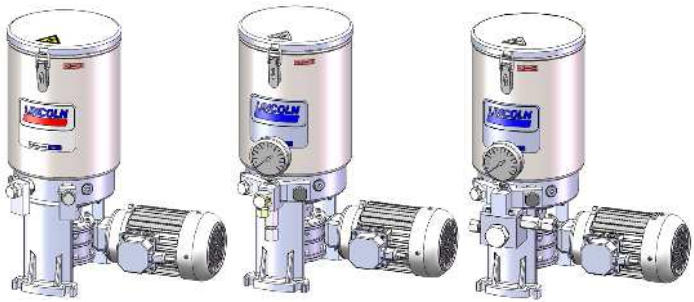
Lubrication pump
ZPU 01/ ZPU 02

Installation instructions
following machinery directive 2006/42/EC

EN



Version E Version V Version F

951-171-016-EN
Version 03
2018/11/30

EC Declaration of incorporation following machinery directive 2006/42/EC, annex II, part 1 B

The manufacturer, SKF Lubrication Systems Germany GmbH, Walldorf Facilities, Heinrich-Hertz-Str. 2-8, DE - 69190 Walldorf, hereby declares that the partly completed machinery

Designation:	Electrically driven lubrication pump to supply lubricants
Type:	ZPU 01 / ZPU 02
Part number:	661-XXXXX-X
Year of construction:	See type identification plate

complies with the following basic safety and health requirements of the EC machinery directive 2006/42/EC at the time when first being launched in the market.

1.1.2, 1.1.3, 1.3.2, 1.3.4, 1.5.1,·1.5.6, 1.5.8, 1.5.9, 1.6.1, 1.7.1, 1.7.3, 1.7.4

The special technical documents were prepared following Annex VII part B of this directive. Upon justifiable request, these special technical documents can be forwarded electronically to the respective national authorities. The person empowered to assemble the technical documentation on behalf of the manufacturer is the head of standardization. See manufacturer's address.

Furthermore, the following directives and harmonized standards were applied in the respective applicable areas:

2011/65/EU	RoHS II
2014/30/EU	Electromagnetic compatibility | Industry

Standard	Edition	Standard	Edition	Standard	Edition	Standard	Edition
DIN EN ISO 12100	2011	DIN EN 60947-5-1	2010	DIN EN 61000-6-2	2006	DIN EN 61000-6-4	2011
DIN EN ISO 809	2012	DIN EN 61131-2	2008	Amendment	2011	DIN EN 60947-5-1	2010
DIN EN 60204-1	2007	Amendment	2009	DIN EN 61000-6-3	2011		
Amendment	2010	DIN EN 60034-1	2011	Amendment	2012		
DIN EN ISO 50581	2013	DIN EN 61000-6-1	2007				

The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the previsions of machinery directive 2006/42/EC and any other applicable directives.

Walldorf, 02/02/2016

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Legal disclosure

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Training courses

In order to provide a maximum of safety and economic viability, SKF carries out detailed training courses. It is recommended that the training courses are attended. For more information please contact the respective SKF Service address.

Copyright

Warranty
The instructions do not contain any information on the warranty. This can be found in our general terms and conditions.

Disclaimer
The manufacturer shall not be held responsible for damages caused by:

- non appropriate use, faulty assembly, operation, setting, maintenance, repair or accidents
- improper or late response to malfunctions
- unauthorized modifications of the product
- intent or negligence
- the use of non-original SKF spare parts

Liability for loss or damage resulting from the use of our products is limited to the maximum purchase price. Liability for consequential damages of whatever kind is excluded.

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Explanation of symbols and signs

	General warning		Dangerous electrical voltage		Risk of falling		Hot surfaces
	Unintentional intake		Crushing hazard		Pressure injection		Suspended load
	Electrostatically sensitive components						
	Wear personal protective equipment (goggles)		Wear personal protective equipment (face shield)		Wear personal protective equipment (gloves)		Wear personal protective equipment (protective clothes)
	Wear personal protective equipment (safety shoes)		Release the product.		General notes		Keep unauthorized persons away.
	Disposal, recycling		Disposal of waste electrical and electronic equipment				

	Warning level	Consequence	Probability
	DANGER	Death, serious injury	imminent
	WARNING	Serious injury	possible
	CAUTION	Minor injury	possible
	ATTENTION	Property damage	possible

Symbol	Meaning
●	Chronological guidelines
○	Lists
✓	Indicates the prerequisites that have to be fulfilled for the activities described in the following

Abbreviations and conversion factors

re.	regarding	°C	degrees Celsius	°F	degrees Fahrenheit
approx.	approximately	K	Kelvin	Oz.	Ounce
i.e.	that is	N	Newton	fl. oz.	fluid ounce
etc.	et cetera	h	hour	in.	inch
poss.	possibly	s	second	psi	pounds per square inch
if appl.	if applicable	d	day	sq.in.	square inch
a.a.r.	as a rule	Nm	Newtonmeter	cu. in.	cubic inch
incl.	including	ml	millilitre	mph	miles per hour
min.	minimum	ml/d	millilitre per day	rpm	revolutions per minute
max.	maximum	cc	cubic centimetre	gal.	gallon
min	minute	mm	millimetre	lb.	pound
etc.	et cetera	l	litre	hp	horse power
e.g.	for example	dB (A)	sound pressure level	kp	kilopound
kW	kilowatt	>	greater than	fpsec	feet per second
U	Voltage	<	less than	Conversion factors	
R	resistance	±	plus/minus	length	1 mm = 0.03937 in.
I	current	Ø	diametre	Area	1 cm^2 = 0.155 sq.in
V	volt	kg	kilogram	Volume	1 ml = 0.0352 fl.oz.
W	watt	rh	relative humidity		1 l = 2.11416 pints (US)
AC	alternating current	≈	approximately	Mass	1 kg = 2.205 lbs
DC	direct current	=	equal to		1 g = 0.03527 oz.
A	ampere	%	per cent	Density	1 kg/cc = 8.3454 lb./gal(US)
Ah	Ampere hour	‰	per mille		1 kg/cc = 0.03613 lb./cu.in.
Hz	Frequency [Hertz]	≥	greater than	Force	1 N = 0.10197 kp
nc	normally closed contact	≤	less than	Pressure	1 bar = 14.5 psi
no	normally open contact	mm^2	square millimetre	Temperature	°C = (°F-32) x 5/9
		rpm^{-1}	revolutions per minute	output	1 kW = 1.34109 hp
				acceleration	1 m/s^2 = 3.28084 $ft./s^2$
				speed	1 m/s = 3.28084 fpsec.
					1 m/s = 2.23694 mph

1. Safety instructions

1.1 General safety instructions

- The owner must ensure that safety information has been read by any persons entrusted with works on the product or by those persons who supervise or instruct the before-mentioned group of persons. In addition, the owner must also ensure that the relevant personnel are fully familiar with and have understood the contents of the Instructions. It is prohibited to commission or operate the product prior to reading the Instructions.
- These Instructions must be kept for further use.
- The described products were manufactured according to the state of the art. Risks may, however, arise from a usage not according to the intended purpose and may result in harm to persons or damage to material assets.
- Any malfunctions which may affect safety must be remedied immediately. In addition to these Instructions, general statutory regulations for accident prevention and environmental protection must be observed.

1.2 General behaviour when handling the product

- The product may only be used in awareness of the potential dangers, in proper technical condition, and according to the information in these instructions.
- Familiarize yourself with the functions and operation of the product. The specified assembly and operating steps and their sequences must be observed.
- Any unclear points regarding proper condition or correct assembly/ operation must be clarified. Operation is prohibited until issues have been clarified.
- Keep unauthorized persons away.
- Wear personal protective equipment always.
- Precautionary operational measures and instructions for the respective work must be observed.
- Responsibilities for different activities must be clearly defined and observed. Uncertainty seriously endangers safety.
- Safety-related protective and emergency devices must not be removed, modified or affected otherwise in their function and are 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 be 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.

1.3 Intended use

Supply of lubricants within a centralized lubrication system following the specifications, technical data and limits stated in these Instructions:

Usage is allowed exclusively for professional users in the frame of commercial and economic activities.

1.4 Foreseeable misuse

Any usage differing from the one stated in these Instructions is strictly prohibited, particularly a usage:

- outside the indicated temperature range
- of non-specified means of operation
- without adequate pressure relief valve
- in continuous operation
- in areas with aggressive or corrosive materials (e.g. high ozone pollution)
- in areas with harmful radiation (e. g. ionising radiation)
- in an explosion protection zone
- to supply, transport, or store hazardous substances and mixtures in accordance with annex I part 2-5 of the CLP regulation (EC 1272/2008) and marked with GHS 01 to GHS 06 and GHS 08 hazard pictograms.
- Use to feed, forward, or store gases, liquefied gases, dissolved gases, vapours, or fluids whose vapour pressure exceeds normal atmospheric pressure (1013 mbar) by more than 0.5 bar at the maximum permissible operating temperature.

