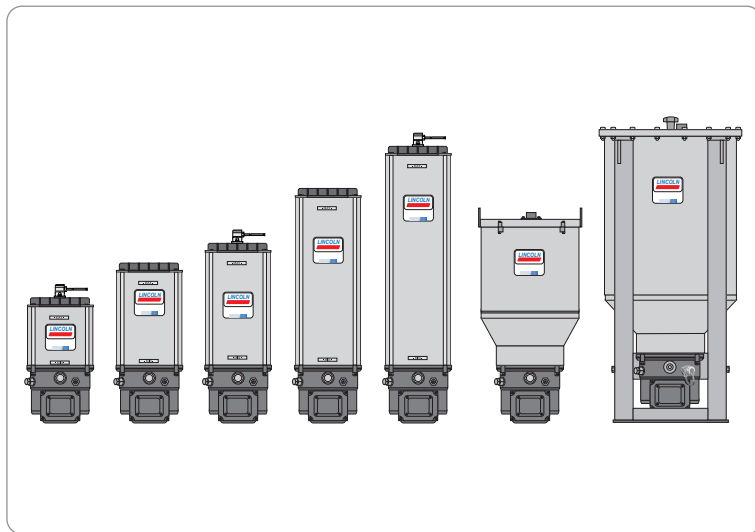


Lubrication pump P603M for multi-line lubrication systems

Assembly instructions
following machinery directive 2006/42/EC

EN



951-171-031-EN

Version 08

17.03.2025



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

The manufacturer SKF Lubrication Systems Germany GmbH, Walldorf Facilities, Heinrich-Hertz-Str. 2-8, DE - 69190 Walldorf hereby declares under its sole responsibility the conformity of the partly completed machinery with the essential health and safety requirements of Machinery Directive 2006/42/EC Annex I marked as applicable and fulfilled in the appendix to the Declaration of Incorporation at the time of placing the machinery on the market.

The 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 manufacturer is authorized for the technical documentation.

Designation: Electrically driven pump to supply lubricant during intermittent operation within a centralized lubrication system
Types: P603M
Part number: 645-xxxx-x / 6450-xxxxxxx

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

EN ISO 12100:2010	EN 60204-1:2018	EN 60034-1:2010/AC:2010	EN 61000-6-4:2007/A1:2011
EN 809:1998+A1:2009/AC:2010	EN 60947-5-1:2004/A1:2009	EN 61000-6-2:2005/AC:2005	
EN IEC 63000:2018	EN 61131-2:2007		

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

Walldorf, 16/04/2021

Jürgen Kreutzkämper
Manager R&D Germany



Stefan Schürmann
Manager PD Germany South



UK Declaration of Incorporation acc. Supply of Machinery (Safety) Regulations 2008 No. 1597 Annex I

The manufacturer SKF Lubrication Systems Germany GmbH, Heinrich-Hertz-Str. 2-8, DE -69190 Walldorf hereby declares under sole responsibility that the partly completed machinery complies with the essential health and safety requirements of UK legislation Supply of Machinery (Safety) Regulations 2008 No. 1597 Annex I, marked in the Annex to the Declaration of Incorporation as applicable and fulfilled at the time of placing on the market.

The technical documentation has been compiled. We undertake to transmit the technical documentation in electronic form, in response to a reasoned request by the national authorities. The person authorised to compile the technical documentation on behalf of the manufacturer is SKF (U.K.) Limited, 2 Canada Close, Banbury, Oxfordshire, OX16 2RT, GBR

Designation: Electrically driven pump to supply lubricant during intermittent operation within a centralized lubrication system
Type: P603M
Part number: 645-xxxxx-x / 6450-xxxxxxx

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

- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 No. 3032
- Electromagnetic Compatibility Regulations 2016 No. 1091

Standards

EN ISO 12100:2010	EN 60204-1:2018	EN 60034-1:2010/AC:2010	EN 61000-6-4:2007/A1:2011
EN 809:1998+A1:2009/AC:2010	EN 60947-5-1:2004/A1:2009	EN 61000-6-2:2005/AC:2005	
EN IEC 63000:2018	EN 61131-2:2007		

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

Walldorf, 16/04/2021

Jürgen Kreutzkämper
Manager R&D Germany



Stefan Schürmann
Manager PD Germany South



Description of the essential health and safety requirements according to 2006/42/EC, Annex I, which have been applied and complied with. Any basic health and safety requirements not listed here are not relevant to this product.

