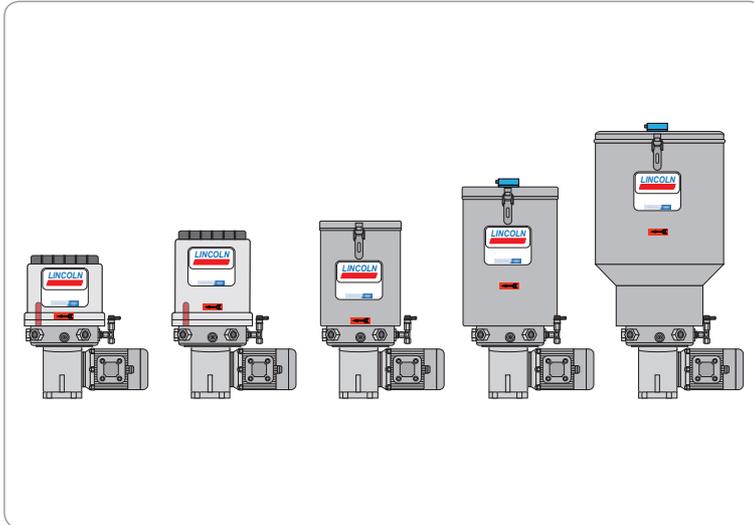


# Lubrication pump P205 for multi-line lubrication systems

Assembly instructions  
following machinery directive 2006/42/EC

EN



951-171-048-EN

Version 02

30/11/2018



## EC Declaration of incorporation acc. to machinery directive 2006/42/EC

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 pump to supply lubricant within a centralized lubrication system  
 Type: P205  
 Part number: 655-xxxx-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:

Standard	Edition	Standard	Edition	
2011/65/EU*	RoHS II			
2014/30/EU*	Electromagnetic compatibility			Industry
ISO 12100	2011	EN 61000-6-3*	2011	
EN 809	2012	EN 60947-5-2*	2014	*only in case of pumps with motor and ultrasonic sensor for level monitoring
EN 50581*	2013	EN 60947-5-7*	2004	

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 provisions of machinery directive 2006/42/EC and any other applicable directives.

Walldorf, August 09, 2018

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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

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### Warranty

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

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### Disclaimer

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

- Non appropriate use  
faulty assembly, operation, setting, maintenance, repair or accidents
- Use of inappropriate lubricants
- Improper or late response to malfunctions
- Unauthorized modifications of the product
- Intent or negligence
- Use of non-original SKF spare parts
- Faulty planning or layout of the centralized lubrication system

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, signs and abbreviations

The following abbreviations may be used within these instructions. Symbols within safety notes mark the kind and source of the hazard.

	General warning		Dangerous electrical voltage		Risk of falling		Hot surfaces
	Unintentional intake		Crushing hazard		Pressure injection		Suspended load
	Electrostatically sensitive components		Potentially explosive atmosphere		Keep unauthorized persons away		
	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)		Disconnect product from mains		General obligation		
	Protective conductor (protection class I)		Protection y double or reinforced insulation (protection class II)		Protection by extra low voltage (protection class III)		Safe galvanic isolation (protection class III)
	CE marking		Disposal, recycling		Disposal of waste electrical and electronic equipment		

Warning level	Consequence	Probability	Symbol	Meaning
 <b>DANGER</b>	Death, serious injury	imminent	●	Chronological guidelines
 <b>WARNING</b>	Death, serious injury	possible	○	Lists
 <b>CAUTION</b>	Minor injury	possible		Refers to other facts, causes, or consequences
<b>NOTICE</b>	Property damage	possible		

## 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
poss.	possibly	h	hour	in.	inch
if appl.	if applicable	s	second	psi	pounds per square inch
incl.	including	d	day	sq. in.	square inch
min.	minimum	Nm	Newtonmeter	cu. in.	cubic inch
max.	maximum	ml	millilitre	mph	miles per hour
min.	minute	ml/d	millilitre per day	rpm	revolutions per minute
etc.	et cetera	cc	cubic centimetre	gal.	gallon
e.g.	for example	mm	millimetre	lb.	pound
kW	kilowatt	l	litre	hp	horse power
U	Voltage	dB (A)	sound pressure level	kp	kilopond
R	resistance	>	greater than	fpsec	feet per second
I	current	<	less than	conversion factors	
V	volt	±	plus/minus	Length	1 mm = 0.03937 in.
W	watt	∅	diameter	Area	1 cm <sup>2</sup> = 0.155 sq.in
AC	alternating current	kg	kilogram	Volume	1 ml = 0.0352 fl.oz.
w	direct current	rh	relative humidity		1 l = 2.11416 pints (US)
A	ampere	≈	approximately	Mass	1 kg = 2.205 lbs
Ah	ampere hour	=	equal to		1 g = 0.03527 oz.
Hz	frequency [Hertz]	%	per cent	Density	1 kg/cc = 8.3454 lb./gal.(US)
nc	normally closed contact	‰	per mille		1 kg/cc = 0.03613 lb./cu.in.
no	normally open contact	≥	greater than	Force	1 N = 0.10197 kp
N/A	not applicable	≤	less than	Pressure	1 bar = 14.5 psi
ft.	feet	mm <sup>2</sup>	square millimetre	Temperature	°C = (°F-32) x 5/9
		rpm	revolutions per minute	Output	1 kW = 1.34109 hp
		↑	Increases a value	Acceleration	1 m/s <sup>2</sup> = 3.28084 ft./s <sup>2</sup>
		↓	Reduces a value	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 products 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 be used only 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 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

### 1.3 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 ambient temperature range
- with non-specified means of operation
- without adequate pressure control valve
- in continuous operation
- of C3 versions in areas with aggressive and corrosive materials (e.g. with high salt concentration)
- of plastic parts in areas with high ozone levels or in areas with harmful radiation (e.g. ionising radiation)

- to supply, transport, or store hazardous substances and mixtures in accordance with annex I part 2-5 of the CLP regulation (EG 1272/2008) or HCS 29 CFR 1910.1200 marked with GHS01-GHS06 and GHS08 hazard pictograms
- to feed, forward, or store gases, liquefied gases, dissolved gases, vapours, or fluids whose vapour pressure exceeds the normal atmospheric pressure of 1013 mbar by more than 0.5 bar at the maximum permissible operating temperature.
- in an explosion protection zone

### 1.5 Modifications of the product

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

### 1.6 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 or changes to the drive
- Replacement of or changes on the pistons of the pump elements

### 1.7 Painting of plastic parts

Painting of any plastic parts or seals of the described products is expressly prohibited. Remove or tape plastic parts completely before painting the superior machine

## 1. Safety instructions

### 1.8 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).

### 1.9 Inspections prior to delivery

The following inspections were carried out prior to delivery:

- Safety and functional tests
- Electrical inspections following ISO 60204-1

### 1.10 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
- Additional information on special versions of the pump. You will find these in the special system documentation
- Any documents of other components required to set up the centralized lubrication system

### 1.11 Markings on the product



Warning of unintended intake by the stirring paddle with the reservoir lid being open



Rotational direction of the pump



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.

### 1.12 Notes related to the type identification plate

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

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. \_\_\_\_\_

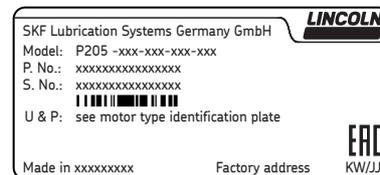
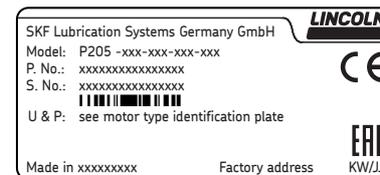
S. No. \_\_\_\_\_

(CW/YY) \_\_\_\_\_

Calendar week/year of construction

#### 1.12.1 EAC conformity marking

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



### 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

In case of an emergency stop the pump station by:

- Interrupting the power supply to the pump
- Where appropriate, using measures determined by the operator, such as 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 at 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 connection diagram in the terminal box of the motor 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
- Ensure proper connection of the protective conductor in case of protection class I
- Observe the stated type of protection
- Undertake drilling only at non-critical, non-load bearing parts of the operator's machine/ infrastructure. Use any available boreholes. Do not damage lines and cables when drilling. Changes to SKF products are prohibited. This includes all drilling, welding, flame-cutting, and grinding work
- Observe possible abrasion points. Protect the parts accordingly

- All components used must be designed according to the maximum operating pressure and the maximum respectively 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 must 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
- Thoroughly remove residues of cleaning agents from the product
- Do not use steam jet and high pressure cleaners. Electrical components may be damaged. Observe the type of protection of the pump
- 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
	A	B	C					G	H	K		
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 adequate 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 to components with adequate load-bearing capacities only. If no tightening torques are stated, apply tightening torques according to the screw size characteristics for 8.8 screws.
Electric shock when connecting the pump		B	C	D	E	F	G	H				Prior to connection of the pump, de-energize all affected electrical components. If necessary, please observe discharge times. The electrical connection may be carried out by commissioned and qualified electricians only and in accordance with the connection diagram.
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 spring coils respectively protective conduits.
Loss of electrical protective function due to faulty installation of electrical components after repair							G					After replacement of electrical components carry out an electrical safety test according to ISO 60204-1.
Deviating installation position. - Foreign objects falling into the motor air intake - Borehole for drainage of condensation water is no longer at the lowest point of the motor.		B	C	D				H				Installation of a suitable protective roof over the air intake.  Deviating installation position only, if the formation of condensation water has been excluded
Life phases: 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.

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)
- economic and ecological aspects



Only lubricants specified for the product (see chapter Technical data) may be used. Unsuitable lubricants may lead to a failure of the product.



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



When handling lubricants the relevant safety data sheets and hazard designations, if any, on the packaging have to be observed.



Due to the multitude of possible additives, individual lubricants, which according to the manufacturer's data sheets fulfil the necessary specification, may not, in fact, be 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.

## 2.2 Selection of lubricants

Lubricants are 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 or 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 downtimes through damage to your machine or system or damage to the centralized lubrication system.

## 2.3 Material compatibility

Lubricants must generally be compatible with the following materials:

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

## 2.4 Temperature characteristics

The lubricant used must be suitable for the specific ambient temperature of the product. The consistency/ viscosity suitable for proper operation of the product must be adhered to and must not be exceeded in case of low temperatures nor fall below specification in case of high temperatures. For information see chapter Technical data.