1.5 Painting of plastic parts

Painting of any plastic parts or seals of the described products is expressly prohibited.

Remove or completely tape parts concerned before painting the superior machine.

1.6 Modifications of the product

Unauthorized conversions or modifications may result in unforeseeable impacts on safety. Therefore, any unauthorized conversions or modifications are expressly prohibited.

1.7 Prohibition of certain activities

Due to potential sources of faults that may not be visible or due to legal regulations the following activities may be carried out by manufacturer specialists or authorized persons only:

- Repairs, changes to the drive
- Replacement of or changes to the pistons of the pump elements

1.8 Inspections prior to delivery

The following inspections were carried out prior to delivery:

- Safety and functional tests
- In case of electrically driven products: electrical inspections following DIN EN 60204-1:2007 / VDE 0113-1:2007.

1.9 Other applicable documents

In addition to these instructions, the following documents must be observed by the respective target group:

- Operational instructions and approval rules
- Safety data sheet of the lubricant used

Where appropriate:

- Project planning documents
- Instructions of the suppliers of purchased parts
- Any documents of other components required to set up the centralized lubrication system
- Other relevant documents for the integration of the product into the machine or system

1.10 Markings on the product

Unintended intake
(with the reservoir being open)

Directional arrow of motor

1.11 Notes related to the type identification plate

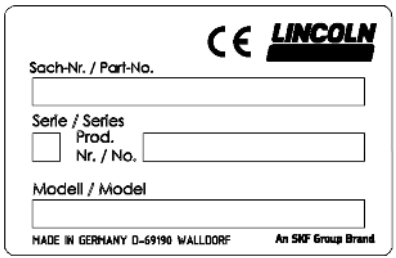
The type identification plate states important characteristics such as type designation, order number, etc.

To ensure that the loss of data due to an illegible type identification plate is avoided, the characteristics should be entered in the Instructions.

Model _____

P. No. _____

S. No. _____



1.12 Notes related to the CE marking

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

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

Reference on Low Voltage Directive 2014/35/EU

The protective regulations of Low Voltage Directive 2014/35/EU are fulfilled according to annex I (1.5.1) of Machinery Directive 2006/42/EC.

Reference on Pressure Equipment Directive 2014/68/EU

Because of its performance data the product does not achieve the limit values defined in Article 4 (1) (a) (i) and is therefore excluded from the scope of application of Pressure Equipment Directive 2014/68/EU following Article 4 (3).

1.13 Persons authorized to operate the pump

1.13.1 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.

1.13.2 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.

1.13.3 Specialist in electrics

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

1.14 Briefing of external technicians

Prior to commencing the activities, external technicians must be informed by the operator of the company safety provisions, the applicable accident prevention regulations to be maintained, and the functions of the superordinate machine and its protective devices.

1.15 Provision of personal protective equipment

The operator must provide suitable personal protective equipment for the respective location of operation and the purpose of operation.

1.16 Operation

The following must be observed during commissioning and operation.

- Any information within this manual and the information within the referenced documents.
- All laws and regulations to be complied with by the user.

1.17 Emergency stopping of the pump station

In case of an emergency stop the pump station by:

- Switching off the superior machine or system in which the pump station has been integrated.
- Actuating the emergency stop switch of the superior machine.

1.18 Transport, installation, maintenance, malfunctions, repair, shutdown, disposal.

- All relevant persons must be informed of the activity prior to starting any work. Observe the precautionary operational measures and work instructions.
- Carry out transport using suitable transport and hoisting equipment on suitable ways only.
- Maintenance and repair work can be subject to restrictions in low or high temperatures (e.g. changed flow properties of the lubricant). Therefore, where possible, try to carry out maintenance and repair work at room temperature.
- Prior to performing work, the product and the machine, into which the product will be integrated, must be depressurized and secured against unauthorized activation.
- Ensure through suitable measures that movable or detached parts are immobilized during the work and that no limbs can be caught in between by inadvertent movements.
- Assemble the product only outside of the operating range of moving parts, at an adequate distance from sources of heat or cold. Other units of the machine or vehicle must not be damaged or impaired in their function by the installation.
- Dry or cover wet, slippery surfaces accordingly.
- Cover hot or cold surfaces accordingly.
- Work on electrical components must be carried out by electrical specialists only. Observe any waiting periods for discharging, if necessary. Carry out works on electrical components only while the system is depressurized and use voltage isolated tools suitable for electrical works only.
- Carry out electrical connections only according to the information in the valid wiring diagram and taking the relevant

regulations and the local connection conditions into account.

- Do not touch cables or electrical components with wet or damp hands.
- Fuses must not be bypassed. Replace defective fuses always by fuses of the same type.
- Undertake drilling at non-critical, non-load bearing parts only. Use any available boreholes. Do not damage lines and cables when drilling.
- Observe possible abrasion points. Protect the parts accordingly.
- All components used must be designed for:
  - the maximum operating pressure
  - the maximum/ minimum ambient temperature
- No parts of the centralized lubrication system may be subjected to torsion, shear, or bending.
- Check all parts prior to their usage for contamination and clean, if necessary.
- Lubricant lines should be primed with lubricant prior to installation. This makes the subsequent ventilation of the system easier.
- Observe the specified tightening torques. When tightening, use a calibrated torque wrench.
- When working with heavy parts use suitable lifting tools.
- Avoid mixing up or wrong assembly of dismantled parts. Mark these parts accordingly.

1.19 Initial commissioning / daily start-up

Ensure that:

- All safety devices are completely available and functional
- All connections are correctly connected
- All parts are correctly installed
- All warning labels on the product are present completely, highly visible and undamaged
- Illegible or missing warning labels are to be replaced without delay

1.20 Cleaning

- Risk of fire and explosion when using inflammable cleaning agents. Only use non-flammable cleaning agents suitable for the purpose.
- Do not use aggressive cleaning agents.
- Do not use steam jet or high pressure cleaners. Electrical components may be damaged.
  Observe the IP protection class.
- Cleaning work may not be carried out on energized components.
- Mark damp areas accordingly.

1.21 Residual risks

Residual risk	Possible in life cycle	Prevention/ remedy
Personal injury / material damage due to falling of raised parts	A, B, C, G, H, K	Keep unauthorized persons away. No people may remain under suspended loads. Lift parts with suitable and tested lifting devices.
Personal injury / material damage due to tilting or falling of the product because of non-observance of the stated tightening torques	B, C, G	Observe the specified tightening torques. Fix the product only to components with sufficient load capacity. If no tightening torques are stated, apply tightening torques according to the screw size characteristics for 8.8 screws.
Personal injury / material damage due to electric shock because of damage to the connection cable	B, C, D, E, F, G, H	Check the connection cable with regard to damages before the first usage and then at regular intervals. Do not mount cable to moving parts or friction points. If this cannot be avoided, use spring coils respectively protective conduits.
Personal injury / damage to material due to spilled or leaked lubricant	B, C, D, F, G, H, K	Be careful when filling the reservoir and when connecting or disconnecting lubricant feed lines. Always use suitable hydraulic screw connections and lubrication lines for the stated pressures. Do not mount lubrication lines to moving parts or friction points. If this cannot be avoided, use flexible hose lines or spring coils respectively protective conduits.
Life cycle: A = transport, B = installation, C = initial start-up, D = operation, E = cleaning, F = maintenance, G = fault, repair, H = shutdown, K = disposal		

2. Lubricants

2.1 General information

Lubricants are used specifically for certain application purposes. In order to fulfil their tasks, lubricants must fulfil various requirements to varying extents. The most important requirements for lubricants are:

- reduction of abrasion and wear
- corrosion protection
- noise minimisation
- protection against contamination or penetration of foreign objects
- cooling (primarily with oils)
- longevity (physical/ chemical stability)
- compatibility with as large a number of materials as possible
- economic and ecological aspects

2.2 Selection of lubricants

SKF considers lubricants to be an element of system design. A suitable lubricant is selected already when designing the machine and forms the basis for the planning of a centralized lubrication system.

The selection is made by the manufacturer/ operator of the machine, preferably together with the lubricant supplier based on the requirement profile defined.

Should you have little or no experience with the selection of lubricants for centralized lubrication systems, please contact SKF.

If required we will be glad to support customers to select suitable components for feeding the selected lubricant and to plan and design their centralized lubrication system.