No.:	Basic safety and health requirements	Applicable:	Complied with:
1.1.1	Definitions	YES	YES
1.1.2	Principles of safety integration	YES	YES
1.1.3	Materials and products	YES	YES
As to 1.1.3 Not fully complied with: The operator has to evaluate the hazards caused by the lubricant on the basis of the safety data sheet (SDS) and take protective measures, if necessary.			
1.1.5	Design of machinery to facilitate its handling	YES	YES
1.1.6	Ergonomics	YES	YES
As to 1.1.6 Not fully complied with: The operator has to ensure that the pump is integrated into the superior machine in such a manner that operation and filling of the pump are ergonomically possible.			
1.2	Control systems	YES	YES
1.2.1	Safety and reliability of control systems	YES	YES
1.2.3	Starting	YES	YES
1.2.6	Failure of the power supply	YES	YES
1.3	Protection against mechanical hazards	YES	YES
1.3.1	Risk of loss of stability	YES	YES
1.3.2	Risk of break-up during operation	YES	YES
As to 1.3.2 Not fully complied with: The operator has to secure the lubrication system against excessive pressure. For this purpose a pressure relief valve with max. 350 bar opening pressure must be provided on each pump element.			
1.3.4	Risks due to surfaces, edges or angles	YES	YES
1.3.7	Risks related to moving parts	YES	YES
1.3.9	Risks of uncontrolled movements	YES	YES
1.5	Risks due to other hazards	YES	YES
1.5.1	Electricity supply	YES	YES
1.5.6	Fire	YES	YES
As to 1.5.6 Not fully complied with: For pumps without control unit, the operator has to take suitable measures to ensure that the relative duty cycle (see Technical Data) is complied with. Otherwise the motor may generate unacceptably high heat.			

No.:	Basic safety and health requirements	Applicable:	Complied with:
1.5.8	Noise	YES	YES
1.5.11	External radiation	YES	YES
1.5.13	Emission of hazardous materials and substances	YES	YES
1.5.15	Risk of slipping, tripping and falling	YES	YES
1.6	Maintenance	YES	YES
1.6.1	Machinery maintenance	YES	YES
1.6.2	Access to operating positions and servicing points	YES	YES
As to 1.6.2 Not fully complied with: The operator has to ensure that the pump is integrated into the superior machine in such a manner that operation of the pump is possible without risk.			
1.6.4	Operator interventions	YES	YES
1.7	Information	YES	YES
1.7.1	Information and warnings on the machinery	YES	YES
1.7.1.1	Information and information devices	YES	YES
1.7.2	Warning of residual risks	YES	YES
1.7.3	Marking of machinery	YES	YES
1.7.4	Instructions	YES	YES
1.7.4.1	General principles for the drafting of instructions	YES	YES
1.7.4.2	Contents of the instructions	YES	YES
1.7.4.3	Sales literature	YES	YES

Legal notice

Manufacturer

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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.

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CP 2001 Rosario, Santa Fe

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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.



This manual is an original manual from the manufacturer.

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
	DANGER	Death, serious injury	imminent	●	Chronological guidelines
	WARNING	Death, serious injury	possible	○	Lists
	CAUTION	Minor injury	possible	☞	Refers to other facts, causes, or consequences
	NOTICE	Property damage	possible		

Fig. 1 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 ² = 0.155 sq.in
AC	alternating current	kg	kilogram	Volume	1 ml = 0.0352 fl.oz.
DC	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 ²	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 ² = 3.28084 ft./s ²
		↓	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. Safety instructions

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) respectively GHS with acute oral, dermal, inhalative toxicity, and of substances or substance mixtures marked with GHS01-GHS06 and GHS08 hazard pictograms.
- to supply, transport or store fluids of group 1 classified as hazardous fluids as defined in the Pressure Equipment Directive (2014/68/EU) Article 13 (1) a).
- 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.
- without adequate protection against too high pressures in case of pressurized products.
- outside the technical data and limits specified in these instructions.

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
- Changes on the power supply board exceeding the replacement in case of defects

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

1.8 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 EN 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 dangerous electrical voltage (VAC versions only)



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



Warning of spring tension in case of pumps with follower plate



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.

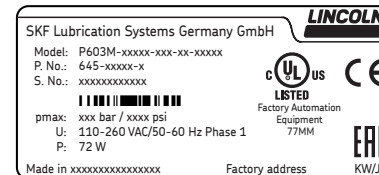
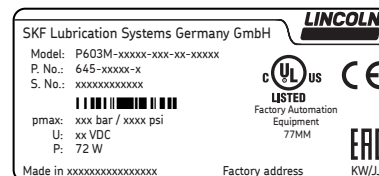
Model: _____

P. No. _____

S. No. _____

(CW/YY) _____

Calendar week/year of construction



1.13 Notes related to the UL approval mark



The UL approval mark confirms conformity of the product with applicable safety regulations of the USA and Canada.