## 2.5 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 a further suitability of the lubricant, please replace it prior to re-commissioning and, if necessary, undertake initial lubrication by hand.

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.

## 2.6 Solid lubricants in lubrication greases

With regard to the different solid lubricants, please observe the following:

### Graphite

max. graphite content 8 %  
max. particle size 25 µm  
(possibly in in lamellar structure)

### MoS<sub>2</sub>

max. MoS<sub>2</sub> content 5 %  
max. particle size 15 µm

### Copper

Chisel pastes containing copper are likely to result in a layer formation on pistons, bores and mating surfaces. This may cause blockages in the centralized lubrication system.

### Calcium carbonate

Chisel pastes containing calcium carbonate are likely to cause a very strong wear on pistons, bores and mating surfaces.

### Calcium hydroxide

Chisel pastes containing calcium hydroxide are likely to harden strongly, what may result in a downtime of the centralized lubrication system

### PTFE, zinc and aluminium

Due to the findings and practical experiences gained so far, no limit values can be set for these solid lubricants yet.

## 2.6.1 Chisel pastes

### NOTICE

#### Damage to the superior machine

Chisel pastes must not be used as a lubricant for bearings.

### NOTICE

#### Damage of the centralized lubrication system

Chisel pastes may be supplied by pump element C only. Hereby the maximum operating pressure must not exceed 200 bar, as otherwise the solid lubricants contained in the chisel paste may cause increased wear.

### 3. Overview, functional description

#### 1 Reservoir

The lubricant is stored in the reservoir. Depending on the pump version there are different types of reservoirs and reservoir sizes.

##### 1.1 Reservoir lid

Serves as a protection against contamination of the lubricant. After removing the reservoir lid the reservoir can be filled from the top with suitable clean lubricant.

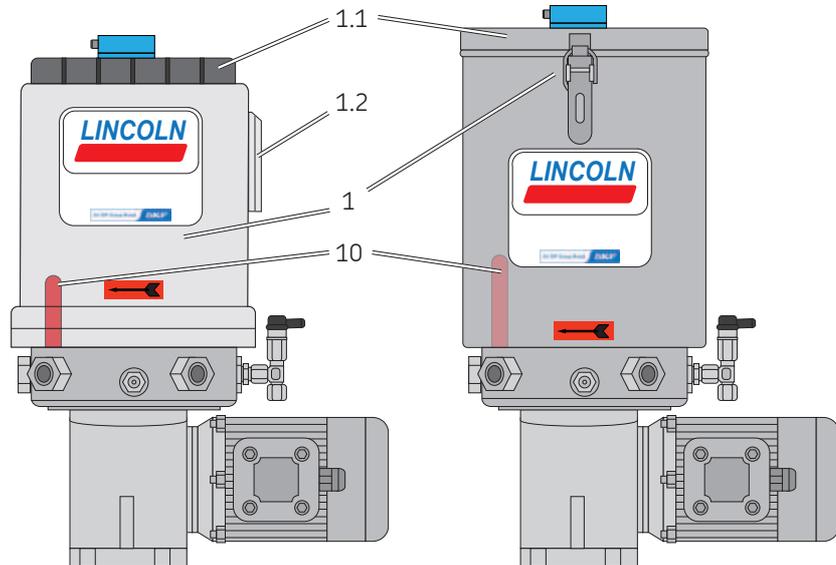
##### 1.2 Reservoir venting device

It provides air for the reservoir while the pump is operating and lubricant is supplied.

##### 10 Stirring paddle

While the pump operates, the stirring paddle homogenises and smoothens the lubricant. The stirring paddle's lower vertical part pushes the lubricant towards the pump elements thus improving the suction behaviour of the pump.

Overview, functional description Fig. 1



**2 Pump housing**

The pump housing serves to mount the pump. The pump housing accommodates the pump elements, the filler fittings as well as the shaft to drive the stirring paddle and the pump elements.

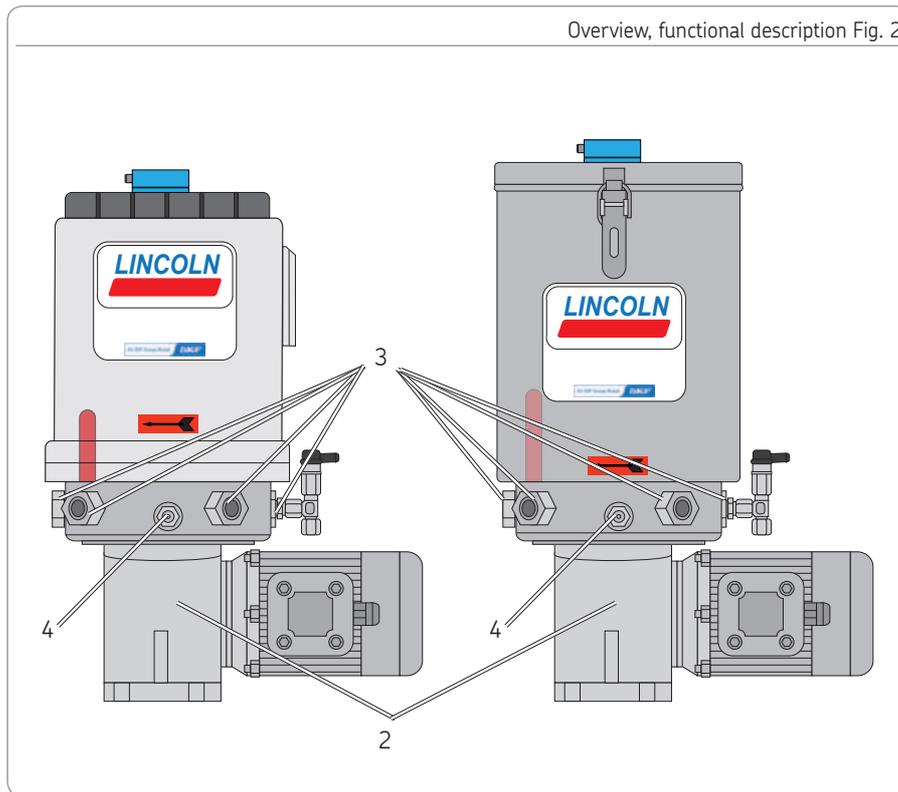
**3 Pump elements**

The pump can be equipped with up to 5 pump elements.

**4 Filler fitting**

The filler fitting serves to fill the pump from the bottom. If the filler fitting is removed, this port can be used to connect the optional filling connection or the external grease return from the pressure control valves to the pump elements with corresponding accessories.

Overview, functional description Fig. 2



**15 Motor**

Serves to drive the pump. Depending on the pump version there are different types of motors.

**16 Gear (hidden)**

The gear reduces the motor speed to the necessary speed of the pump.

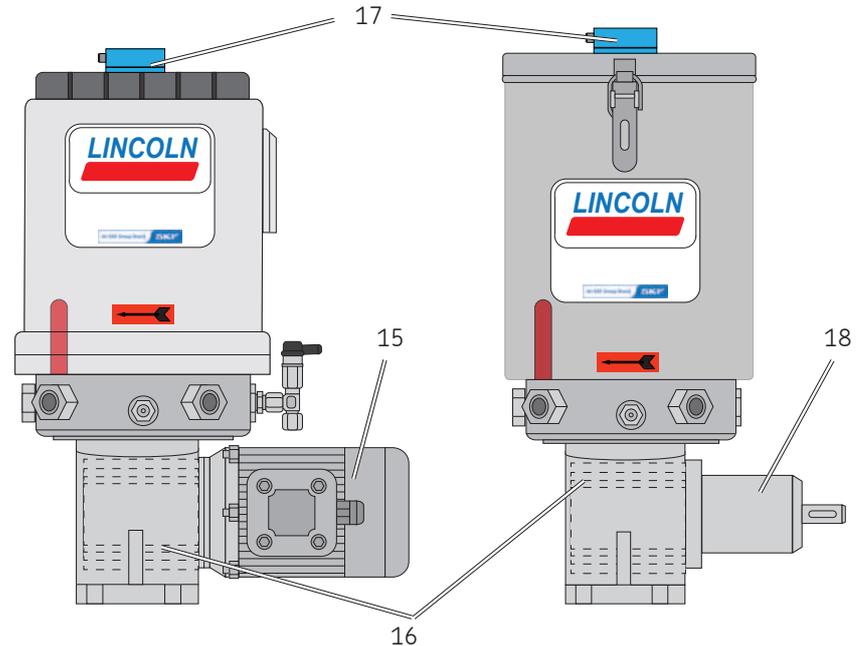
**17 Ultrasonic sensor**

Serves to monitor the filling level in the reservoir. The respective filling level is indicated by 2 LEDs (see Technical data of the ultrasonic sensor). The switch points are factory-set according to the reservoir size.

**18 Free shaft end**

For pumps supplied without motor, the operator chooses and mounts a suitable motor.

Overview, functional description Fig. 3



## 4. Technical data

### 4.1 General technical data

Operating pressure	350 bar max.	Weight of the empty pump <sup>2)</sup>	
Number of pump elements	max. 5	4 l reservoir	approx. 10.5 kg
Direction of rotation	clockwise	5 l reservoir	approx. 10.5 kg
sound pressure level	< 70 dB (A)	8 l reservoir	approx. 10.5 kg
Ambient temperature <sup>1)</sup>	-20 °C to +70 °C	10 l reservoir	approx. 12.5 kg
Installation position <sup>2)</sup>	vertical, i.e. reservoir at top.	30 l reservoir	approx. 14.5 kg
Degree of protection of motor   ultra-sonic sensor	IP 55   IP 65	Gear ratios	700:1   280:1   70:1
Protection class	1	Nominal output per pump element and stroke	
Lubricants (also see Chapter lubricants)	<ul style="list-style-type: none"> <li>- Lubrication greases up to and including NLGI II</li> <li>- Lubrication oils of at least 40 mm<sup>2</sup>/s (cST) at ambient temperature</li> <li>- Chisel paste</li> </ul>	K5	0.10 cm <sup>3</sup>
		K6	0.16 cm <sup>3</sup>
Filling	<ul style="list-style-type: none"> <li>- Filler fitting</li> <li>- Reservoir lid</li> <li>- Optional filling connection</li> </ul>	K7	0.22 cm <sup>3</sup>
		KR	0,04 - 0,18 cm <sup>3</sup>
Connections on the pump	5 x outlet M22 x 1,5 for pump elements, closure screws, filling connection G1/4" resp. G 1/2" or adapter with lubrication fitting	B7	0.10 cm <sup>3</sup>
		C7	0.22 cm <sup>3</sup>

<sup>1)</sup>The minimum admissible ambient temperature assumes that the lubricant used can be pumped. The upper limit applies to pumps with ultrasonic sensor for the level monitoring. Pumps without ultrasonic sensor for the level monitoring can be operated at up to +80 °C.

