6. Then hold the pump element horizontal so that the piston of the pump element engages in the groove of the driver ring.
7. Screw in the pump element (**2**).
   – Tightening torque = 30 Nm,± 3 Nm.

Then check that the pump element works correctly. Do this by switching on the pump and checking that the pump element supplies lubricant. You may need to top up the lubricant for this purpose.

12.1.3 Pump designs F and V

Fig. 17



Installing the pump elements of designs F and V

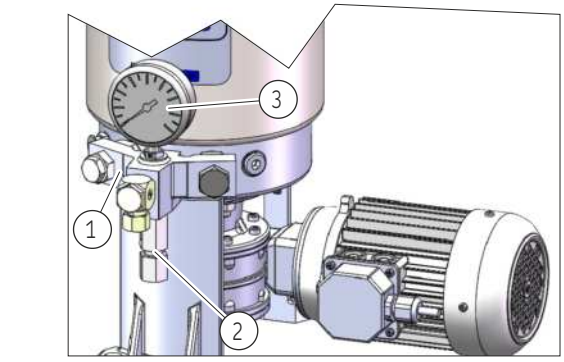
1. Unscrew the check valve (**4**) from the pump cylinder (**1**).
2. Unscrew the holding screw (**5**) from the bridge (**3**).
3. Remove the bridge (**3**).
4. If necessary, unscrew the dummy element (**6**) from the pump housing.
5. Completely remove the pump cylinder (**1**) from the pump housing by unscrewing on the hexagon of the pump cylinder.
6. Lightly push the pump cylinder (**1**) down so that the piston detaches from the groove of the driver ring (see Fig.16/**3**).
7. Remove the pump cylinder (**1**) together with the packing ring.
8. Pull the piston of the new pump cylinder about 30 mm out of the pump cylinder.
9. Insert the pump cylinder (**1**) at an angle until the piston is above the driver ring (see Fig.16/**3**).
10. Then hold the pump cylinder (**1**) horizontal so that the piston of the pump element engages in the groove of the driver ring.
11. Screw in the pump cylinder (**1**).
    – Tightening torque = 30 Nm,± 3 Nm.
12. Place the bridge (**3**) on the pump cylinder (**1**).
13. Screw the holding screw (**5**) into the bridge.
    – Tightening torque = 30 Nm,± 3 Nm.
14. Screw the check valve (**4**) into the pump element.
    – Tightening torque = 30 Nm,± 3 Nm.

Then check that the pump element works correctly. Do this by switching on the pump and checking that the pump element supplies lubricant. You may need to top up the lubricant for this purpose.

12.2 Replace pressure regulating valve.

12.2.1 Pump design "V"

Fig. 18



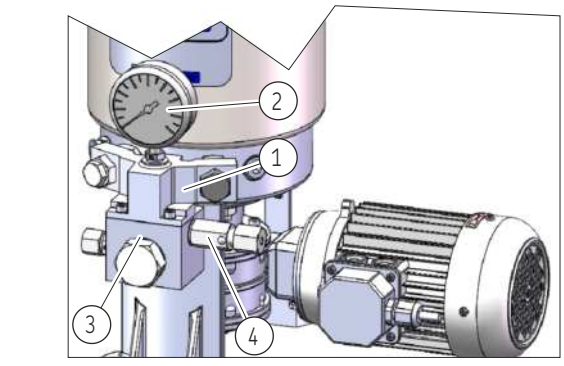
Replacing the pressure limiting valve – design “V”

1 Bridge
2 Pressure limiting valve
3 Pressure gauge

1. Unscrew the faulty pressure limiting valve (**2**) from the bridge (**1**) by applying a wrench to the hexagon of the valve.
2. Screw the new pressure limiting valve (**2**) into the bridge by applying a wrench to the hexagon of the valve. Tighten it.
   – Tightening torque = 30 Nm,± 3 Nm.

12.2.2 Pump design "F"

Fig. 19



Replacing the pressure limiting valve – design “F”

1 Bridge
2 Pressure gauge
3 Filter block
4 Pressure limiting valve

1. Unscrew the faulty pressure limiting valve (**4**) from the bridge (**1**) by applying a wrench to the hexagon of the valve.
2. Screw the new pressure limiting valve (**4**) into the bridge by applying a wrench to the hexagon of the valve. Tighten it.
   – Tightening torque = 30 Nm,± 3 Nm.

13 Shutdown, disposal

13.1 Temporary shutdown

Temporary shutdowns should be done by a course of action to be defined by the operator.

13.2 Permanent shutdown, disassembly

Permanent shutdown and disassembly of the product must be planned properly by the operator and conducted in compliance with all applicable laws and regulations.

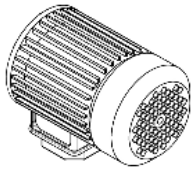
13.3 Disposal

The waste producer/operator must dispose of the various types of waste in accordance with the applicable laws and regulations of the country in question.