You will avoid possible costly downtimes through damage to your machine/ system or damage to the centralized lubrication system.

Only lubricants specified for the product may be used. Unsuitable lubricants may lead to a failure of the product.

Do not mix lubricants. This may have unforeseeable effects on the usability and therefore on the function of the centralized lubrication system.

Due to the multitude of possible additives, it is possible that individual lubricants, which according to the manufacturer's data sheets fulfil the necessary specification, are not in fact suitable for use in centralized lubrication systems (e.g. incompatibility between synthetic lubricants and materials). In order to avoid this, always use lubricants tested by SKF.

2.3 Material compatibility

Lubricants must generally be compatible with the following materials:

- steel, grey iron, brass, copper, aluminium
- NBR, FPM, ABS, PA, PU

2.4 Ageing of lubricants

After a prolonged downtime of the machine, the lubricant must be inspected prior to re-commissioning as to whether it is still suitable for use due to chemical or physical ageing. We recommend that you undertake this inspection already after a machine downtime of 1 week.

If doubts arise as to the suitability of the lubricant, please replace it prior to re-commissioning and, if necessary, undertake initial lubrication manually.

It is possible for lubricants to be tested in the company's laboratory for their suitability for being pumped in centralized lubrication systems (e.g. "bleeding").

Please contact SKF if you have further questions regarding lubricants.

You may request an overview of the lubricants tested by SKF.

3. Overview, functional description

Pump types ZPU 01/ ZPU 02
basically consist of the following main components

1 Reservoir with stirring paddle
The reservoir contains the lubricant and, if needed, a sensor for low-level indication purposes.
While the pump operates, the stirring paddle rotates to homogenize and vent the lubricant. The stirring paddle's lower part pushes the lubricant towards the pump elements thus improving transportability.

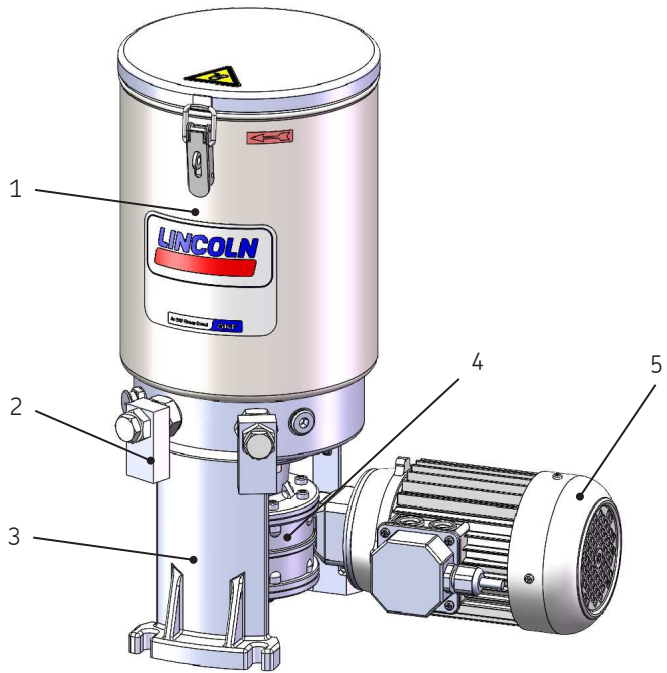
2. Pump element
Supplies lubricant into the lubricant feed line.

3. Pump housing

4. Gear
The gear reduces the motor speed to the speed required for the pump's eccentric shaft.

5. Motor
The motor drives the pump and is connected to the gear.

Overview Fig. 1

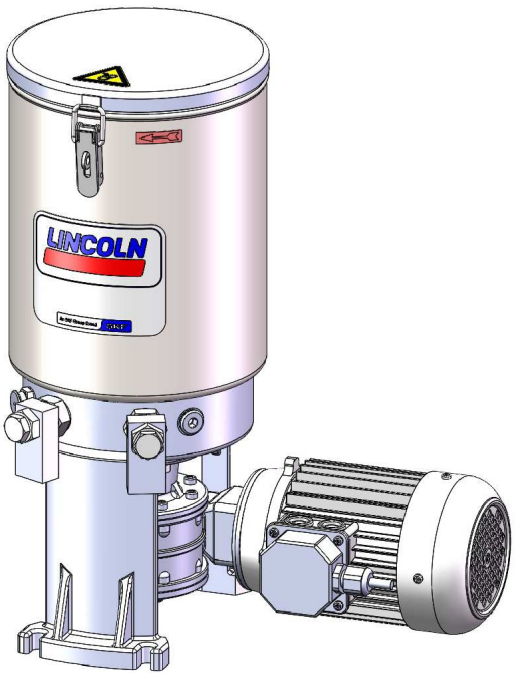


Versions

Version E:
Consists of 1 or 2 pump elements that are fitted directly into the pump housing.

ZPU 01/ ZPU 02 pump versions E are used mainly for progressive systems with one or two lubrication circuits.

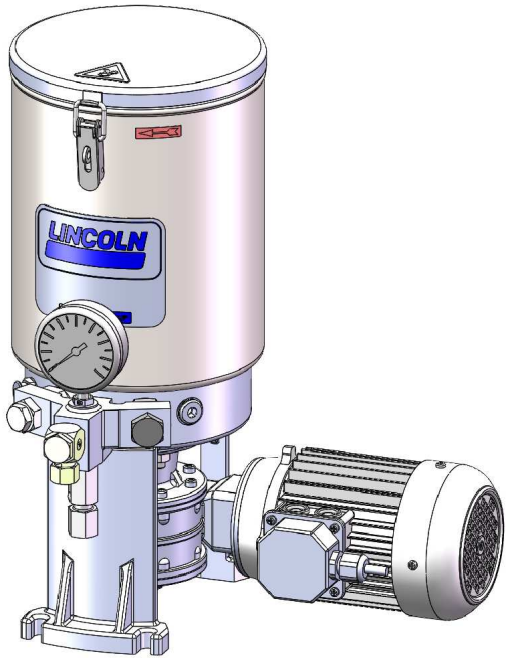
Overview version E Fig. 2



Version V:
Consists of a bridge to combine the lubricant volume and a pressure gauge.

ZPU 01/ ZPU 02 pump versions V are used mainly for progressive systems with one lubrication circuit.

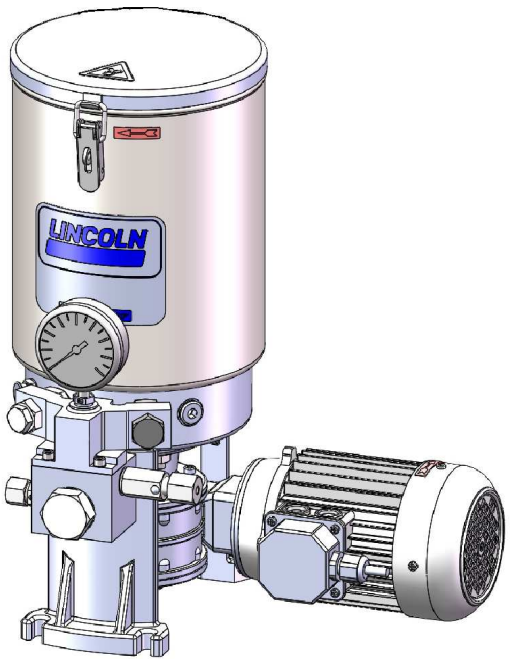
Overview version V Fig. 3



Version F:
Consists of a bridge to combine the lubricant volume, a filter block, a pressure gauge and a pressure control valve.

ZPU 01/ ZPU 02 pump versions F are used mainly for dual-line systems with one lubrication circuit.