The maximum filling must be reduced according to the expected inclination (e.g. in case of construction or agricultural machinery).

<sup>2)</sup> weight indication without lubricant. Deviations from the values result from the specific reservoir variant as well as from the gear and motor used. In case of a delivery without motor about 3.0 kg must be subtracted from the indicated weight.

## 4.2 Technical data of the motors

Part number	Type of motor					1
245-13590-1	B04-03					
Rated voltage	V	500	VAC	Operating mode	S1	
				Design	B14/18	
Rated frequency	f	50	Hz	Size	56	
Rated power	P	0.09	KW	Degree of protection	IP 55	
Rated speed	n	1500	rpm	Insulation class	F	
Nominal current	$I_N$	0.3 A	A	Flange	80	
Starting current		2.5 x rated current	A	Shaft	Ø 9 x 20 mm	
Efficiency	$\eta$	0.52	%			
Performance factor	$\cos \varphi$	0.62				

Part number	Type of motor					2
245-13989-2	TN 56B4					
Rated voltage	V	380-420	440-480	VAC	Operating mode	S1
					Design	B14
Rated frequency	f	50	60	Hz	Size	56
Rated power	P	0.09	0.11	KW	Degree of protection	IP 55
Rated speed	n	1340	1600	rpm	Insulation class	F
Nominal current	$I_N$	0.43		A	Flange	80
Starting current		2.5 x rated current		A	Shaft	Ø 9x20 mm
Efficiency	$\eta$	56		%		
Performance factor	$\cos \varphi$	0.65				

### 4.3 Ratios and speeds

#### Pumps with free shaft ends

700:1

280:1

070:1



When choosing an adequate motor, the following speeds must be adhered to

Lubrication grease min. 2 rpm max. 25 rpm

Lubrication oil min. 2 rpm max. 35 rpm

#### Pump with multi-range motor

380-420 V AC

440-480 V AC

700:1

2.0 rpm

2.4 rpm

280:1

4.7 rpm

6.0 rpm

#### Pump with single-range motor

500 V AC

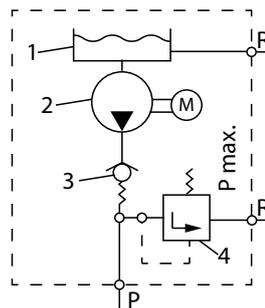
700:1

2.0 rpm

280:1

5.4 rpm

### 4.4 Hydraulic connection diagram



1 = Reservoir

2 = Pump

3 = Check valve

4 = Pressure control valve

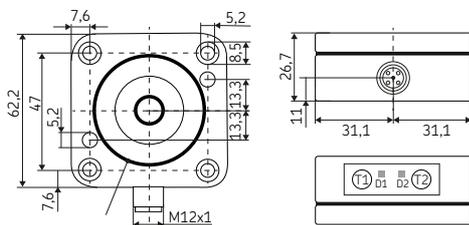
R = Return line

P = Pressure line

## 4.5 Technical data of the ultrasonic sensor

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 (protected against reverse polarity)
Residual ripple	±10 %
No-load supply current	≤ 60 mA
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
Compliance with standards	EN 60947-5-2
Display elements	LED red/ LED green Switching output set/ not set
Switching output	3x pnp; $U_B$ -2V; $I_{max} = 3x 200$ mA; NO contact, short-circuit resistant

## Dimensions

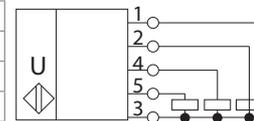


Switching states	Switching point			Indication by LED		
	D1	D2	D3	D1	D2	
High-level indication (D1)	A	A	B	red	red	C
Area between high- and pre-low-level indication	B	A	B	green	red	C
Pre-low-level signal (D3)	B	A	A	green	red	D
Low-level indication (D2)	B	B	B	green	green	C

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

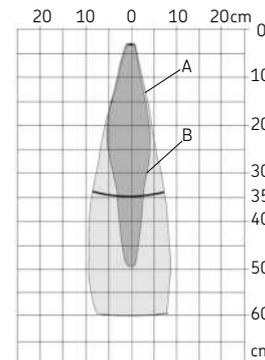


1	+ $U_B$	brown
3	- $U_B$	blue
4	D2	black
2	D1	white
5	D3/Com	grey

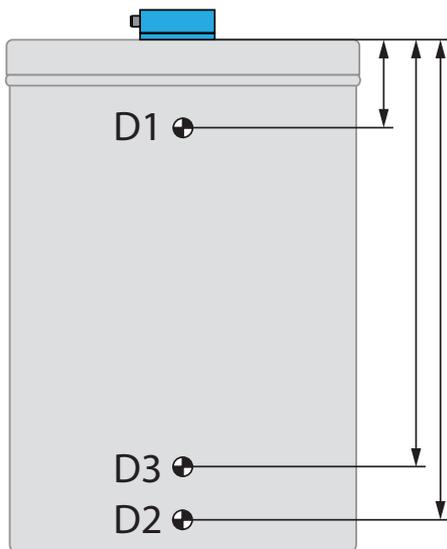


## Detection zone:

The dark grey areas indicate the zone in which the standard reflector is reliably detected. This is the typical operating range of the ultrasonic 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.



## 4.5.1 Switch points in case of reservoir versions XYBU



D1 (high-level indication) set to 65 mm always  
 D2 (low-level indication) set according to the reservoir size  
 D3 (pre-low-level indication) set to 10 mm above low-level indication always.

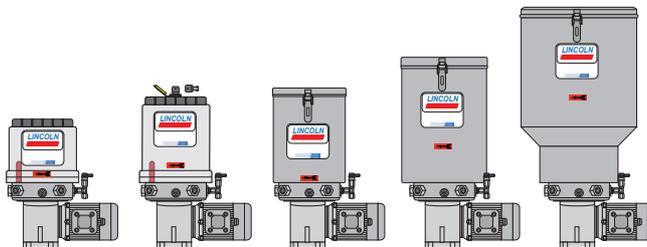
		D1	D2	D3	
4 l	Plastic reservoir	65	150	140	Part numbers of the sensors, see spare parts
4 l	Plastic reservoir	65	130	120	
5 l	Sheet steel reservoir	65	180	170	
8 l	Plastic reservoir	65	245	235	
8 l	Plastic reservoir	65	225	215	
10 l	Sheet steel reservoir	65	210	200	
30 l	Sheet steel reservoir	65	420	410	

#### 4.6 Reservoir versions

In the following you find the possible reservoir variants of the pumps described in these instructions (also see type identification code). For a better representation only the smallest possible reservoir size will be depicted always. In the figures the different reservoir variants may not always be distinguishable visually, as the differences are located in the interior construction (e.g. with and without low level indication).

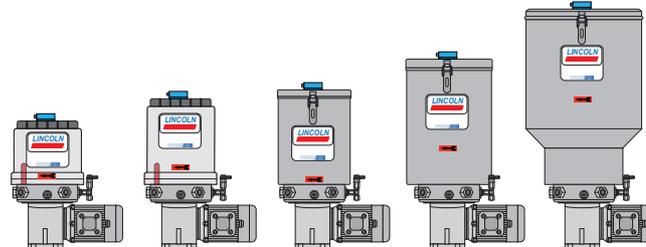
(✓ = available reservoir sizes)

XYN /XYNA*					
Litres	4	5	8	10	30
	✓	✓	✓	✓	✓



\*only as 8l and 4l reservoir available

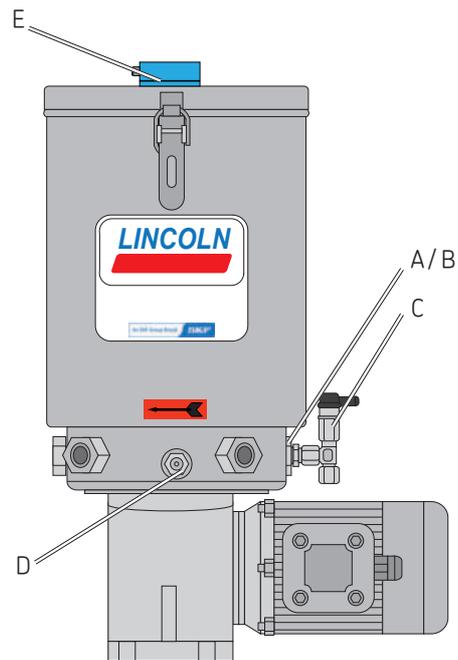
XYBU					
Litres	4	5	8	10	30
	✓	✓	✓	✓	✓



#### 4.7 Tightening torques

A	Pump element with housing	25 Nm $\pm$ 2.5 Nm
B	Closure screw with housing	20 Nm $\pm$ 0.2 Nm
C	Pressure control valve	6 Nm $\pm$ 0.6 Nm
D	Lubrication fitting	10 Nm $\pm$ 0.1 Nm
E	Ultrasonic sensor	1,5 Nm $\pm$ 0.2 Nm

If no tightening torques are stated for screw connections, the tightening torques are to be applied according to the properties of 8.8 screws.



#### 4.8 Type identification code

The type identification code facilitates selection/ identification of important features of the product. For the type identification code of the respective product, see the type identification plate on the pump.