1.14 Notes related to the EAC marking



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

1.15 Notes related to the UKCA marking



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

1.16 Notes related to the China RoHS marking



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

1.17 Persons authorized to operate the pump

1.17.1 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.

1.17.2 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.

1.17.3 Specialist in electrics

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

1.18 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.

1.19 Provision of personal protective equipment

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

1.20 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

1.21 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

1.22 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 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
- Ensure proper connection of the protective conductor in case of protection class I
- Observe the stated type of protection
- 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 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

1.23 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

1.24 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

1.25 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 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.
Personal injury/ material damage due to electric shock in case 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 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.
Reservoir with follower plate is subjected to spring load							G				Remove reservoir with follower plate only when the spring is quite released (i.e. the reservoir is empty). Provide adequate protective measure, e.g. fastening straps, when loosening the reservoir. Do not work with your head directly above the reservoir.
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

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 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 viscosity required 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. Specified viscosities, 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.

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



Only lubricants specified for the product (see chapter Technical data) 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.



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.

3. Overview, functional description

3.1 Pumps with plastic reservoir

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 of pumps without follower plates 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. It vents the reservoir while the pump is filled.

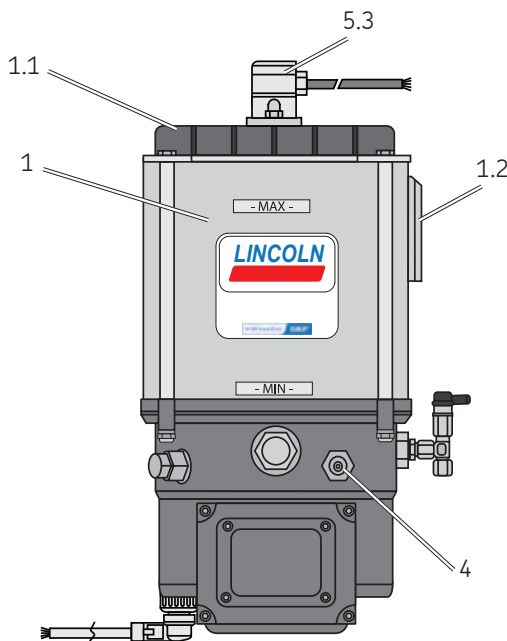
4 Filler fitting

Serves to fill the pump. If the filler fitting is removed, this port can be used to connect the external grease return from the pressure control valves to the pump elements with corresponding accessories.

5.3 Electrical connection of the low-level indication

in case of pumps with follower plate

Fig. 2 Overview, functional description of pumps with plastic reservoir and follower plate

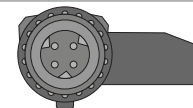


Types of connections

Square plug
DIN EN 175301-803-A



Bayonet plug
DIN 72585 / ISO 15170



2 Pump housing

The pump housing accommodates the motor, the electrical connections, the filler fitting and the pump elements.

3 Pump elements

The pump can be equipped with up to 3 pump elements.

3.3 Cap screw

The cap screw serves to close outlets that are not used.

15 Blind plug

The blind plug serves for the manufacturer's purposes exclusively and must not be unscrewed by the operator.

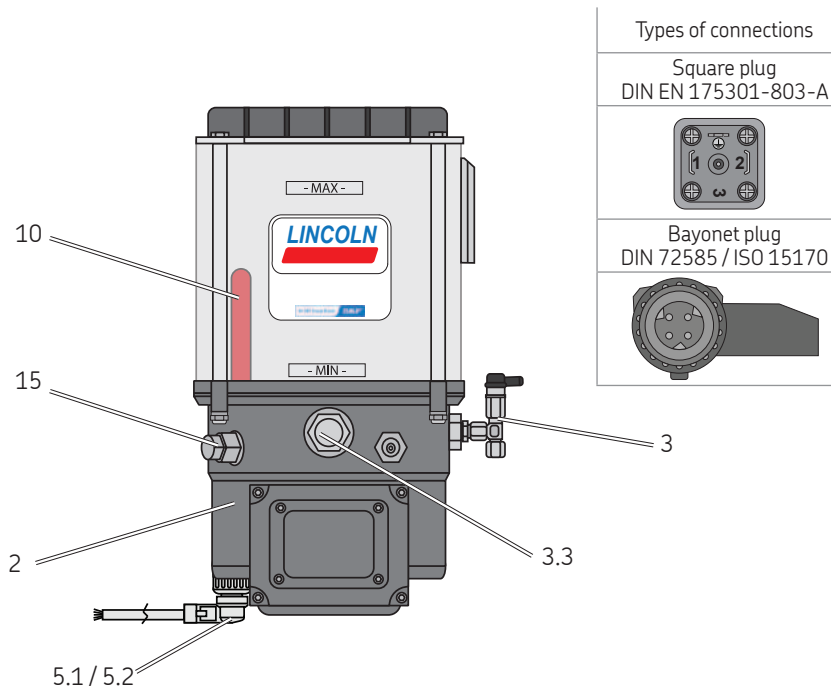
5 Electrical connections

They are used for (5.1) power supply (input) and for (5.2) signal connection (concealed) of the pump.