Overview version F Fig. 4



4. Technical data

4.1 General technical data

Range of operating temperatures	-25 °C to +70 °C
The indicated operating temperature range of the pump presupposes the suitability of the lubricant used for the respective actually existing operating temperature. Using a lubricant not suitable for the actual operating temperature may, in case of low temperatures, result in a defect or failure of the pump due to a too high lubricant viscosity.	
Operating pressure	350 bar max. with gear ratio i=1:100 and i=1:490 400 bar max. with gear ratio i=1:049
Pump versions E must be protected by the operator against inadmissibly high pressure by suitable pressure control valves. Pump versions F and V are supplied with suitable pressure control valves ex works.	
Outlet fitting	Version E (G1/4“) Version E or F (G3/8“) for tube 10 mm
Installation position	vertical, i.e. reservoir at top. Deviation ± 5°
Sound pressure level	< 70 dB (A)
Type of protection	IP 55
Weight of the empty pump	approx. 19 kg
Number of pump elements	ZPU 01 = 1 ZPU 02 = 2
Filling of the pump	via reservoir lid
Approved lubricants	mineral oils (basic oils) respectively environmentally compatible oils as of ISO VG 46 up to greases of NLGI class 2 Operating viscosity (oils) ≥ 50 mm^2/s

Output volumes

In case of 60 Hertz motors the output volume increases by 20 %

	Gear ratio M490	M100	M049
ZPU 01	160 cm^3/h	800 cm^3/h	1600 cm^3/h
ZPU 02	320 cm^3/h	1600 cm^3/h	3200 cm^3/h

Admissible speeds when supplying the pump without motor and gear

The speeds have to be adhered to by selecting suitable motors and gears

	Minimum speed	Maximum speed
Lubrication grease	2.5 rpm^{-1}	30 rpm^{-1}
Lubrication oil	2.5 rpm^{-1}	35 rpm^{-1}

4.2 Motors 380 - 480 V AC

Part number	Type of motor				Manufacturer				
245-13913-1	TN 63B				Motori Elettrici				
Rated voltage	V	230 | 400	265 | 460	VAC	Efficiency	η	62	%	
Circuit		△ Y	△ Y		Insulation class		F		
Rated frequency	f	50	60	Hz	Type of protection	IP	55		
Rated power	P	0.18	0.21	KW	Flange		Ø 90	mm	
Rated speed	n	1380	1656	rpm^{-1}	Operating mode		S1		
Nominal current	I_N	1.22	0.7	A	Size		63		
Starting current		2.5 x rated current		A	Design		B14		
Performance factor	χοσ φ	0.69			Shaft		Ø 11x 23	mm	
Motor for gear M100 | M490									

Part number	Type of motor				Manufacturer				
245-13914-1	TN 63				Neri				
Rated voltage	V	230 | 400	265 | 460	VAC	Efficiency	η	62		%
Circuit		△ Y	△ Y		Insulation class		F		
Rated frequency	f	50	60	Hz	Type of protection	IP	55		
Rated power	P	0.25	0.29	KW	Flange		Ø 90	mm	
Rated speed	n	1334	1600	rpm^{-1}	Operating mode		S1		
Nominal current	I_N	2.5	1.4	A	Size		63		
Starting current		2.5 x rated current		A	Design		B14		
Performance factor	χοσ φ	0.55			Shaft		Ø 11x 23	mm	
Motor for gear M049									

4.3 Motors 380 - 480 V AC with gear

Part number					Manufacturer			
245-13915-1					Neri			
Rated voltage	V	230 | 400	265 | 460	VAC	Insulation class		F	
Circuit		△ Y	△ Y		Type of protection	IP	55	
Rated frequency	f	50	60	Hz	Flange		Ø 90	mm
Rated power	P	0.18	0.21	KW	Operating mode		S1	
Rated speed	n	1360	1630	rpm^{-1}	Size		63	
Nominal current	I_N	1.2	0.7	A	Design		B14	
Starting current		2.5 x rated current		A	Shaft		Ø 11x 23	mm
Performance factor	$\chi o \sigma \varphi$	0.7			Ratio	i	100	
Efficiency	η	54	%					

Part number	Type of motor				Manufacturer			
245-13916-1	DIC 63L4				Motori Elettrici			
Rated voltage	V	220 | 420	250 | 480	VAC	Insulation class		F	
Circuit		△ Y	△ Y		Type of protection	IP	55	
Rated frequency	f	50	60	Hz	Flange		Ø 90	mm
Rated power	P	0.25	0.29	KW	Operating mode		S1	
Rated speed	n	1500	1800	rpm^{-1}	Size		63	
Nominal current	I_N	2.07/1.2	2.07/1.2	A	Design		B14	
Starting current		3.6 x rated current		A	Shaft		Ø 11x 23	mm
Performance factor	$\chi o \sigma \varphi$	0.77			Ratio	i	049	
Efficiency	η	65	%					

Part number	Type of motor				Manufacturer			
245-13918-1	TN 63B				Motori Elettrici			
Rated voltage	V	230 | 400	265 | 460	VAC	Insulation class		F	
Circuit		△ Y	△ Y		Type of protection	IP	55	
Rated frequency	f	50	60	Hz	Flange		Ø 90	mm
Rated power	P	0.18	0.21	KW	Operating mode		S1	
Rated speed	n	1380	1630	rpm^{-1}	Size		63	
Nominal current	I_N	1.22	0.7	A	Design		B14	
Starting current		2.6 x rated current		A	Shaft		Ø 11x 23	mm
Performance factor	$\chi o \sigma \varphi$	0.68			Ratio	i	490	
Efficiency	η	54.3		%				

4.4 Motors 500 V AC

Part number	Type of motor			Manufacturer			
245-13919-1	TN 63B			Motori Elettrici			
Rated voltage	V	290 | 500	V AC	Insulation class		F	
		△ Y		Type of protection	IP	55	
Rated frequency	f	50	Hz	Flange		Ø 90	mm
Rated power	P	0.18	KW	Operating mode		S1	
Rated speed	n	1360	rpm^{-1}	Size		63	
Nominal current	I_N	1.0/0.6	A	Design		B14	
Starting current		2.5 x rated current	A	Shaft		Ø 11x 23	mm
Performance factor	χοσ φ	0.69					
Efficiency	η	62	%	Motor for gear M100 | M490			

Part number	Type of motor			Manufacturer			
245-13120-1	TN63			Neri			
Rated voltage	V	290 | 500	V AC	Insulation class		F	
		△ Y		Type of protection	IP	55	
Rated frequency	f	50	Hz	Flange		Ø 90	mm
Rated power	P	0.25	KW	Operating mode		S1	
Rated speed	n	1400	rpm^{-1}	Size		63	
Nominal current	I_N	2.0/1.2	A	Design		B14	
Starting current		2.5 x rated current	A	Shaft		Ø 11x 23	mm
Performance factor	χοσ φ	0.55					
Efficiency	η	62	%	Motor for gear M049			

4.5 Motors 500 V AC with gear

Part number	Type of motor			Manufacturer			
245-13921-1	T63B			Neri Motori			
Rated voltage	V	290 | 500	V AC	Insulation class		F	
Circuit		△ Y		Type of protection	IP	55	
Rated frequency	f	50	Hz	Flange		Ø 90	mm
Rated power	P	0.18	KW	Operating mode		S1	
Rated speed	n	1360	rpm^{-1}	Size		63	
Nominal current	I_N	1.0/0.6	A	Design		B14	
Starting current		2.5 x rated current	A	Shaft		Ø 11x 23	mm
Performance factor	$\chi o \sigma \varphi$	0.68		Ratio	i	100	
Efficiency	η	54	%				

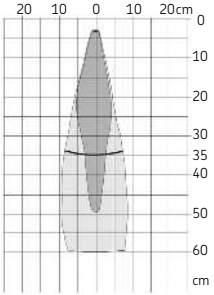
Part number	Type of motor			Manufacturer			
245-13922-1	T63C 025 4p B14			Neri Motori			
Rated voltage	V	290 | 500	V AC	Insulation class		F	
		△ Y		Type of protection	IP	55	
Rated frequency	f	50	Hz	Flange		Ø 90	mm
Rated power	P	0.25	KW	Operating mode		S1	
Rated speed	n	1360	rpm^{-1}	Size		63	
Nominal current	I_N	1.1/0.64	A	Design		B14	
Starting current		2.7 x rated current	A	Shaft		Ø 11x 23	mm
Performance factor	$\chi o \sigma \varphi$	0.69		Ratio	i	49	
Efficiency	η	38	%				

Part number	Type of motor			Manufacturer			
245-13923-1	TN 63B			Varvel			
Rated voltage	V	290 | 500	V AC	Insulation class		F	
Circuit		△ Y		Type of protection	IP	55	
Rated frequency	f	50	Hz	Flange		Ø 90	mm
Rated power	P	0.18	KW	Operating mode		S1	
Rated speed	n	1360	rpm^{-1}	Size		63	
Nominal current	I_N	1.0/0.6	A	Design		B14	
Starting current		2.5 x rated current	A	Shaft		Ø 11x 23	mm
Performance factor	$\chi o \sigma \varphi$	0.68		Ratio	i	490	
Efficiency	η	54	%				