P	2	0	5		-	M		0	7	0	-	4		X	Y	N			-	1		K	5	-	380 - 420, 440-480	Examples	
P	2	0	5	X	-	F		2	8	0	-	5		X	B				-	2		K	6	-			
P	2	0	5		-	M		7	0	0	-	8		X	Y	B	U			-	3		K	7	-		380 - 420, 440-480
P	2	0	5		-	F		2	8	0	-	1	0		X	Y	B	U		-	4		K	R	-		
A		B		C		D		E		F		G		H		K		Category									

##### A | Product designation

P205

##### B | Corrosion protection classes

X = C5-M Term of protection  $\geq 15$  years

The duration of the corrosion protection does not stand for the warranty period

##### C | Drive assy

M = Three-phase flange motor

F = free shaft end

##### D | Gear ratio

280 = 280 : 1

700 = 700 : 1

70 = 70 : 1

##### E | Reservoir sizes

4 = 4 l (Plastic reservoir)

5 = 5 l (Sheet steel reservoir)

8 = 8 l (Plastic reservoir)

10 = 10 l (Sheet steel reservoir)

30 = 30 l (Sheet steel reservoir)

##### F | Reservoir versions

XYN = Reservoir for lubrication grease and lubrication oil without level monitoring

XYBU = Reservoir for lubrication grease and lubrication oil with ultrasonic sensor for level monitoring

XYNA = Reservoir for lubrication grease and lubrication oil without level monitoring with lockable reservoir lid

##### G | Number of pump elements

1-5 = Pump elements

##### H | Type of pump elements

K5 = Piston  $\varnothing$  5 mm

K6 = Piston  $\varnothing$  6 mm

K7 = Piston  $\varnothing$  7 mm

KR = Piston  $\varnothing$  7mm; adjustable output

B7 = Piston  $\varnothing$  7 mm

C7 = Piston  $\varnothing$  7 mm

Output volume of pump elements, see chapter Technical data

##### K | Additional motor designation

380-420; 440-480 = Multi-range motor 380 - 420 VAC 50 Hz resp. 440-480 VAC 60 Hz

290-500 = Single-range motor for 290 - 500 VAC 50 Hz

000 = Pump without motor (but with connection flange)

## 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



Before application inspect the products with regard to possible damages occurred during their storage. This particularly applies for parts made out of plastic (embrittlement).

### 5.4 Corrosion protection

The corrosion protection (e. g. on the inside of the sheet metal reservoirs) should be verified and renewed every 6 - 12 months corresponding to the conditions at the place of storage.

### 5.5 Special storage conditions of the motor

- Do not store the motor on the fan cover.
- After a longer period of storage, make sure to check the insulation resistance of the motor.
- In case of a storage > 1 year make sure to consider the bearing grease's service life that will be reduced by 10% per year.

## 5.6 Storage temperature range

- In case of parts not filled with lubricant the admissible storage temperature corresponds to that of the admissible ambient temperature of the pump (see Technical data)
- In case of parts filled with lubricant the admissible storage temperature range is:

min. + 5 °C [+41 °F]  
 max. + 35 °C [+95 °F]



If the storage temperature range is not adhered to, the following work steps for replacing the lubricant may not in all cases lead to the desired result.

## 5.7 Storage conditions for parts filled with lubricant

The conditions mentioned in the following will have to be adhered to when storing products filled with lubricant,

### 5.7.1 Storage period of up to 6 months

The filled products can be used without having to take further measures.

### 5.7.2 Storage period from 6 to 18 months

#### Pump

- Connect the pump electrically
- Switch the pump on and let it run, e.g. by triggering an additional lubrication, until about 4 cc of lubricant will leak from each pump element
- Switch the pump off and disconnect it from the electrical grid
- Remove and dispose of leaked lubricant

#### Metering devices

- Remove all connection lines and closure screws, if any
- Connect the pump primed with new lubrication grease suitable for the application purpose to the divider bar in such way that the opposite port of the divider bar remains open

- Let the pump run until new lubricant leaks from the divider bar
- Remove leaked lubricant
- Reinstall closure screws and connection lines

#### Lines

- Dismantle preassembled lines
- Ensure that both line ends remain open
- Prime lines with new lubricant

### 5.7.3 Storage period exceeding 18 months

To avoid dysfunctions consult the manufacturer before commissioning. The general procedure to remove the old grease filling corresponds to that of a storage period from 6 to 18 months.

## 6. Installation

### 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 degree 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 or piston detectors, must be clearly visible
  - Observe prescriptions in chapter Technical data regarding the installation position

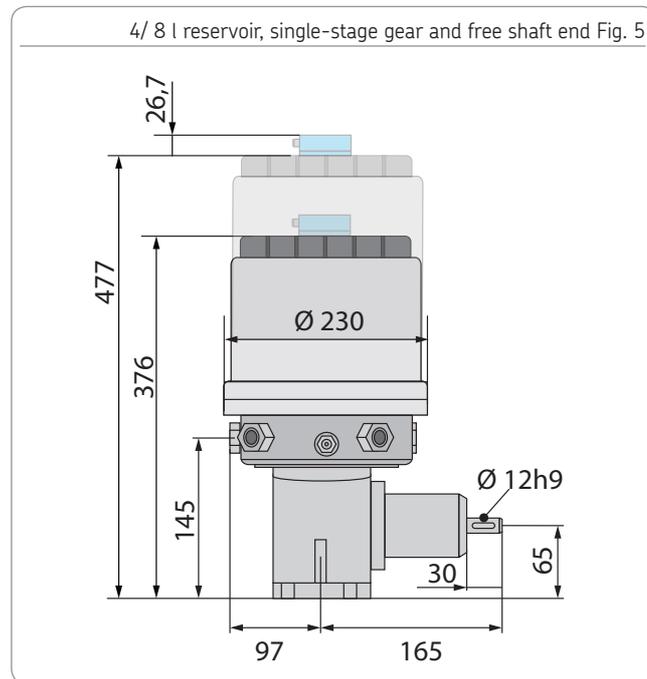
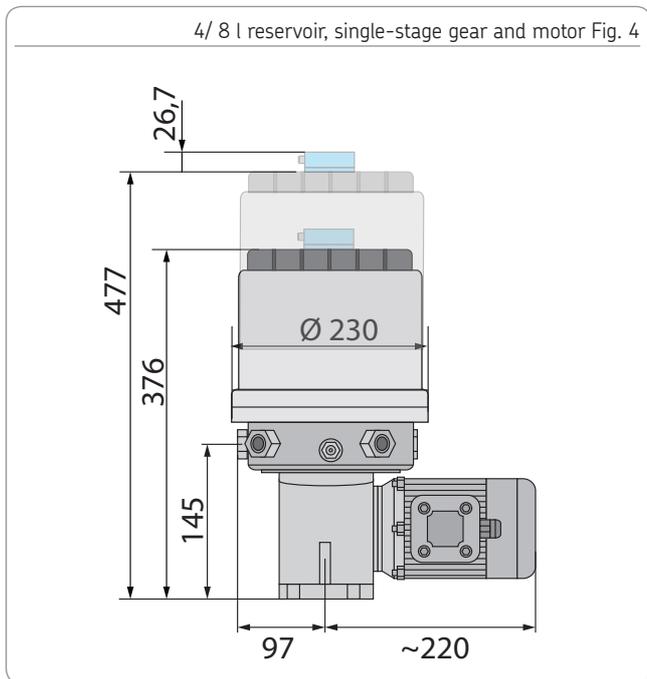
### 6.2 Place of installation

Protect the product against humidity, dust and vibrations and install it in an easily accessible position to facilitate other installation and maintenance works.

## 6.3 Mechanical connection

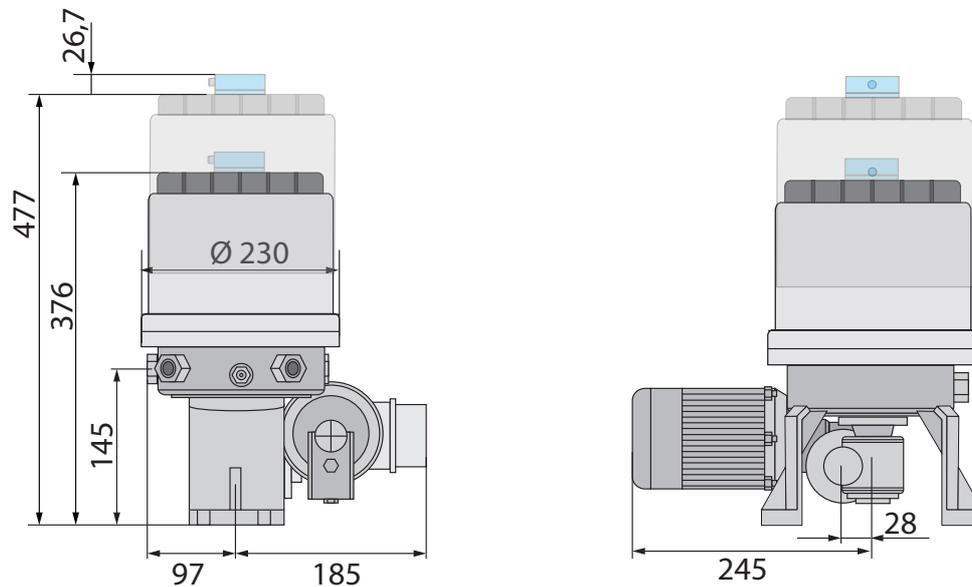
### 6.3.1 Minimum assembly dimensions

Ensure sufficient space for maintenance work or for attachment of further components to build a centralized lubrication system to the pump by leaving a free space of at least 100 mm into each direction in addition to the stated dimensions.