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.

Fig. 3 Overview, functional description of pumps with plastic reservoir without follower plate



3.2 Pumps with sheet steel reservoir

1 Reservoir

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

1.2 Reservoir venting device

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

1.3 Inspection glass

Serves to verify the filling level in the reservoir.

2 Pump housing

The pump housing accommodates the motor, the electrical connections, the filler fitting and the pump elements.

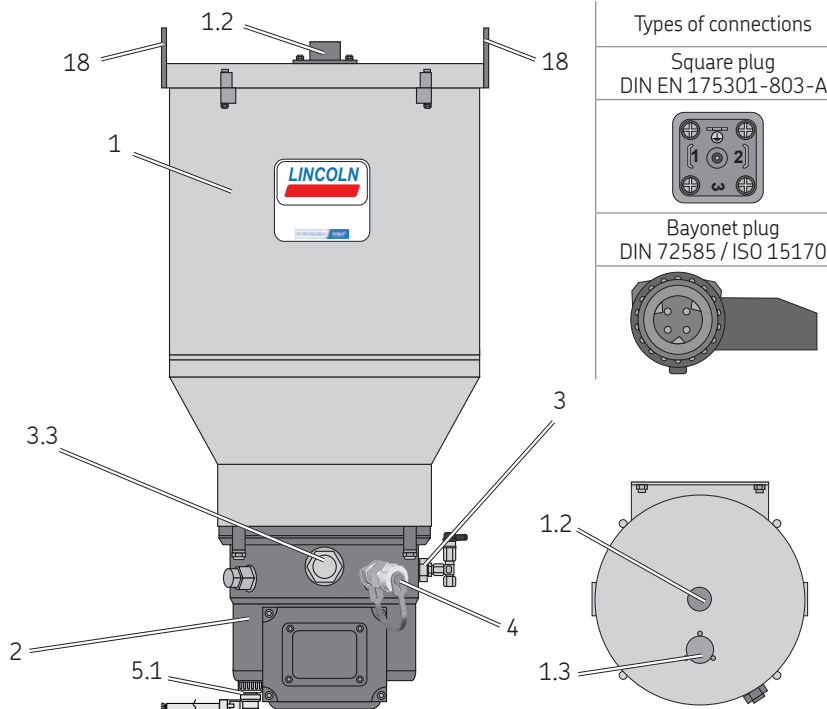
3 Pump elements

The pump can be equipped with up to 3 pump elements. The cap screw (3.3) serves to close outlets that are not used.

18 Lifting lugs

The lifting lugs serve to lift the pump.

Fig. 4 Overview, functional description of pumps with 30/40 L sheet steel reservoir



15 Blind plug

The blind plug serves for the manufacturer's purposes exclusively and must not be unscrewed by the operator.

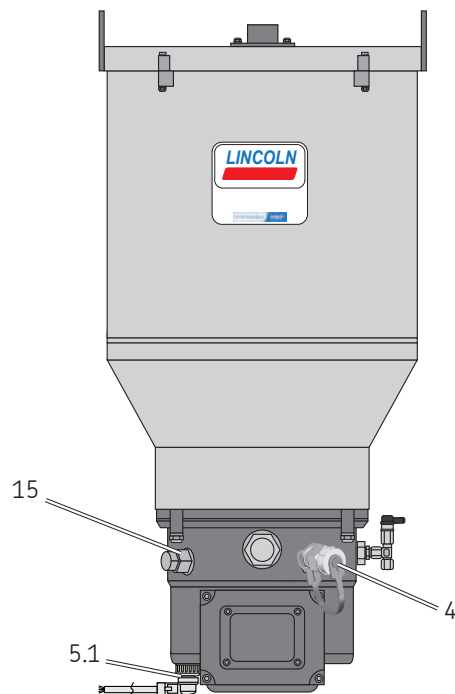
4 Filling connection

Serves to fill the pump.

5 Electrical connection

Is used to connect the (5.1) power supply.

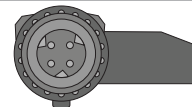
Fig. 5 Overview, functional description of pumps with 30/40 L sheet steel reservoir

**Types of connections**

Square plug
DIN EN 175301-803-A



Bayonet plug
DIN 72585 / ISO 15170



1 Reservoir

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

1.2 Reservoir venting device

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

2 Pump housing

The pump housing accommodates the motor, the electrical connections, the filler fitting and the pump elements.