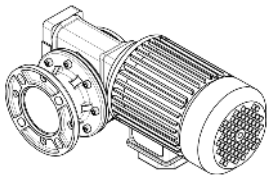
14 Spare parts

Spare parts may be used exclusively for replacement of identical defective parts. Modifications with spare parts on existing products are not allowed.

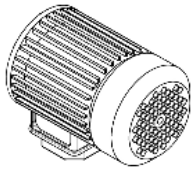
14.1 Motors 380 - 480 VAC

Designation	Pcs.	Item number	Figure
Motors for gearbox M100/M 490 | 0.18 kW / 0.21 kW	1	245-13913-1	
Motors for gearbox M049 | 0.25 kW / 0.29 kW	1	245-13914-1	

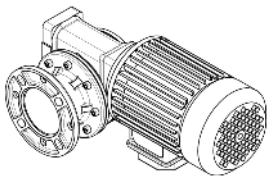
14.2 Motors 380 - 480 VAC with gearbox

Designation	Pcs.	Item number	Figure
Motors with gearbox M100 | 0.18 kW / 0.21 kW	1	245-13915-1	
Motors with gearbox M049 | 0.25 kW / 0.25 kW	1	245-13916-1	
Motors with gearbox M490 | 0.18 kW / 0.21 kW	1	245-13918-1	

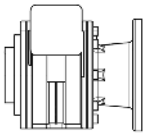
14.3 Motors 500 VAC

Designation	Pcs.	Item number	Figure
Motors for gearbox M100/M 490 | 0.18 kW	1	245-13919-1	
Motors for gearbox M049 | 0.25 kW	1	245-13920-1	

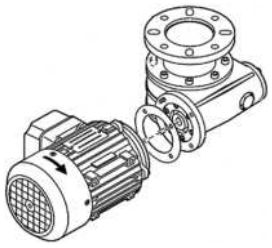
14.4 Motors 500 VAC with gearbox

Designation	Pcs.	Item number	Figure
Motors for gearbox M100 | 0.18 kW	1	245-13921-1	
Motors with gearbox M049 | 0.25 kW	1	245-13922-1	
Motors with gearbox M490 | 0.18 kW	1	245-13923-1	

14.5 Gearboxes

Designation	Pcs.	Item number	Figure
Transmission ratio i = 100:1	1	246-14145-1	
Transmission ratio i = 490:1	1	246-14146-1	
Transmission ratio i = 049:1		246-14145-2	

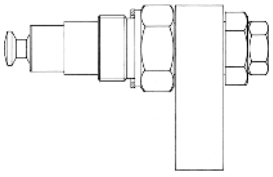
14.6 Packing ring, motor – gearbox

Designation	Pcs.	Item number	Figure
Packing ring Ø 60 x 90 x 0.5	1	306-19415-1	

14.7 Packing ring, gearbox – pump housing

Designation	Pcs.	Item number	Figure
Packing ring Ø 70 x 126 x 0.5	1	306-19640-1	

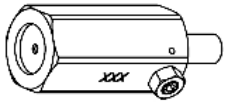
14.8 Pump element for pump design E

Designation	Pcs.	Item number	Figure
Pump element, complete	1	500-30018-3	

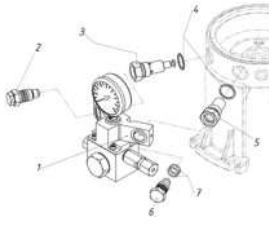
14.9 Plug screw for pump design E

Designation	Pcs.	Item number	Figure
Plug screw for pump element	1	303-17431-1	

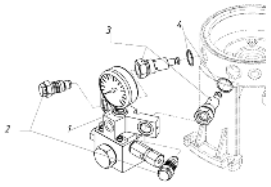
14.10 Pressure limiting valve for pump design E

Designation	Pcs.	Item number	Figure
Pressure limiting valve 10 mm / 350 bar	1	624-25483-1	
Pressure limiting valve 10 mm / 410 bar	1	624-28073-1	

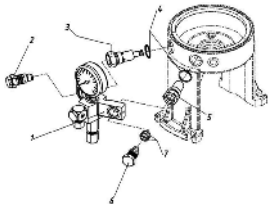
14.11 Bridge for pump design F1 (ZPU01) complete with one pump element

Designation	Pcs.	Item number	Figure
Bridge version F1 complete with a 350 bar pump element	1	600-26787-1	
Bridge version F1 complete with a 400 bar pump element	1	600-77912-1	
Comprising:			
1 Bridge with filter block and pressure gauge	1		
2 Valve, complete	1		
3 Pump cylinder, complete	1		
4 Packing ring	2		
5 Dummy cylinder	1		
6 Holding screw	1		
7 O-ring	2		

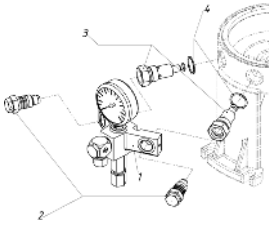
14.12 Bridge for pump design F2 (ZPU02) complete with two pump elements