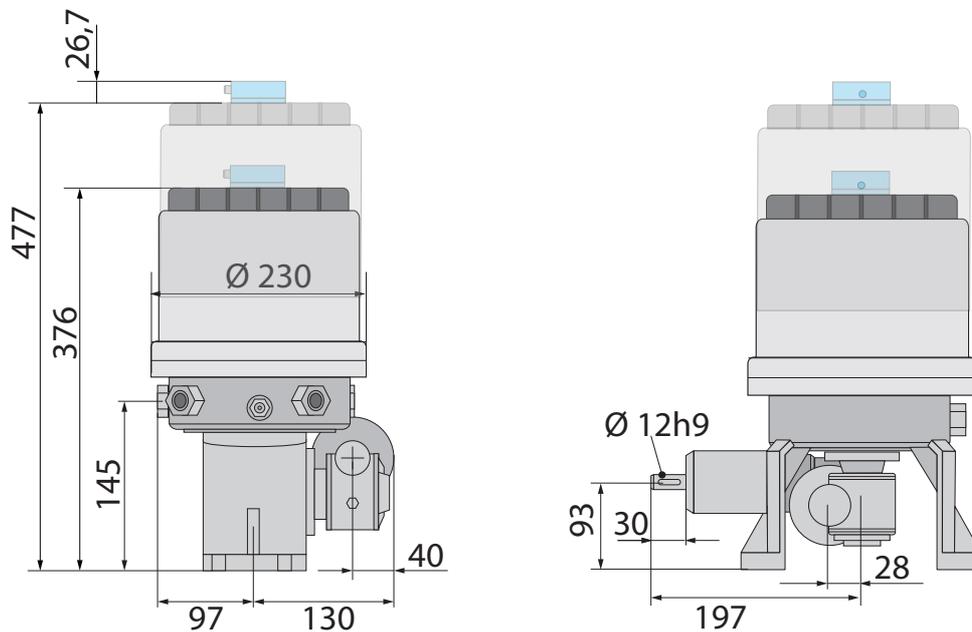




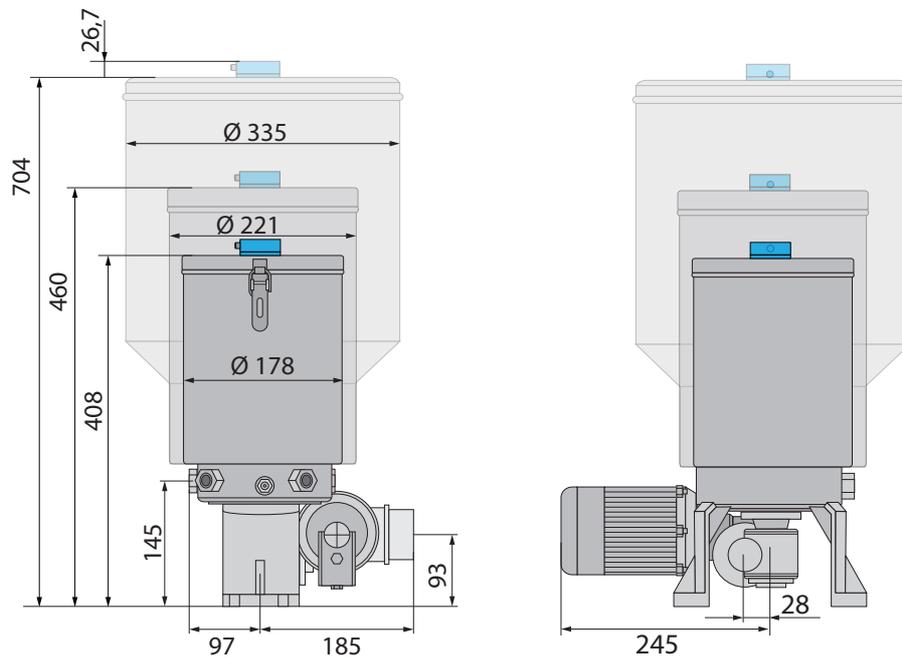
4/ 8 l reservoir, two-stage gear and motor Fig. 8



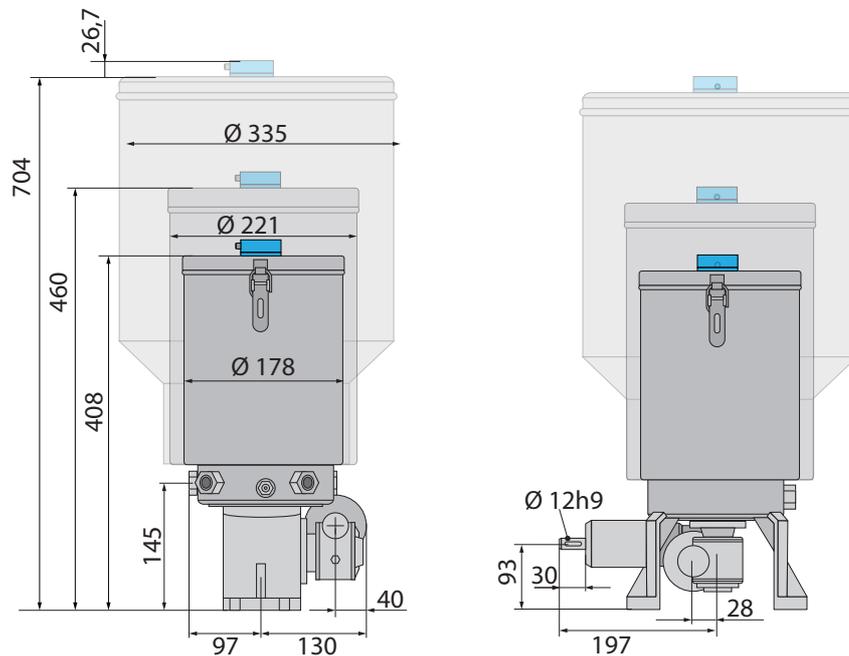
4/ 8 l reservoir, two-stage gear and free shaft end Fig. 9



5/ 10/ 30 l reservoir, two-stage gear and motor Fig. 10



5/ 10/ 30 l reservoir, two-stage gear and free shaft end Fig. 11



### 6.3.2 Installation bores

#### NOTICE

##### Damage to the pump

Fastening may not be done on two parts moving against one another (machine bed and machine assembly).

The product is fastened to the 4 mounting bores (7). Drill the mounting bores on non load-bearing parts only.

Fastening is done by means of:

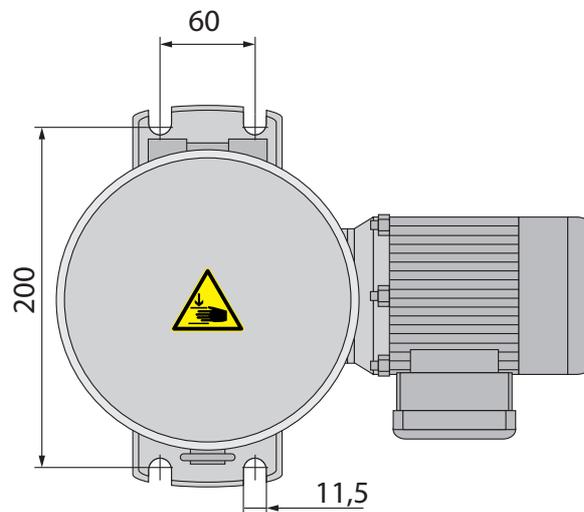
4 x screw M8 (strength class 8.8)

4 x hex nut M8

4 x washer 8C

Tightening torque =  $25 \text{ Nm} \pm 2.5 \text{ Nm}$

Installation bores Fig. 12



## 6.4 Electrical connection

**WARNING****Electric shock**

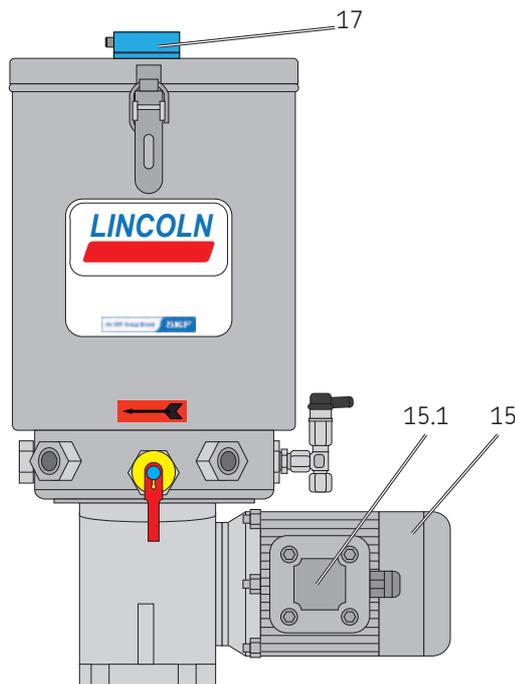
Before carrying out any works on electrical components, an electrician must disconnect the product from the power supply.



Electrical connection must be carried out according to the prescriptions of DIN IEC 60364-1/VDE 0100.

- Connect the motor (15) according to the wiring diagram inside of the terminal box (15.1)
- Connect the ultrasonic sensor (17) according to the wiring diagram included in these instructions (see Technical data of ultrasonic sensor)

Electrical connection, Fig. 13



### 6.5 Adjusting the output volume on the pump element KR



The output of pump element R can be adjusted only while the pump is idle. Factory setting is full supply, i.e. the adjusting measure is  $S = 29$  mm.

To set the output volume proceed as follows:

- Loosen the counter nut (3.1)
- Adjust the output volume by screwing the spindle (3.2) to the indicated measure according to the table on the right

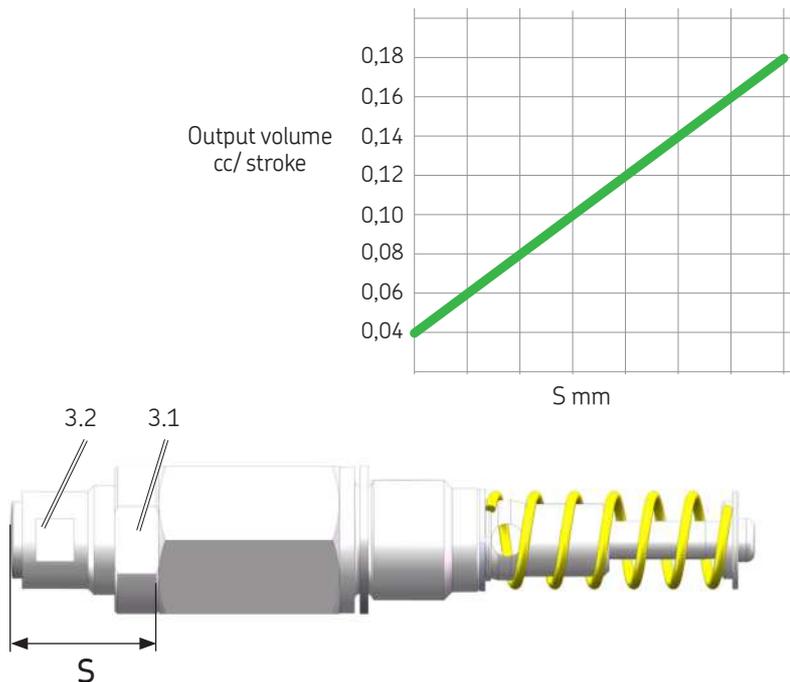
↺ = lower output volume

↻ = higher output volume

- After adjusting the output volume, retighten the counternut (3.1)

Tightening torque = 20 Nm  $\pm$  2.0 Nm

Adjusting the output volume on pump element KR Fig. 14



### 6.6 Mount pressure control valve

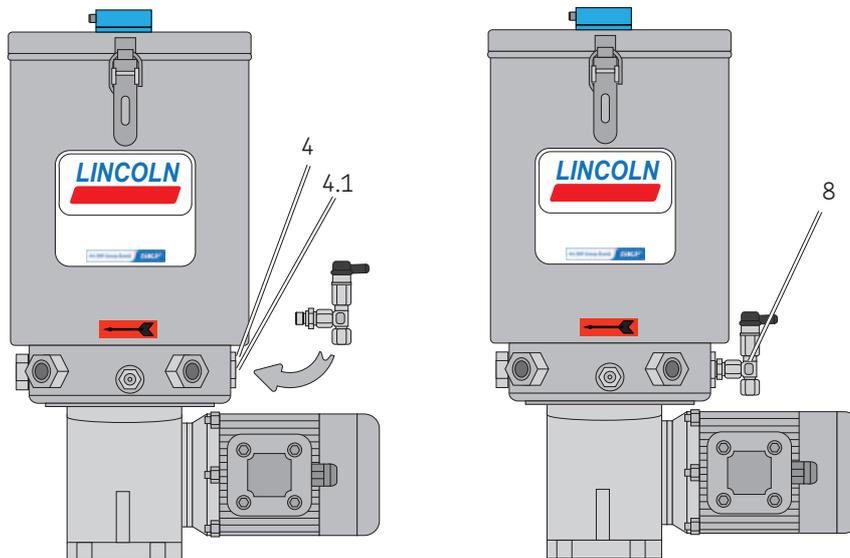
Protect each pump element by means of a pressure control valve suitable for the planned maximum admissible operating pressure of the centralized lubrication system.