3 Pump elements

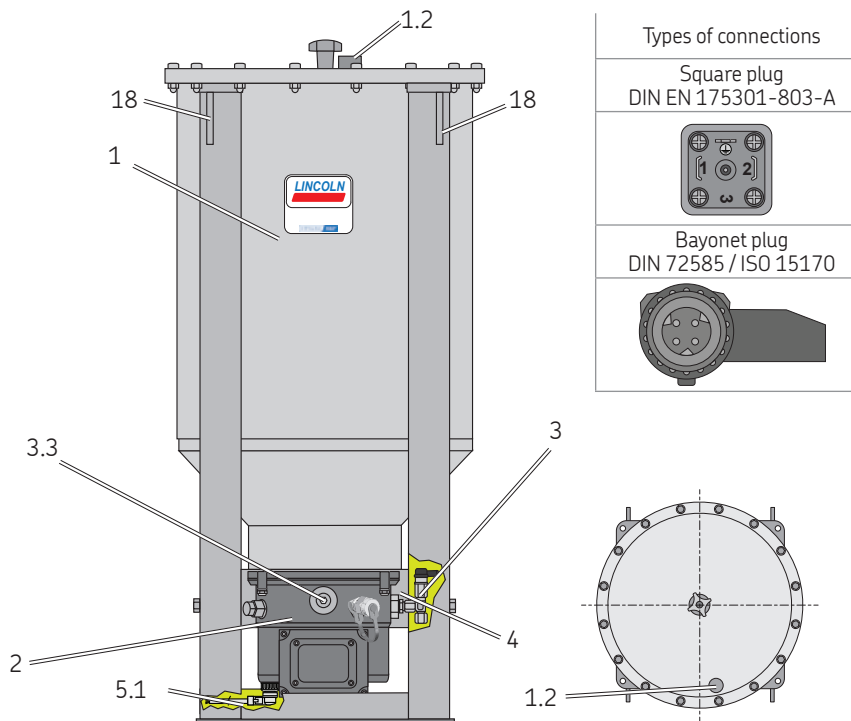
The pump can be equipped with up to 3 pump elements. The different cap screws (3.3) serve to:

- close unneeded ports.
- in case of Z7 / ZT7 pump elements to cross-port the outputs to one outlet.

18 Lifting lugs

The lifting lugs serve to lift the pump.

Fig. 6 Overview, functional description of pumps with 100 L sheet steel reservoir



15 Blind plug

The blind plug serves for the manufacturer's purposes exclusively and must not be unscrewed by the operator.

4 Filling connection

Serves to fill the pump.

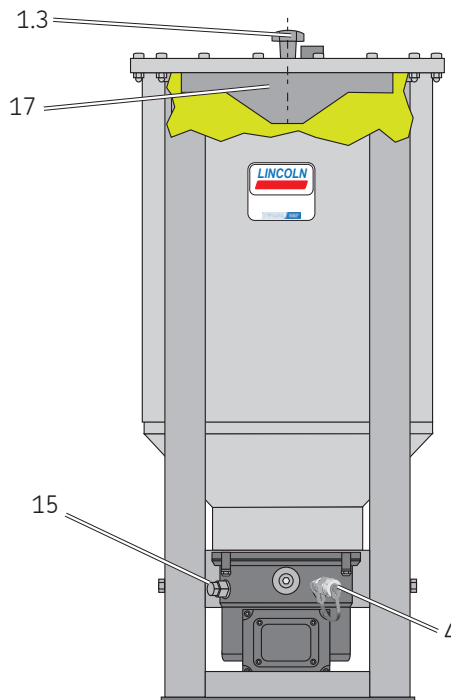
5 Electrical connection

Is used to connect the (5.1) power supply.

1.3 Rotary knob for wiper bar

Using the rotary knob (1.3), the wiper bar (17) on the inside of the transparent plastic lid (PMMA) can be turned to remove any grease deposits.