4.6 Ultrasonic Sensor 664-853xx-x

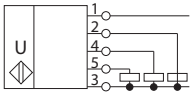
Ultrasonic sensor 664-853xx-x

Blind zone	0 - 65 mm
Scanning range limit	600 mm
Ultrasonic frequency	approx. 400 kHz
Switching frequency	3.7 Hz
Resolution	0.18 mm
Accuracy	±1 %
Repeatability	±0.15 %
Operating voltage U_B	9 - 30 V DC (polarized)
Residual ripple	±10 %
No-load supply current	≤ 60 mA
Type of connection	M12 x 1 plug; 5-pole
Response delay	272 ms
Readiness delay	< 300 ms
Type of protection following EN 60529	IP 65
Range of operating temperatures	-40 °C to + 70 °C
Switch points	High-level indication D1 = 65 mm; low-level indication D2 corresponding to the reservoir size; pre-low-level indication D3 programmable on customer request, pre-set to 10 mm above low-level (optional use possible)
Compliance with standards	EN 60947-5-2
Display elements	LED green / LED red Switching output not set/ set
Housing material	PBT, polyester, ultrasonic transducer: PUR, epoxy resin with glass content
Switching output	3x pnp; UB-2V; Imax = 3x 200 mA; NO contact, short-circuit resistant

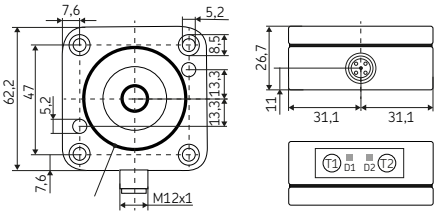


Detection zone in centimetres
The dark grey areas indicate the zone in which the standard reflector (pipe) is reliably detected. This is the typical operating range of the sensors, The light grey areas indicate the zone in which a big reflector – like, e.g. a plate – is still detected – provided it is optimally positioned to the sensor. Outside the light grey area an evaluation is not possible any more.

1	+ U_B	brown
3	- U_B	blue
4	D2	black
2	D1	white
5	D3/Com	grey



Dimensions



Display of the switching states	Switch points			Indication by LED		
	D1	D2	D3	D1	D2	
High-level indication	A	A	B	red	red	C
Between high- and pre-low-level indication	B	A	B	green	red	C
Pre-low-level indication	B	A	A	green	red	D
Low level indication	B	B	B	green	green	C
A = switched, B = not switched, C = permanent, D = flashing						

4.7 Tightening torques

All pump versions							Pump version V						
Reservoir with pump housing	8	Nm	±	0.8	Nm		Pump cylinder with pump housing	30	Nm	±	3	Nm	
Ultrasonic sensors with reservoir lid	1.5	Nm	±	0.2	Nm		Check valve with pump cylinder	30	Nm	±	3	Nm	
Closure screw with housing	30	Nm	±	3	Nm		Stop screw with pump cylinder	30	Nm	±	3	Nm	
Lubrication fitting with pump housing	20	Nm	±	2	Nm		Pressure gauge with bridge	55	Nm	±	5	Nm	
							Pressure control valve with bridge	30	Nm	±	3	Nm	
Pump version E							Fitting for supply line with bridge	30	Nm	±	3	Nm	
Pump element with pump housing	30	Nm	±	3	Nm		Hollow screw for filter block	100	Nm	±	10	Nm	
Pump version F													
Pump cylinder with pump housing	30	Nm	±	3	Nm								
Check valve with pump cylinder	30	Nm	±	3	Nm								
Pressure gauge with bridge	55	Nm	±	5	Nm								
Bridge with filter block	10	Nm	±	1	Nm								
Pressure control valve with filter block	30	Nm	±	3	Nm								
Fitting for supply line with filter block	30	Nm	±	3	Nm								
Hollow screw for filter block	100	Nm	±	10	Nm								

Observe the specified tightening torques. If no tightening torques are stated, the tightening torques are to be applied to the screw size for 8.8 screws.

4.8 Type identification code

The type identification code facilitates identification of important equipment features of the product. For type identification code see type identification plate of product.

Z	P	U	0	2	–	M	1	0	0	–	1	0	X	Y	B	U	–	F	–	3	8	0	–	4	2	0	,	4	4	0	–	4	8	0
(A)						(B)					(C)							(D)		(E)																

(A)	Product designation
ZPU 01	1 pump element
ZPU 02	2 pump elements

(B)	Drive assy.
M	Three-phase motor with flange Ø 90 mm, additional designation, see (E)
100	Gear ratio i = 1:100*
049	Gear ratio i = 1:049*
490	Gear ratio i = 1:490*

(C)	Reservoir versions
10 XYBU	10L reservoir for grease and oil with level monitoring
10 XYN	10L reservoir for grease and oil without level monitoring
30 XYBU	30L reservoir for grease and oil with level monitoring
30 XYN	30L reservoir for grease and oil without level monitoring

(D)	Pump elements
E	Only pump element(s)
V	Bridge with pump element(s) and pressure gauge
F	Bridge with pump element(s), filter block, pressure gauge and pressure control valve

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

* in case of gear ratio i = 1:100 and i = 1: 490 the maximum operating pressure is 350 bar.
In case of gear ratio i = 1:049 the maximum operating pressure is 400 bar.

5. Delivery, returns, and storage

5.1 Delivery

After receipt of the shipment, check the shipment for damage and completeness according to the shipping documents. Immediately report any transport damages to the forwarding agent.

Keep the packaging material until any discrepancies are resolved. During in-house transport ensure safe handling.

5.2 Returns

Clean all parts and pack them properly (i.e. following the regulations of the recipient country) before returning them.

Protect the product against mechanical influences such as impacts. There are no restrictions for land, sea or air transport.

Mark returns on the packaging as follows.

5.3 Storage

SKF products are subject to the following storage conditions:

- dry, dust- and vibration-free in closed premises
- no corrosive, aggressive materials at the place of storage (e. g. UV rays, ozone)
- protected against pests and animals (insects, rodents, etc.)
- possibly in the original product packaging
- shielded from nearby sources of heat and coldness
- in case of high temperature fluctuations or high humidity take adequate measures (e. g. heater) to prevent the formation of condensation water
- the admissible storage temperature range corresponds to that of the operating temperature (see Technical data)

Before application inspect the products with regard to possible damages occurred during their storage. This particularly applies for parts made out of plastic and rubber (embrittlement) as well as for components primed with lubricant (ageing).

6. Assembly

6.1 General information

Only qualified technical personnel may install the products described in these Instructions.

During assembly pay attention to the following:

- Other units must not be damaged by the assembly.
- The product must not be installed within the range of moving parts.
- The product must be installed at an adequate distance from sources of heat and coldness.
- Observe the product's IP type of protection.
- 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-level sight glasses or piston detectors must be clearly visible.
- Observe prescriptions in the Technical data (chapter 4) regarding the installation position.

6.2 Place of installation

Protect the product against humidity, dust and vibrations and install it in an easily accessible position to ensure all other installations can be carried out without any problem.

6.3 Mechanical connection

6.3.1 Minimum assembly dimensions

Ensure sufficient space for maintenance work or for a possible disassembly of the product by leaving a free space of at least 100 mm into each direction in addition to the stated dimensions.

	Pump version		
	E	V	F
H1 (10L)	514#	513#	514#
H2 (30L)	754#	754#	754#
B1 (10L)	380*	380*	380*
B2 (30L)	440*	440*	440*
T1 (10L)	280	343	330
T2 (30L)	330	390	377
D1 (10L)	Ø 220	Ø 220	Ø 220
D2 (30L)	Ø 324	Ø 324	Ø 324

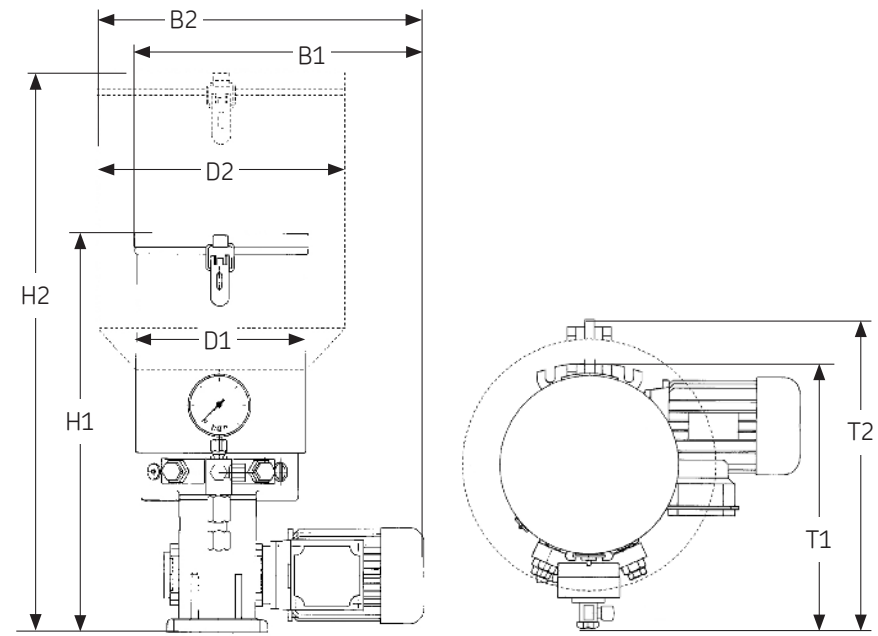
* additional free space requirement, distance to the air inlet of the motor = + 40 mm