To carry out the assembly proceed as follows:

- Remove the closure plug (4.1) from the pump element (4)
- Screw pressure control valve (8) into pump element (4)
- Repeat procedure for each pump element

Tightening torque = 6 Nm -0.5 Nm

Mounting the pressure control valve Fig. 15



## 6.7 Lubrication line connection

 <b>CAUTION</b>
 <p><b>Risk of falling</b> Exercise care when dealing with lubricants. Bind and remove spilled or leaked lubricants immediately.</p>



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 operating pressure
- the admissible ambient temperature
- the output volume and the lubricant to be supplied

Observe the following installation instructions for safe and smooth operation.

- Use clean components and filled 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
- Possibly 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

## 6.8 Filling with lubricant

### 6.8.1 Filling via the reservoir lid of plastic reservoirs

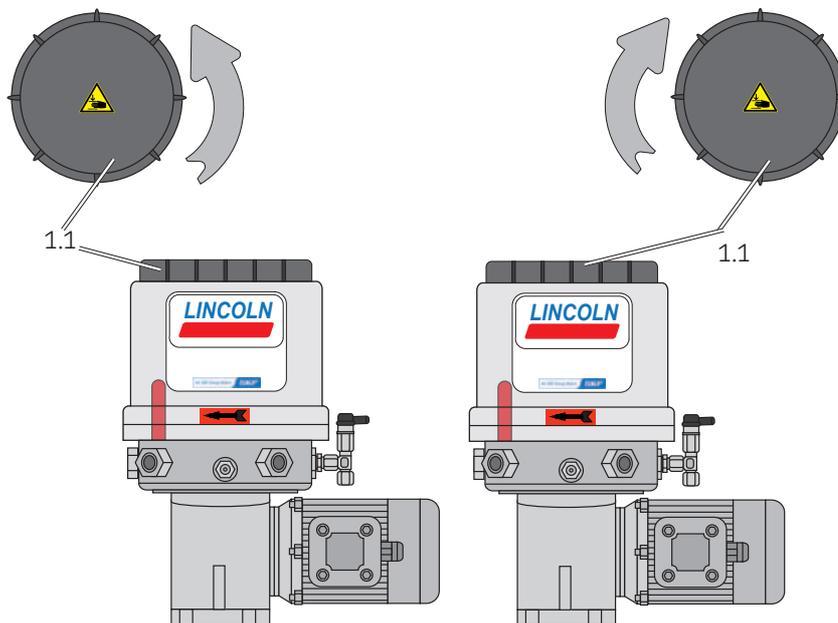
#### WARNING



Crushing hazard on the rotating stirring paddle. Filling the reservoir via the reservoir lid is allowed only while pump is shut down.

- Remove reservoir lid (1.1) anticlockwise.
- Switch filler pump on and fill reservoir up to about 20 mm below the reservoir rim. Make sure to fill in the lubricant without air inclusions, if possible
- Switch off filler pump
- Mount reservoir lid (1.1) clockwise

Filling via the reservoir lid of plastic reservoir Fig. 16



### 6.8.2 Filling via the reservoir lid of sheet steel reservoirs

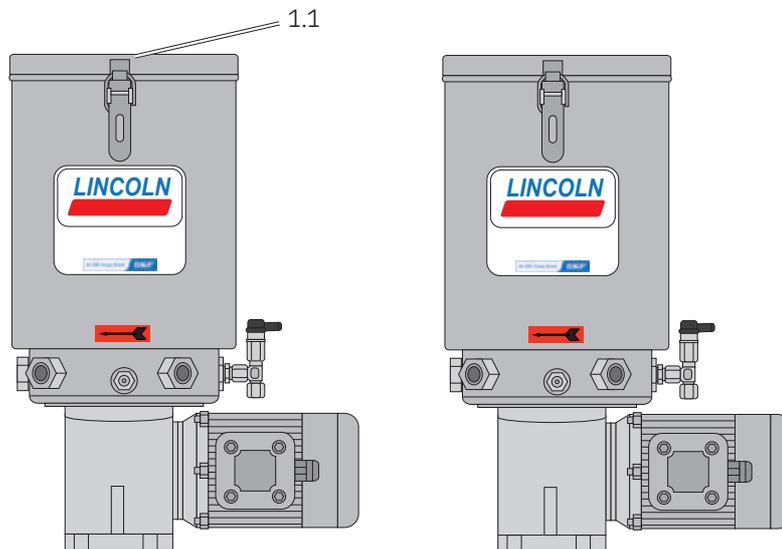
#### WARNING



Crushing hazard on the rotating stirring paddle. Filling the reservoir via the reservoir lid is allowed only while pump is shut down.

- Open reservoir lid (1.1) and protect against being shut accidentally
- Fill reservoir up to max. 20 mm below the reservoir rim. Make sure to fill in the lubricant without air inclusions, if possible
- Close reservoir lid (1.1) and lock it again

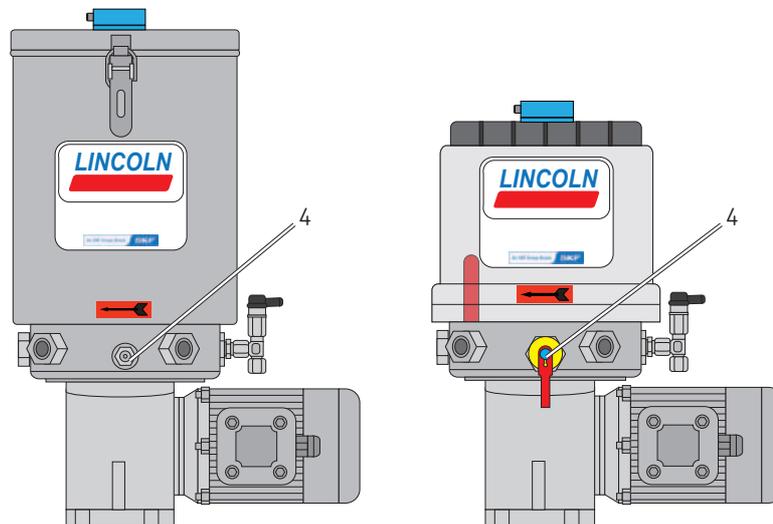
Filling via the reservoir lid of sheet metal reservoirs Fig. 17



### 6.8.3 Filling via filler fitting

- Pumps with ultrasonic sensors
- Connect filling connection of filler pump with filler fitting (4)
- Switch on filler pump and fill reservoir until both LEDs of the ultrasonic sensor are lighting red (high-level indication)
- Switch filler pump off and remove it from filler fitting (4) of pump

Filling via filler fitting Fig. 18

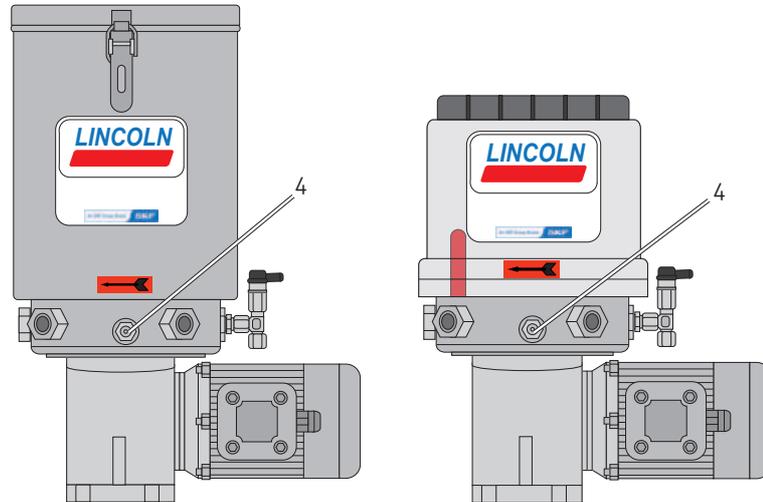


#### 6.8.4 Filling via filler fitting

##### Pumps without ultrasonic sensors

- **For sheet steel reservoirs:** Open locking and reservoir lid (1.1) and protect against being shut accidentally.
- **For plastic reservoirs:** Remove reservoir lid (1.1) anticlockwise.
- Switch filler pump on and fill reservoir up to about 20 mm below the reservoir rim
- Switch filler pump off and remove it from filler fitting (4) of pump
- **For sheet steel reservoirs:** Close and lock reservoir lid.
- **For plastic reservoirs:** Mount reservoir lid (1.1) clockwise.