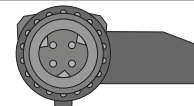
Fig. 7 Overview, functional description of pumps with 100 L sheet steel reservoir

**Types of connections**

Square plug
DIN EN 175301-803-A



Bayonet plug
DIN 72585 / ISO 15170



4. Technical data

4.1 General technical data

Operating pressure	max. 350 bar [5076 psi]	Weight of the empty pump	
Number of pump elements	max. 3	4 litres approx. 9 kg	[1.05 gal. approx. 19.8 lbs.]
Direction of rotation	clockwise	8 litres approx. 10 kg	[2.11 gal. approx. 22.0 lbs.]
sound pressure level	< 70 dB (A)	10 litres, approx. 11 kg	[2.64 gal. approx. 24.3 lbs.]
Nominal speed	17 rpm	15 litres, approx. 13 kg	[3.96 gal. approx. 28.7 lbs.]
Relative duty cycle	30 % ED S3 30 minutes	20 litres, approx. 15 kg	[5.28 gal. approx. 33.1 lbs.]
Ambient temperature ¹⁾	-40 °C to +70 °C [-40 °F to +158 °F]	30 litres, approx. 20 kg	[7.95 gal. approx. 44.1 lbs.]
Installation position ²⁾	vertical, i.e. reservoir at top.	40 litres, approx. 22 kg	[10.60 gal. approx. 48.5 lbs.]
Protection type and class	see next page	100 litres, approx. 56 kg	[26.42 gal. approx. 123.48 lbs.]
Approved lubricant consistencies Reservoir for lubricating grease		Lubrication greases up to and including NLGI 2 Railhead conditioner [#]	
Filling*	- Filler fitting - Reservoir lid (reservoirs without follower plate only) - Filling connection (standard for 30/40-litre and 100-litre sheet steel reservoirs)		Sheet steel reservoirs cannot be filled via the reservoir lid.

* The existing filling options depend on the actual pump configuration.

[#] Suitable track conditioners have to be agreed upon SKF prior to using them.

¹⁾ The minimum admissible ambient temperature assumes that the lubricant used can be pumped. The maximum admissible ambient temperature depends on the load and is mainly determined by the runtime and the operating pressure. In case of temperatures $\geq 60^\circ\text{C}$ [140° F] and heavy load (high pressure) the maximum duty cycle should be reduced. Depending on the pump configuration there must be considered possible limitations regarding the ambient temperature due to electrical components (e.g. ultrasonic sensors).

²⁾ Pumps with follower plate allow for a rotating installation as well, e. g. in wind turbine generators. Maximum speed and maximum distance to the rotation axis on request. The following applies for pumps without follower plate: The maximum filling must be reduced according to the expected inclination (e.g. in case of construction or agricultural machinery). The minimum filling must be increased as of an expected inclination of $> 30^\circ$, as otherwise a reduced lubricant volume in the suction area of the pump could result in a functional impairment.

4.2 Electrical data

	V DC pump	V AC pump
Rated voltage	24 V DC $\pm$ 10 %	110 - 240 V AC ($\pm$ 10 %)
Frequency		50-60 Hz ($\pm$ 5 %) 1-phase
Recommended back-up fuse	3.0 A (slow-blow)	6.0 A (slow-blow) 110 - 260 V
Switch-on current limitation		type 80 A peak (cold start @25 °C / 77 °F)
Operating voltage of motor	24 V DC	24 V DC
Output (signal)	non-isolated	non-isolated
Max. switching capacity	72 W	72 W
Max. switching voltage	30 V DC	30 V DC
Max. switching current	700 mA	700 mA
Current consumption	3 A	typically 1.6 A at 110 V AC up to 0.82 A at 260 V AC

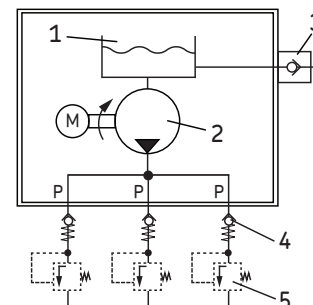
4.2.1 Protection types and classes

Degree of protection	IP6K9K
Types of protection	
- Square plug	SELV / PELV
- Bayonet plug	SELV / PELV



The specified degree of protection of the pump assumes that IP6K9K-capable connection sockets and corresponding cables are used. When using connection sockets and cables with a lower degree of protection, classification is made according to the lowest degree of protection. For the achievable degrees of protection when using the connection sockets and cables supplied by us, see chapter Spare parts.

4.3 Hydraulic connection diagram



- 1 = Reservoir
- 2 = Pump
- 3 = Filler fitting
- 4 = Check valve
- 5 = Pressure control valve
- P = Pressure line

4.4 Nominal output volumes



The stated nominal outputs per stroke and pump element refer to NLGI 2 lubrication greases at an ambient temperature of + 20 °C [68 °F] and a back pressure of 100 bar [1450 psi] on the pump element. Deviating operating conditions or deviating pump configuration result in a changed motor speed and thus in a change of the output per time unit. If as a consequence of the changed motor speed the output per time unit needs to be adapted, this will be done by adapting the lubrication and pause time settings of the pump.

Pump element	Z7	ZT7 ³⁾	K5	K6	K7	Unit
Nominal output per stroke	0.25	0.25	0.125	0.18	0.25	cc
	[0.015	[0.015	[0.0075	[0.011	[0.015	[cu. in.]