Designation	Pcs.	Item number	Figure
Bridge version F2 complete with two 350 bar pump elements	1	600-26788-1	
Bridge version F2 complete with two 400 bar pump elements	1	600-77913-1	
Comprising:			
1 Bridge with filter block and pressure gauge	1		
2 Valve, complete	2		
3 Pump cylinder, complete	2		
4 Packing ring	2		

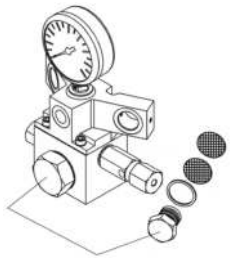
14.13 Bridge for pump design V1 (ZPU01) complete with one pump element

Designation	Pcs.	Item number	Figure
Bridge version V1 complete with a 350 bar pump element	1	600-26785-1	
Bridge version V1 complete with a 400 bar pump element	1	600-77914-1	
Comprising:			
1 Bridge with filter block and pressure gauge	1		
2 Valve, complete	1		
3 Pump cylinder, complete	1		
4 Packing ring	2		
5 Dummy cylinder	1		
6 Holding screw	1		
7 O-ring	2		

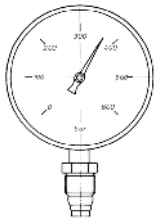
14.14 Bridge for pump design V2 (ZPU02) complete with two pump elements

Designation	Pcs.	Item number	Figure
Bridge version V2 complete with two 350 bar pump elements	1	600-26786-1	
Bridge version V2 complete with two 400 bar pump elements	1	600-77915-1	
Comprising:			
1 Bridge with filter block and pressure gauge	1		
2 Valve, complete	2		
3 Pump cylinder, complete	2		
4 Packing ring	2		

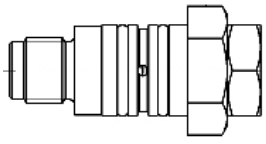
14.15 Filter for pump design F

Designation	Pcs.	Item number	Figure
Packing ring Usit Ø 34.3 x 43 x 2	1	220-12238-3	
Filter, coarse (410 µm mesh size)	1	428-21544-1	
Filter, fine (270 µm mesh size)	1	428-21545-1	

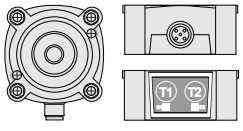
14.16 Pressure gauge for pump designs F and V

Designation	Pcs.	Item number	Figure
Pressure gauge 0 - 600 bar	1	500-32143-1	

14.17 Check valve for pump designs F and V, complete

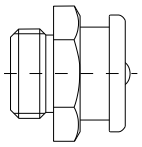
Designation	Pcs.	Item number	Figure
Check valve, complete	1	500-30012-3	

14.18 Ultrasonic sensor

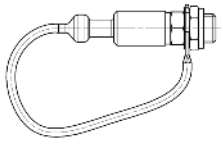
Designation	Pcs.	Item number	Figure
Ultrasonic sensor for reservoir size 10 L	1	664-85313-8	
Ultrasonic sensor for reservoir size 30 L	1	664-85313-9	

15 Accessories

15.1 Button-head lubricating nipple

Designation	Pcs.	Item number	Figure
Button-head lubricating nipple ST AG (G3/8)	1	251-14040-3	

15.2 Fill connection ZPU 01/02 (optional fill connection)

Designation	Pcs.	Item number	Figure
Fill connection ZPU 01/02 (G3/8)	1	561-32455-1	

16 Appendix

16.1 China RoHS Table

Table 22

部件名称 (Part Name)	有毒害物质或元素 (Hazardous substances)				
	铅	汞	镉	六价铬	多溴联苯
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated biphenyls (PBB)
用钢和黄铜加工的零件 (Components made of machining steel and brass)	X	0	0	0	0
部件名称 (Part Name)	多溴二苯醚	邻苯二甲酸二丁酯	邻苯二甲酸丁苄酯	鄰苯二甲酸二(2-乙基己基)酯	邻苯二甲酸二异丁酯
	Polybrominated diphenyl ethers (PBDE)	Dibutyl phthalate (DBP)	Benzyl butyl phthalate (BBP)	Bis (2-ethylhexyl) phthalate (DEHP)	Diisobutyl phthalate (DIBP)
用钢和黄铜加工的零件 (Components made of machining steel and brass)	0	0	0	0	0

本表格依据SJ/T11364的规定编制 (This table is prepared in accordance with the provisions of SJ/T 11364.)

0:	表示该有毒有害物质在该部件所有均质材料中的含量均在GB/T 26572 规定的限量要求以下。 (Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.)
X:	表示该有毒有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572标准规定的限量要求。 (Indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.)

Notes / Notizen / Apuntes

Notes / Notizen / Apuntes

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