Filling via filler fitting Fig. 19

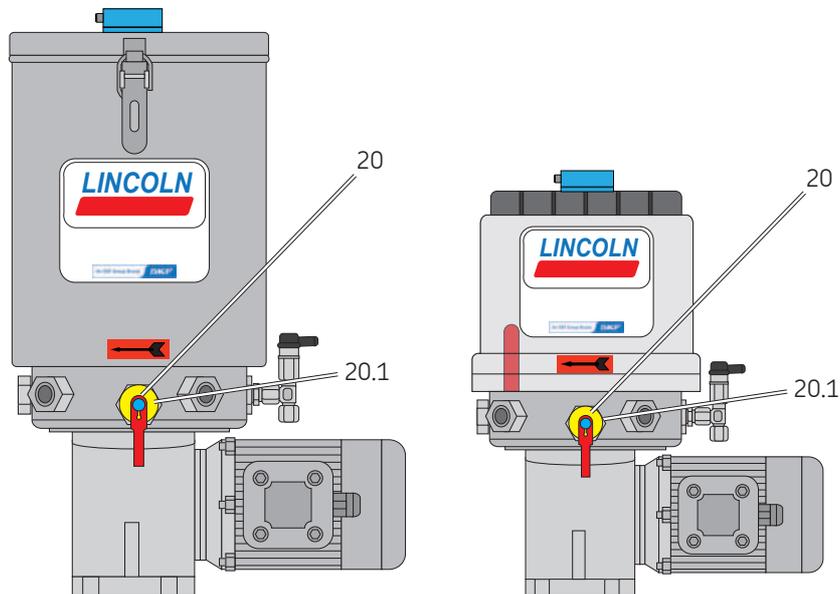


### 6.8.5 Filling via the optional filling connection

#### Pumps with ultrasonic sensors:

- Unscrew protective cap (20.1) from filling connection (20) anticlockwise
- Connect filling connection of filler pump with filler fitting (4)
- Switch on filler pump and fill reservoir until both LEDs of the ultrasonic sensor are lighting red
- Switch off filler pump and remove it from filler fitting (20) of pump
- Screw protective cap (20.1) clockwise onto filling connection (20) of pump again

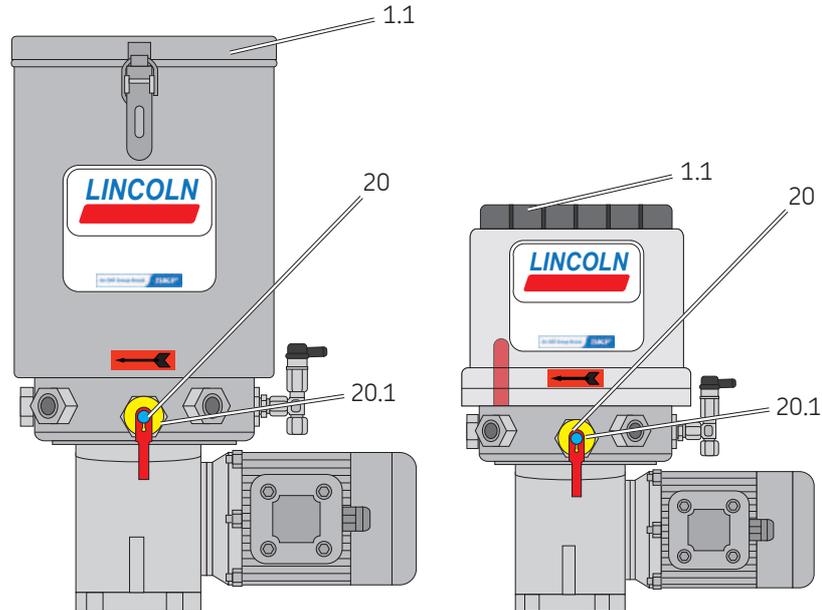
Filling with lubricant via optional filling connection Fig. 20



### Pumps without ultrasonic sensors:

- Unscrew protective cap (20.1) anticlockwise
- Connect filling connection of filler pump with filler fitting (20)
- **For sheet steel reservoirs:** Open locking and reservoir lid (1.1) and protect against being shut accidentally.  
**For plastic reservoirs:** Remove reservoir lid (1.1) anticlockwise.
- Switch filler pump on and fill reservoir up to about 20 mm below the reservoir rim
- Switch off filler pump and remove it from filler fitting (20) of pump
- **For sheet steel reservoirs:** Close and lock reservoir lid.  
**For plastic reservoirs:** Mount reservoir lid (1.1) clockwise.

Filling with lubricant via optional filling connection Fig. 21



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

## 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 of pumps without low-level indication and the timely refilling of lubricant.

### 8.1 Refill lubricant

See chapter Filling with lubricant

## 9. Cleaning

 <b>WARNING</b>
 <b>Electric shock</b> 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 degree of protection of the pump. Otherwise electrical components may be damaged. Performance of cleaning, 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.

### 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.

### 9.4 Cleaning of the ultrasonic sensor

If the active sensor face is contaminated with lubricant, clean it with a cloth.

## 10. Maintenance

Regular and appropriate maintenance is a prerequisite to detect and clear faults in time.

 <b>WARNING</b>
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;"></div> <div style="margin-bottom: 10px;"></div> <div></div> </div> <p><b>Risk of injury</b> Before carrying out any maintenance works - with the exception of visual inspections - take at least the following safety measures:</p> <ul style="list-style-type: none"> <li>○ Keep unauthorized persons away</li> <li>○ Mark and secure work area</li> <li>○ De-pressurize the product</li> <li>○ Disconnect the product from the power supply and secure it against being switched on</li> <li>○ Verify that no power is being applied</li> <li>○ Earth and short-circuit the product</li> <li>○ Where needed, cover neighbouring units that are live</li> </ul>

### 10.1 Pump maintenance

The pump is mainly maintenance-free. However, the following parts should be inspected and, if necessary, replaced by new parts at regular intervals:

- Pressure relief valves
- Check valves
- Pump elements

Tolerance of the pressure relief valves  
+ 5% / - 10 %

If this tolerance is exceeded, the pressure relief valves must be replaced.

### 10.2 Maintenance of the gear

#### 10.2.1 Service life

The nominal service life of the gear unit is 15,000 hours at SF 1,0 load characteristic.

#### 10.2.2 Oil change

The gear comes with a synthetic oil filling that needs to be changed only after 5 years.

### 10.3 Maintenance of the ultrasonic sensor

The ultrasonic sensor is free of maintenance.

### 10.4 Maintenance of the motors

Motor maintenance chart

As individual operating conditions cannot be defined by us for all applications, the listed time lines represent a general advice for undisturbed operation. The operator has to adapt the time lines to the specific operating conditions always

#### 10.4.1 Motor bearings

When reaching their nominal life, the bearings have to be replaced or inspected to ensure that they are free from any mechanical damage.

- 20,000 h in case of axial load
- 40,000 h in all other cases of load

Activity	Interval / deadline
Check the airways and surfaces	according to the degree of contamination during the application. Latest however every 4 weeks
check them for condensation water	Interval depends on climatic conditions, at the latest, however, in the frame of the main inspection.
Re-lubrication / oil change	Re-lubrication interval, grease volume and grease quality, see type identification respectively lubrication plate of the motor
Initial inspection	After about 500 operating hours, at the latest, however, after 6 months
Main inspection	After about 10,000 operating hours, at the latest, however, after 12 months.

### 10.5 Measurement of the insulation resistance

	 <b>WARNING</b>
	<b>Electric shock</b> Do not touch the terminals when measuring the insulation resistance. Wear insulating gloves. Observe the manual of the insulation measurement device.

#### NOTICE

**Damage to the motor**

The voltage applied for the insulation test must not exceed 500 V.

Before the first start-up and after longer downtimes measure the insulation resistance following the standards (e. g. VDE 0100 / IEC / DIN EN 61557) valid in the country of use.

If the insulation resistance falls below the required minimum value, determine and eliminate the cause (e.g. appropriate drying of the coil, etc.).

### 10.6 Visual inspections

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.

Checklist Maintenance Visual inspections

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

## 11. Troubleshooting

Fault table 1

Fault	Possible cause	Remedy
Pump does not run	Power supply to pump interrupted <ul style="list-style-type: none"> <li>- Superior machine is switched off</li> <li>- Connection cable of pump is loose or defective</li> <li>- External fuse is defective</li> </ul> Pump motor is defective Motor circuit breaker has tripped	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.  If the fault cannot be determined and remedied, please contact our Customer Service.

Fault table 2

Fault	Possible cause	Remedy
Pump runs but supplies no or only little lubricant	Blockade, fault within the centralized lubrication system Defective check valve Defective pressure relief valve Suction bore of pump element is clogged Close pump element Air pockets in the lubricant Reservoir empty	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.
	Wrong configuration of metering device within the centralized lubrication system	If the fault cannot be determined and remedied, please contact our Customer Service.

## 12. Repairs

 <b>WARNING</b>
 <b>Risk of injury</b> Before carrying out any repair work, take at least the following safety measures:
 <ul style="list-style-type: none"> <li>○ Keep unauthorized persons away</li> <li>○ Mark and secure work area</li> <li>○ De-pressurize the product</li> </ul>
 <ul style="list-style-type: none"> <li>○ Disconnect the product from the power supply and secure it against being switched on</li> <li>○ Verify that no power is being applied</li> <li>○ Earth and short-circuit the product</li> <li>○ Where needed, cover neighbouring units that are live</li> </ul>

### 12.1 Check pump element and replace pressure control valve.



The characteristics of the new pump element must correspond to the characteristics of the pump element to be replaced.

To replace the pump element, proceed as follows:

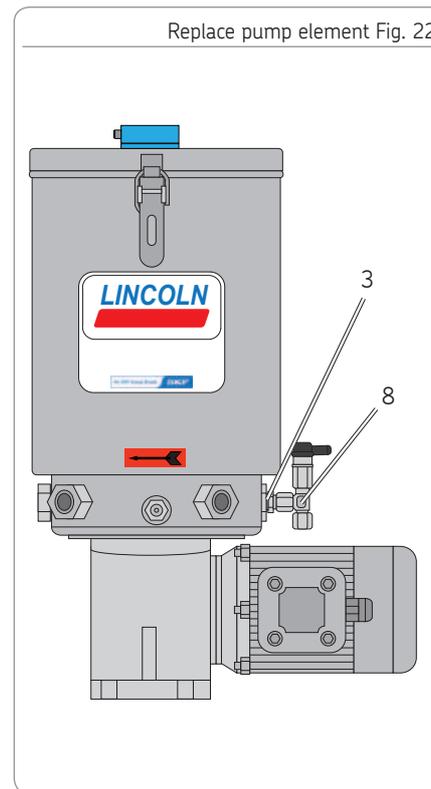
- Unscrew defective pump element (3) at its hexagon out of pump housing together with pressure control valve
- Screw the new pump element (3) into the pump housing together with a new gasket

Tightening torque = 20 Nm  $\pm$  2.0 Nm

- Then screw a new pressure control valve (8) into the pump element

Tightening torque = 6 Nm  $\pm$  0.5 Nm

Replace pump element Fig. 22



## 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 planned and carried out by the operator in a professional manner and 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 via 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.

#### Electrical components

have to be disposed of or recycled following WEEE directive 2012/19/EU.

#### Plastic or metal parts

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.