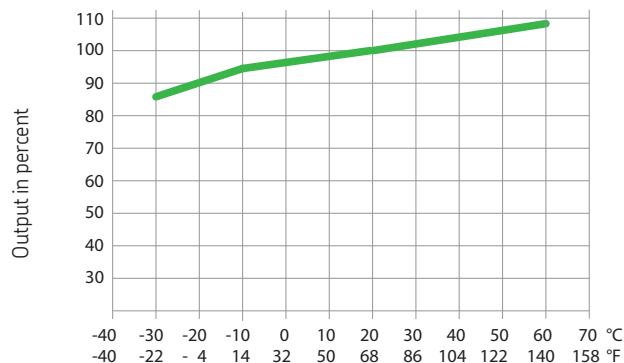
³⁾ Suitable for use with track conditioner only

4.4.1 Influencing variables on the output volume

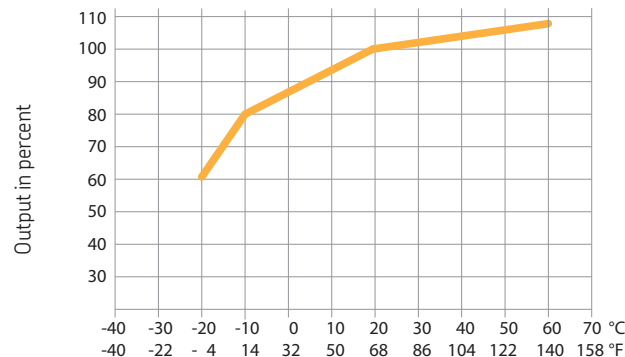
Influencing variables	Increasing the output	Reducing the output
Ambient temperature	> + 20 °C [68 °F]	< + 20 °C [68 °F]
Consistency class of the lubrication grease	< NLGI 2	N/A
Number of pump elements	N/A	> 1
Back pressure at the pump element	< 100 bar [1450 psi]	> 100 bar [1450 psi]

4.4.2 Output diagrams of typical NLGI 2 lubricants

Low temperature lubrication grease



High temperature lubrication grease



The output diagrams represent the average value of the different high- respectively low-temperature lubrication greases.

Calculation of the output using the example of a high-temperature lubrication grease

Nominal speed of the pump motor per minute x nominal output of pump element K7 per stroke x efficiency in percent at an assumed ambient temperature of -10 °C [14 °F] = 17 rpm x 0.25 cc (0.0152) x 80 % = 3.4 cc/min [0.207 cu.in./min.].

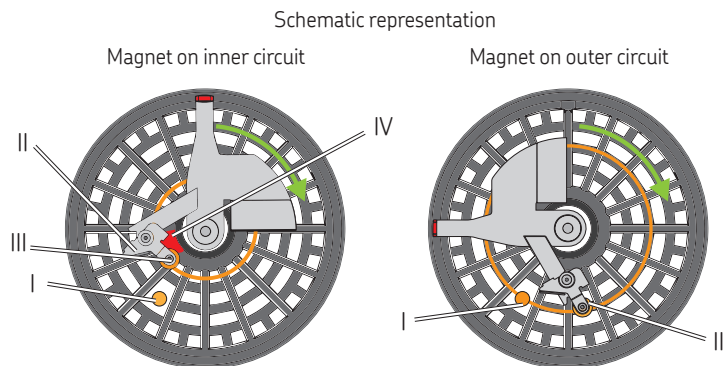
4.5 Functioning principle of the intermittent low-level indication

The intermittent low-level indication operates free of contact. Its main components are the following:

- o firmly positioned magnetic switch (I) inside of the reservoir bottom
- o flexible guide plate (II) connected to the stirring paddle with a magnet (III) and a control cam (IV)

If the reservoir is filled with a lubrication grease suitable for the intermittent low-level indication and the pump is operating, then the guide plate (II) is deflected by the resistance of the lubrication grease. As a consequence the magnet (III) connected to the guide plate (II) is moved on its inner circuit and cannot trigger a pulse at the magnetic switch (I) with its magnetic field. A control cam (IV) positively guides the magnet together with the pivoted guide plate towards the outside during each revolution. As soon as the guide plate leaves the control cam, the lubricant's resistance pushes the guide plate together with the magnet to the inside again.

As soon as the lubricant inside the reservoir has fallen to that level that the lubricant's resistance is no more sufficient to further deflect the guide plate (II), the magnet (III) remains on the outer circuit and triggers a pulse each time it slides across the magnetic switch (I). If during an operating cycle the magnet (III) slides across the magnetic switch (I) six times, a low-level signal is sent by the control printed circuit board of the pump. For programming of the external control of the pump, see corresponding chapter in these instructions.