additional free space requirement to open the housing lid

30 L reservoir = + 170 mm

10 L reservoir = + 110 mm

Minimum assembly dimensions Fig. 5



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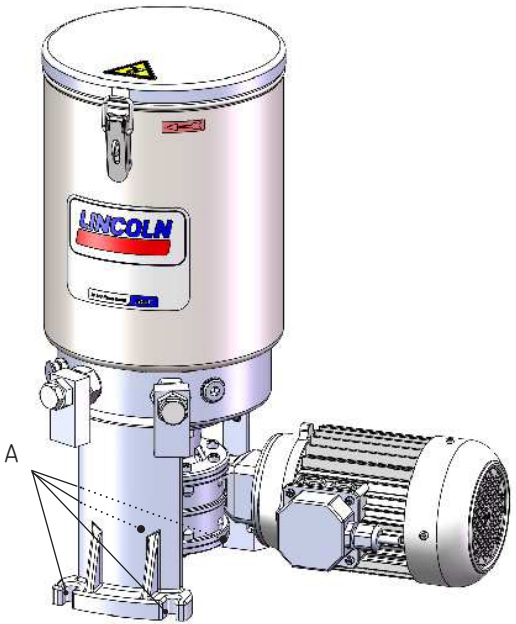
6.3.2 Installation bores

The product is fastened on the 4 mounting bores (A) on an even surface of the pump housing.

Fastening is done by means of 4 screws type M8 (property class 8.8)

Installation bores Fig. 6



6.4 Electrical connection

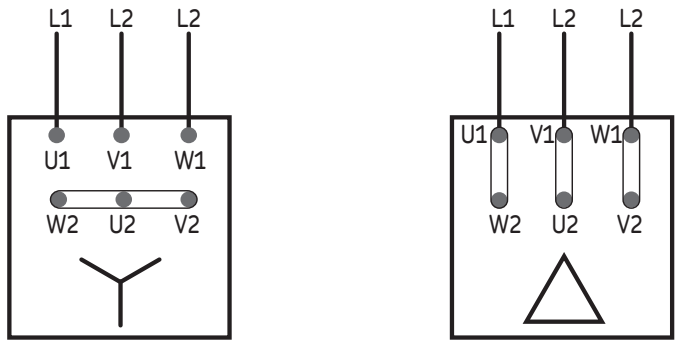
WARNING

Risk of injury

Before carrying out any work on electrical components, take at least the following safety measures:

- Keep unauthorized persons away.
- Mark and secure work area.
- Depressurize the product.
- Disconnect the product from the power supply and secure it against being switched on.
- Verify that no power is being applied.
- Earth and short-circuit the product.
- Where needed, cover neighbouring units that are live.

Connection diagrams Fig. 7



Star connection

Delta connection

Carry out the electrical connection of the pump following the indications made by the motor manufacturer.

Connection diagram, see motor terminal box.

Connect electrical cables in such way that no forces are transferred to the product (tension-free connection).

6

6.5 Connection of the lubrication line

	CAUTION
	Risk of falling Exercise care when dealing with lubricants. Bind and remove spilled or leaked lubricants immediately.

Connect lubrication lines in such way that no forces are transferred to the product (tension-free connection).

All components of the centralized lubrication system must be laid out for:

- the maximum arising pressure
- the admissible temperature range
- the output volume and the lubricant to be supplied

Protect the centralized lubrication system against too high pressure by means of a suitable pressure relief valve.

Observe the following installation instructions for safe and smooth operation.

- Use clean components and primed lubrication lines only.
- The main lubrication line should be laid preferably rising with a possibility to vent it at its highest point. Lubrication lines shall generally be laid in such way that there can never be created air pockets at any point.
- Mount the lubricant metering devices at the end of the main lubrication line in such way that the outlets of the lubricant metering devices show upwards.
- If lubricant metering devices have to be mounted below the main lubrication line, then this should not be done at the end of the main lubrication line.
- The lubricant flow should not be impeded by the installation of sharp elbows, angle valves, gaskets protruding to the inside, or cross-section changes (big to small). Provide unavoidable changes of the cross sections in the lubrication lines with as smooth transitions as possible.

6.5.1 Filling via the reservoir lid

WARNING

Crushing hazard
on the rotating stirring paddle. Filling via the reservoir lid is allowed only after disconnecting the pump from the power supply. Never reach into the reservoir while the pump is running.

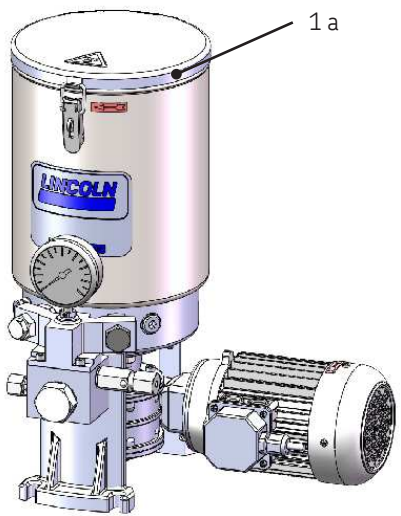
Make sure that no dirt enters the reservoir during the filling procedure.

- Switch the pump off.
- Open the reservoir lid (1a).
- Remove contaminations from the reservoir lid and from the ultrasonic sensor, if any.

In case of reservoirs with ultrasonic sensor:
The ultrasonic sensor must not get in contact with lubricant.
The distance between the lubricant and the ultrasonic sensor must be at least 60 mm.

- Fill the reservoir
- Close the reservoir lid (1a).
- Switch the pump on again.

Filling via the reservoir lid Fig. 8



7. Initial 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.

Start-up check list

7.1 Inspections prior to initial start-up	YES	NO
Electrical connection carried out correctly.	☐	☐
Mechanical connections carried out correctly	☐	☐
Pump filled with the planned lubricant	☐	☐
The performance data of the previously indicated connections correspond to the specifications stated in the Technical data	☐	☐
All components, such as lubrication lines and metering devices, have been correctly installed	☐	☐
Product protected with adequate pressure relief valve	☐	☐
No visible damage, contamination and corrosion	☐	☐
Any dismantled protection and monitoring equipment has been reassembled and checked for correct function	☐	☐
All warning labels on the product are available and in proper condition	☐	☐
7.2 Inspections during initial start-up		
No unusual noises, vibrations, accumulation of moisture, or odours present	☐	☐
No unwanted escape of lubricant from connections (leakages).	☐	☐
Lubricant is supplied free from bubbles	☐	☐
Bearings and friction points are provided with the planned amount of lubricant	☐	☐

8. Operation

SKF products operate automatically to the greatest possible extent.

Basically, activities during standard operation are limited to the control of the filling level and the timely refilling of lubricant as well as the outside cleaning of the product in case of contamination.

8.1 Refill lubricant

Description, see corresponding chapter (6.6.1).

9. Cleaning

WARNING

Electric shock

Carry out cleaning works only on depressurized products that have been disconnected from the power supply. Do not touch cables or electrical components with wet or damp hands.

Use steam-jet cleaners or high-pressure cleaners only in accordance with the IP protection class of the pump. Otherwise electrical components may be damaged.

Cleaning execution, required personal protective equipment, cleaning agents and devices following the valid operational regulations of the operator.

9.1 Cleaning agents

Cleaning agents compatible with the material may be used only (materials, see chapter 2.3).

Thoroughly remove residues of cleaning agents from the product and rinse off with clear water. Thus the formation of lye stone is avoided.

9.2 Exterior cleaning

- Mark and secure wet areas.
- Keep unauthorized persons away.
- Thorough cleaning of all outer surfaces with a damp cloth.

Make sure to keep the reservoir closed during the cleaning procedure.

9.3 Interior cleaning

Normally, interior cleaning is not required.

Should incorrect or contaminated lubricant have been filled, inside cleaning of the product will be required.

To do so, contact the SKF Customer Service.

10. Maintenance

Regular and appropriate maintenance is a prerequisite to detect and clear faults in time.
The specific timelines have to be determined, verified at regular intervals and adapted, if necessary, by the operator based on the operating conditions. If needed, copy the table for regular maintenance activities.