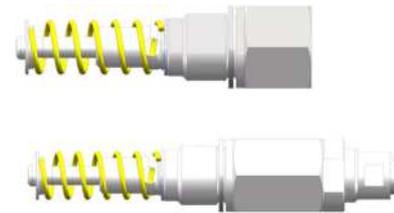
## 14. Spare parts

The spare parts assemblies may be used exclusively for replacement of identical defective parts. Modifications with spare parts on existing products are not allowed. Exceptions to this are the pump elements and the optional filling connection.

### 14.1 Pump elements

Designation	Qty.	Part number C3 version	Part number C5-M version
Pump element K5 including gasket	1	600-26875-2	600-29303-1
Pump element K6 including gasket	1	600-26876-2	600-29304-1
Pump element K7 including gasket	1	600-26877-2	600-29305-1
Pump element KR including gasket	1	655-28716-1	Not available
Pump element B7 including gasket	1	600-29185-1	Not available
Pump element C7 including gasket	1	600-28750-1	Not available

Fig. 23



### 14.2 Pressure relief valves

Designation	Qty.	Part number
Pressure control valve SVTS-350-R 1/4-D6   C3	1	624-28894-1
Pressure control valve SVTS-350-R 1/4-D6   C5-M	1	624-29343-1
Pressure control valve SVET-350-G 1/4 A-D8   C3	1	624-29054-1
Pressure control valve SVTSV-270-R1/4-1/8NPTFI-NIP00R-A   C3	1	270864



Other pressure control valves on request

Fig. 24

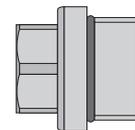


**14.3 Closure screw M22 x 1,5**

Designation	Qty.	Part number
Closure screw M22x1,5 including gasket	1	519-60445-1

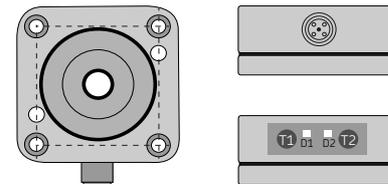
Serves to close an unneeded outlet, e.g. if a pump element is removed.

Fig. 25

**14.4 Ultrasonic sensors**

Designation		Qty.	Part number
Sensor BU LS = 150; VS=65; VLO 140	4 l Plastic reservoir	1	664-85313-5
Sensor BU LS = 180; VS=65; VLO 170	5 l Sheet steel reservoir	1	664-85313-6
Sensor BU LS = 245; VS=65; VLO 235	8 l Plastic reservoir	1	664-85313-7
Sensor BU LS = 225; VS=65; VLO 215	8 l Plastic reservoir	1	664-85314-2
Sensor BU LS = 210; VS=65; VLO 200	10 l Sheet steel reservoir	1	664-85313-8
Sensor BU LS = 420; VS=65; VLO 410	30 l Sheet steel reservoir	1	664-85313-9

Fig. 26



**14.5 Motors**

Designation	Qty.	Part number
A Single-stage motor 290- 500 VAC 50 Hz	1	245-13590-1
B Multi-range motor 380 - 420 VAC 50 Hz / 440-480VAC 60 Hz	1	245-13989-2

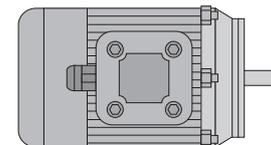


Fig. 27

**14.6 Gear**

Designation	Qty.	Part number
C Gear 070:1	1	246-14174-1
D Gear 280:1	1	246-14174-2
E Gear 700:1	1	246-14174-3

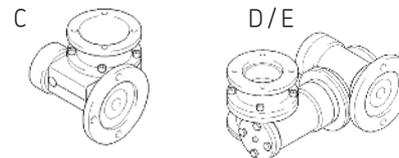


Fig. 28

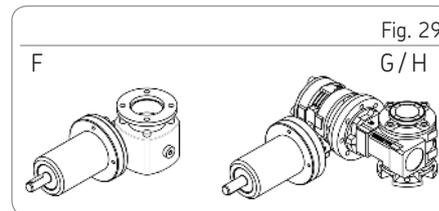
**14.7 Drive assy (Motor and gear)**

Designation	Qty.	Part number
Drive assy consisting of motor and gear B + C	1	245-13932-1
Drive assy consisting of motor and gear B + D	1	245-13933-1
Drive assy consisting of motor and gear B + E	1	245-13934-1
Drive assy consisting of motor and gear A + C	1	245-13935-1
Drive assy consisting of motor and gear A + D	1	245-13936-1
Drive assy consisting of motor and gear A + E	1	245-13937-1

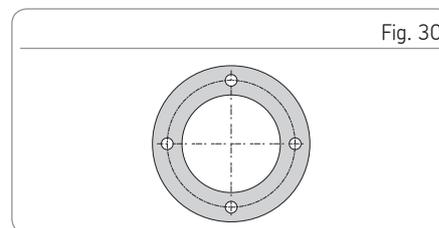
without  
Fig.

**14.8 Drive assy (free shaft end)**

Designation	Qty.	Part number
F Drive P205-F070 (gear 70:1)	1	655-28733-1
G Drive P205-F280 (gear 280:1)	1	655-28740-1
H Drive P205-F700 (gear 700:1)	1	655-28732-1

**14.9 Flange seals**

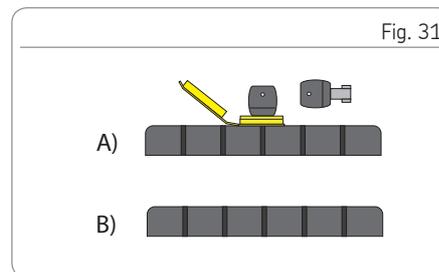
Designation	Qty.	Part number
Flange seal for gear / motor or gear / free shaft end 50 x 80 x 0.5	1	306-19714-1
Flange seal for gear / pump housing 40 x 70 x 0.5	1	306-19713-1

**14.10 Reservoir lid**

Designation	Qty.	Part number
A) Reservoir lid 4/ 8 l Version	1	544-36963-1
B) Reservoir lid 4/ 8 l Version	1	544-31992-1

A) Lockable including 2 keys and warning label

B) Including warning label



### 14.11 Reservoir assy

Designation			Qty.	Part number
4 l XYN	Plastic		1	655-28734-1
5 l XYN	Sheet steel		1	655-28735-1
8 l XYN	Plastic		1	655-28736-1
4 XYBU	Plastic	-	1	655-28738-1
5 XYBU	Sheet steel		1	655-28737-1
8 XYBU	Plastic		1	655-28739-1
10 XYBU	Sheet steel		1	655-29325-1
30 XYBU	Sheet steel		1	655-28915-1

Delivery including reservoir lid, stirring paddle, transition ring\*, fixed paddle, ultrasonic sensor# and all labels.

\* not for sheet steel reservoirs

# only for reservoir version XYBU

Fig. 32

655-28734-1



655-28735-1



655-28736-1



655-28738-1



655-28737-1



655-28739-1



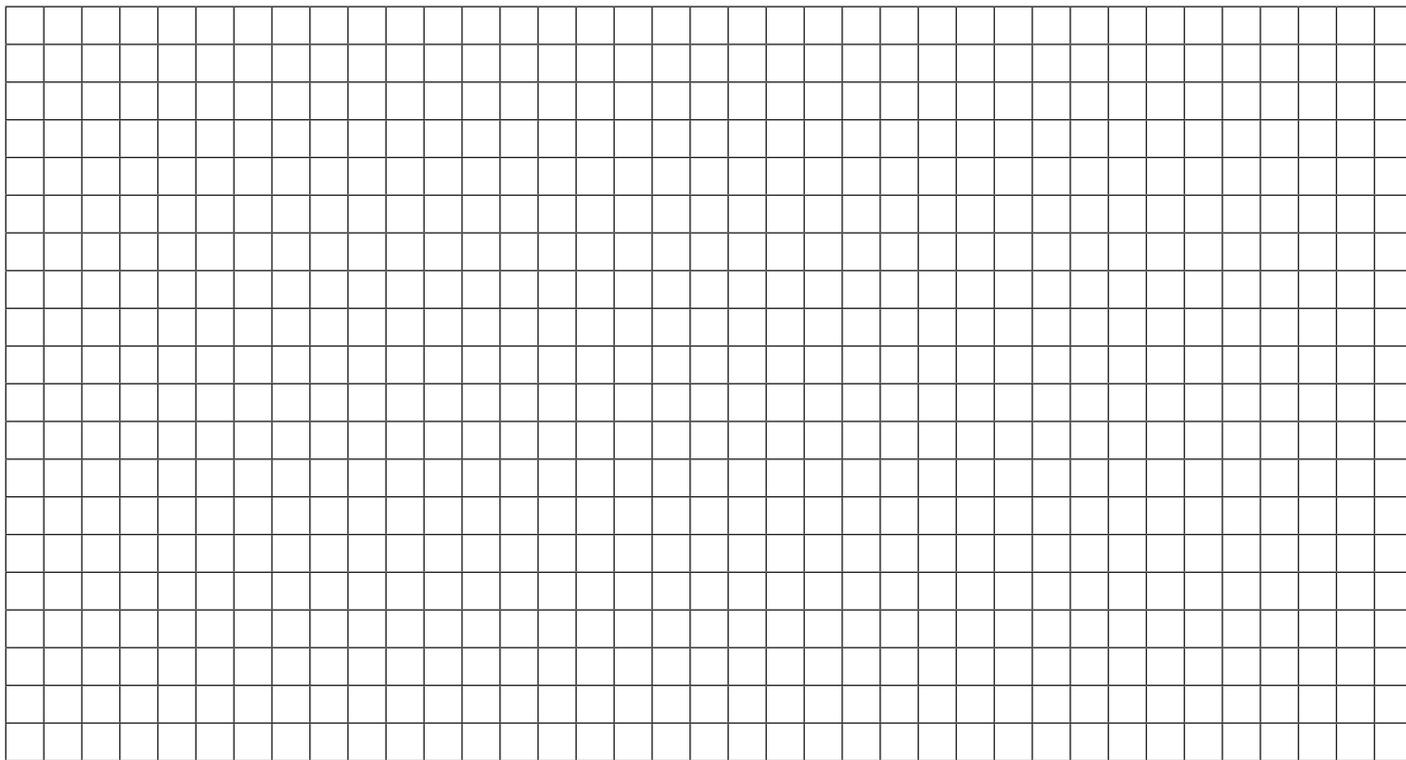
655-29325-1



655-28915-1



## Notes



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