Maintenance check list

Activity to be done	YES	NO
Electrical connection carried out correctly.	☐	☐
Mechanical connections carried out correctly	☐	☐
The performance data of the previously indicated connections correspond to the specifications stated in the Technical data	☐	☐
All components, such as lubrication lines and metering devices, have been correctly installed	☐	☐
Product protected with adequate pressure relief valve	☐	☐
No visible damage, contamination and corrosion	☐	☐
Any dismantled protection and monitoring equipment has been reassembled and checked for correct function	☐	☐
All warning labels on the product are available and in proper condition	☐	☐
No unusual noises, vibrations, accumulation of moisture, or odours present	☐	☐
No unwanted escape of lubricant from connections	☐	☐
Lubricant is supplied free from bubbles	☐	☐
Bearings and friction points are provided with the planned amount of lubricant	☐	☐

10.1 Maintenance of gear unit

The gear units are largely maintenance-free and primed with synthetic oil. Carry out the following activities in the indicated intervals in order to avoid damages.

Every 500 working hours:
Visual control for leakages (radial sealing ring)

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

10.1.1 Required oil quality

Synthetic oil of the specification ISO VG 320 suitable for the operating temperature range.

10.2 Motor maintenance

10.2.1 Inspection of the bearings

After a longer period of standstill or storage the bearing grease of the motor must be checked and replaced, if necessary, before a new start-up.

10.2.2 Required grease quality

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

10.2.3 Replacement of the bearing grease

Given normal load conditions (operation at nominal speed and under normal environmental conditions) replace the bearing grease as follows.

Motor	bipolar	multipolar
service hours	10,000	20,000

In case of deviating conditions, e.g. operation with a frequency converter, the replacement interval reduces in accordance with the percentage deviation of the actual speed from the nominal speed of the motor.

To replace the bearing grease proceed as follows:

- Implement the safety measures as specified in chapter 12 Repairs.
- Provide access to the bearing and remove old grease from bearing.
- Clean the bearing with suitable solvents.
- Provide the bearing with new grease.

Fill only two thirds of the bearing th grease. Filling the bearing and the bearing lid fully with grease increases the bearing temperature and results in higher wear.

- Properly reinstall the bearing lid and any other detached parts again.

11. Troubleshooting

Fault table 1

Fault	Possible cause	Remedy
Pump does not run	- Power supply to the pump is interrupted - Superior machine is switched off - Connection cable of pump is loose or defective - External fuse is defective - Pump motor is defective - Internal cable break	Check whether one of the indicated faults is present and remedy it in the frame of responsibilities. Faults outside of your own responsibility have to be reported to your superior to initiate further measures.
Pump runs, but does not supply lubricant or supplies an insufficient amount of lubricant.	Blockade, fault within the centralized lubrication system Defective check valve Defective pressure relief valve Suction bore of pump element is clogged Defective pump element Too high lubricant consistency (at low temperatures) In case of version F: Contaminated filter (mostly visible from a "fluttering" display of the pressure gauge).	Check whether one of the indicated faults is present and remedy it in the frame of responsibilities. Faults outside of your own responsibility have to be reported to your superior to initiate further measures. Check and clean filter and replace, if necessary.
If the fault cannot be determined and remedied, please contact our Customer Service.		

12. Repairs

WARNING

Risk of injury

Before carrying out any repair work, take at least the following safety measures:

- Keep unauthorized persons away.
- Mark and secure work area.
- Depressurize the product.
- Disconnect the product from the power supply and secure it against being switched on.
- Verify that no power is being applied.
- Earth and short-circuit the product.
- Where needed, cover neighbouring units that are live.

12.1 Replace the pump element

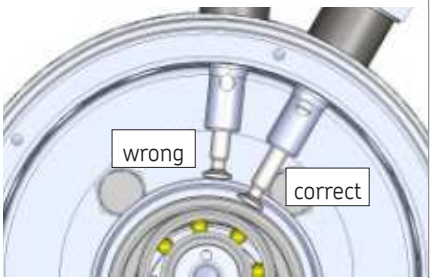
In case of pumps with grease filling, the grease may remain in the reservoir. In case of pumps with oil filling, the oil must be collected with an adequate collecting bin when unscrewing the pump element.

ATTENTION

Risk of damage to the pump. Make sure that each pump element is seated correctly in the notch of the catch ring (see Fig. 9).

Turn the stirring paddle to the opposite side of the pump element. This facilitates mounting the piston into the notch of the catch ring.

Mounting of the pump element Fig. 9



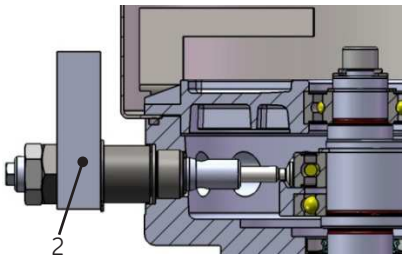
12.1.1 Pump version E

- Fully unscrew the pump element (2) at the hexagon out of the pump.
- Press pump element (2) down as shown so that the piston disengages from the notch of the catch ring.
- Remove the pump element (2).
- Pull piston of the new pump element about 30 mm out of the pump element (2).
- Insert the pump element obliquely until the piston is located above the catch ring.
- Now hold the pump element horizontally so that the piston of the pump element engages in the notch of the catch ring.
- Screw in the pump element (2).

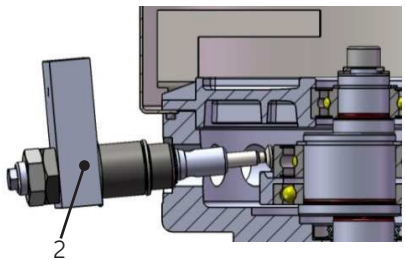
Tightening torque = 35 Nm

Then check the pump element for proper function. To do so, switch the pump on and check, whether the pump element supplies lubricant. If needed, refill lubricant.

Unscrew the pump element Fig. 10



Pump element pressed down Fig. 11



12.1.2 Pump versions F and V

- Unscrew the check valve (6) out of the pump cylinder (7).
- Unscrew the blind stud (8a) out of the bridge (9).
- Remove the bridge (9).
- If needed, unscrew blind stud (8b) out of pump element.
- Fully unscrew the pump cylinder (7) at the hexagon out of the pump housing.
- Press the pump cylinder (14) slightly down so that the piston disengages from the notch of the catch ring (see Fig. 11).
- Remove the pump cylinder (7) including the sealing ring.
- Pull the piston of the new pump cylinder about 30 mm out of the pump cylinder.
- Insert the pump element (7) obliquely until the piston is located above the catch ring (see Fig. 11).
- Now hold the pump cylinder (7) horizontally so that the piston of the pump element engages in the notch of the catch ring.
- Screw in the pump cylinder (7).
- Position the bridge (9) on the pump cylinder (7).
- Screw the blind stud (8a) into the bridge.

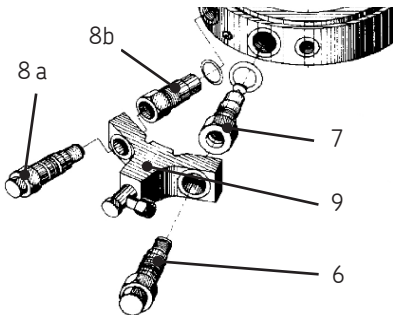
Tightening torque = 30 Nm ± 3 Nm

- Screw the check valve into the pump element.

Tightening torque = 30 Nm ± 3 Nm

Then check the pump element for proper function. To do so, switch the pump on and check, whether the pump supplies lubricant.

Correct assembly of the pump elements Fig. 12



13. Shutdown and disposal

13.1 Temporary shutdown

Temporarily shut the system down by:

- switching off the superior machine.
- Disconnecting the product from the power supply.

13.2 Final shutdown and disassembly

The final shutdown and disassembly of the product must be professionally planned and carried out by the operator in compliance with all regulations to be observed.

13.3 Disposal

Countries within the European Union

Disposal should be avoided or minimized wherever possible. Disposal of products contaminated with lubricant must be effected vi a licensed waste disposal contractor in accordance with environmental requirements and waste disposal regulations as well as local authority requirements.

The specific classification of the waste is in the waste producer's responsibility, as the European Waste Catalogue provides different waste disposal codes for the same type of waste but of different origin.

Dispose of or recycle electrical components following WEEE directive 2012/19/EU.

Parts made of plastic or metal can be disposed of with the commercial waste.

Countries outside the European Union

The disposal has to be done according to the valid national regulations and laws of the country where the product is used.

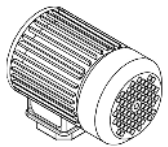
14. Spare parts

The spare parts assemblies 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 V AC

Designation	Qty.	Part number
Motor for gear M100/M490 | 0.18 kW / 0.21 kW	1	245-13913-1
Motor for gear M049 | 0.25 kW / 0.29 kW	1	245-13914-1

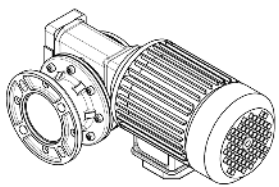
Fig. 13



14.2 Motors 380 - 480 V AC with gear

Designation	Qty.	Part number
Motor with gear M100 | 0.18 kW / 0.21 kW	1	245-13915-1
Motor with gear M049 | 0.25 kW / 0.25 kW	1	245-13916-1
Motor with gear M490 | 0.18 kW / 0.21 kW	1	245-13918-1

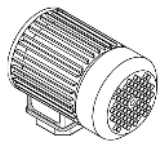
Fig. 14



14.3 Motors 500 V AC

Designation	Qty.	Part number
Motor for gear M100/M490 | 0.18 kW	1	245-13919-1
Motor for gear M049 | 0.25 kW	1	245-13920-1

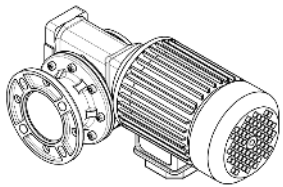
Fig. 15



14.4 Motors 500 V AC with gear

Designation	Qty.	Part number
Motor with gear M100 | 0.18 kW	1	245-13921-1
Motor with gear M049 | 0.25 kW	1	245-13922-1
Motor with gear M490 | 0.18 kW	1	245-13923-1

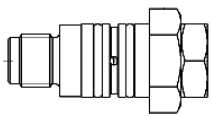
Fig. 16



14.5 Check valve assy. for pump versions F and V

Designation	Qty.	Part number
Check valve assy.	1	500-30012-3

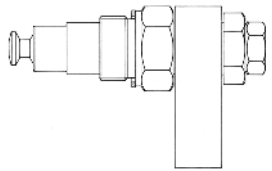
Fig. 17



14.6 Pump element for pump version E

Designation	Qty.	Part number
Pump element assy.	1	500-30018-3

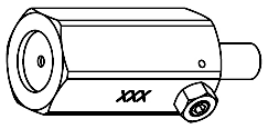
Fig. 18



14.7 Pressure control valve for pump version E

Designation	Qty.	Part number
Pressure control valve 10 mm / 350 bar	1	624-25483-1
Pressure control valve 10 mm / 400 bar	1	624-28073-1

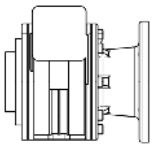
Fig. 19



14.8 Gear

Designation	Qty.	Part number
Gear ratio i = 100:1	1	246-14145-1
Gear ratio i = 490:1	1	246-14146-1
Gear ratio i = 049:1	1	246-14145-2

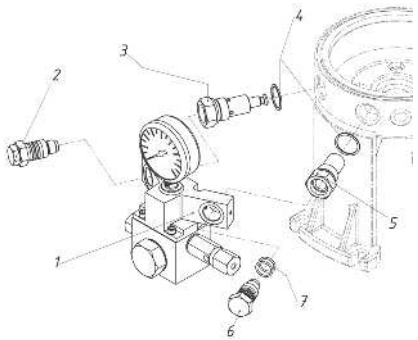
Fig. 20



14.9 Bridge assy. for version F with one pump element

Designation	Qty.	Part number
Bridge assy. for version F with one pump element 350 bar	1	600-26787-1
Bridge assy. for version F with one pump element 400 bar	1	600-77912-1
Consisting of:	1	
Item 1 Bridge with filter block and pressure gauge	1	
Item 2 Valve assy.	1	
Item 3 Pump cylinder assy.	2	
Item 4 Sealing ring (2x)	1	
Item 5 Blind cylinder	1	
Item 6 Locking screw	2	
Item 7 O-ring (2x)		

Fig. 21



14.10 Closure screw for pump version E

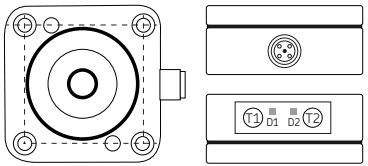
Designation	Qty.	Part number
Closure screw for pump element	1	303-17431-1

Fig. 22

14.11 Ultrasonic sensor

Designation	Stk.	Sachnummer
Ultrasonic sensor for reservoir size 10 L	1	664-85313-8
Ultrasonic sensor for reservoir size 30 L	1	664-85313-9

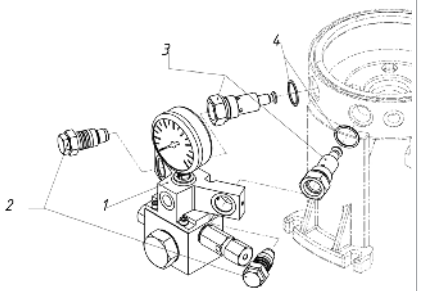
Fig. 23



14.12 Bridge assy. for version F with two pump elements

Designation	Qty.	Part number
Bridge assy. for version F with two pump elements 350 bar	1	600-26788-1
Bridge assy. for version F with two pump elements 400 bar	1	600-77913-1
Consisting of:	1	
Item 1 Bridge with filter block and pressure gauge	1	
Item 2 Valve assy.	2	
Item 3 Pump cylinder assy.	2	
Item 4 Sealing ring (2x)		

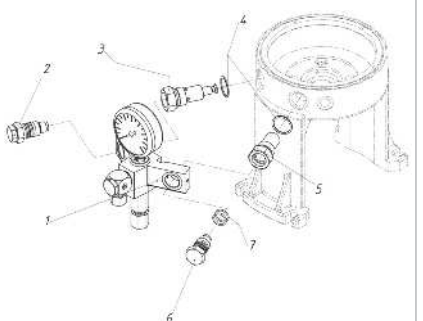
Fig. 24



14.13 Bridge assy. for version V with one pump element

Designation	Qty.	Part number
Bridge assy. for version V with one pump element 350 bar	1	600-26785-1
Bridge assy. for version V with one pump element 400 bar	1	600-77914-1
Consisting of:	1	
Item 1 Bridge with filter block and pressure gauge	1	
Item 2 Valve assy.	1	
Item 3 Pump cylinder assy.	2	
Item 4 Sealing ring (2x)	1	
Item 5 Blind cylinder	1	
Item 6 Locking screw	2	
Item 7 O-ring (2x)		

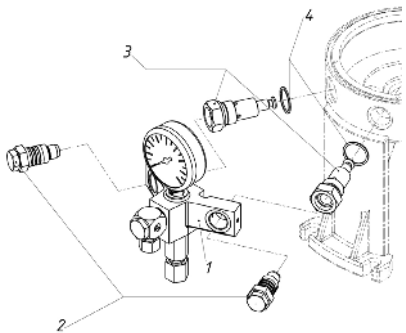
Fig. 25



14.14 Bridge assy. for version V with two pump elements

Designation	Qty.	Part number
Bridge assy. for version V with two pump elements 350 bar	1	600-26786-1
Bridge assy. for version V with two pump elements 400 bar	1	600-77915-1
Consisting of:	1	
Item 1 Bridge with filter block and pressure gauge	1	
Item 2 Valve assy.	2	
Item 3 Pump cylinder assy.	2	
Item 4 Sealing ring (2x)		

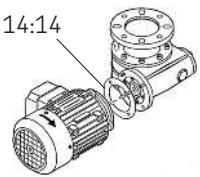
Fig. 26



14.15 Sealing ring

Designation	Qty.	Part number
Sealing ring Ø 60 x 90 x 0.5	1	306-19415-1

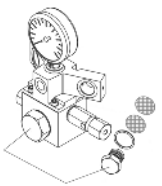
Fig. 27



14.16 Parts for strainer for version F

Designation	Qty.	Part number
Rubber-lined sealing ring Ø 34.3 x 43 x 2	1	220-12238-3
Coarse strainer	1	428-21544-1
Fine strainer	1	428-21545-1

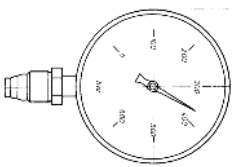
Fig. 28



14.17 Pressure gauge for pump versions V and F

Designation	Qty.	Part number
Pressure gauge 0 - 600 bar	1	500-32143-1

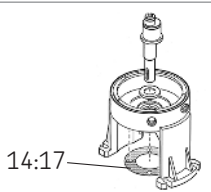
Fig. 29



14.18 Sealing ring

Designation	Qty.	Part number
Sealing ring Ø 70 x 126 x 0.5	1	306-19640-1

Fig. 30



Notes

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