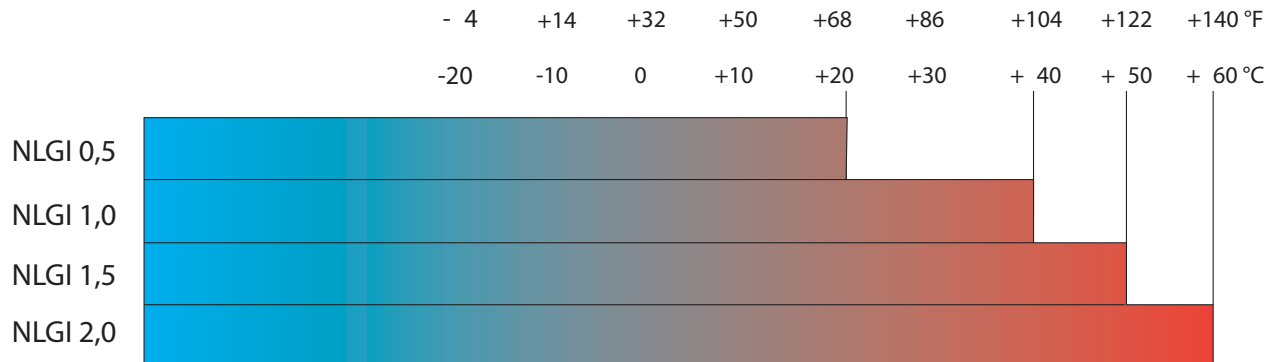


4.6 Limits of use of the intermittent low-level indication

The following lubricant consistencies have to be complied with in order to ensure the correct functioning of the intermittent low-level indication. Above the stated range of temperature a correct functioning of the intermittent low-level indication cannot be ensured. The inferior temperature ranges require the suitability of the lubricant for the respective temperature range. Otherwise the too high consistency of the lubricant may result in malfunctions, e.g. interruption of the lubricant supply, or in damages to the pump (e. g. bending of the stirring paddle).



The intermittent low-level indication is not appropriate for lubrication grease of NLGI class ≤ 0 .



4.7 Processing of the low-level signals in case of external controller and monitoring of the pump

To avoid early low-level indication (e.g. caused by air inclusions or wave formation in the lubricant) in case of external controller or monitoring the following conditions have to be fulfilled by programming the external controller accordingly.

- After each operating cycle the pulses of the intermittent low-level indications have to be deleted.



Pulses must never be added up over several operating cycles. This will result in an early low-level indication.

Operating cycle ≥ 32 seconds:

- Each operating cycle requires at least 6 signals by the magnetic switch .

Operating cycle ≥ 24 seconds ≤ 32 seconds:

- Each operating cycle requires at least 4 signals by the magnetic switch .

Operating cycle ≤ 24 seconds:

- The number of required magnetic switch signals has to be adapted to the operating conditions to be expected.
To do so, contact our Customer Service.

4.7.1 Visualization of a low-level indication

The low-level signal is visualized via an external control light as shown in the connection diagram.

4.7.2 Remaining run time of pump in case of a low-level indication

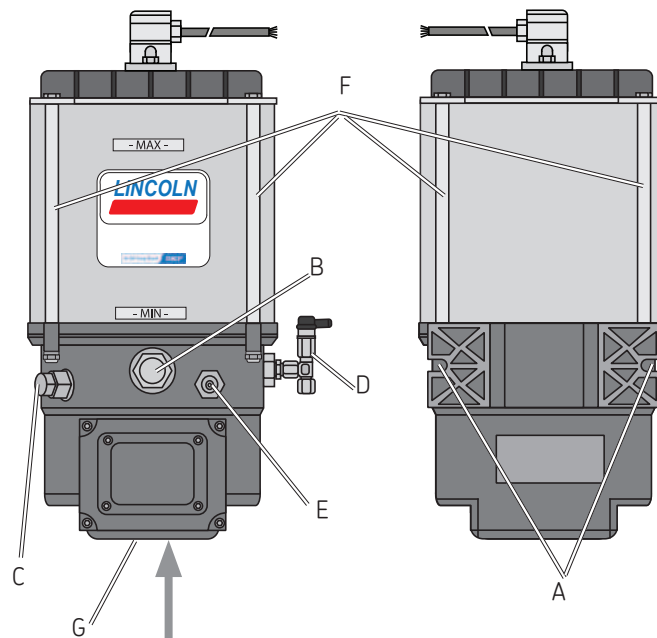
Pump with external controller

The owner has to ensure that the pump is stopped by the external control unit latest 4 minutes after the low-level signal.

4.8 Tightening torques

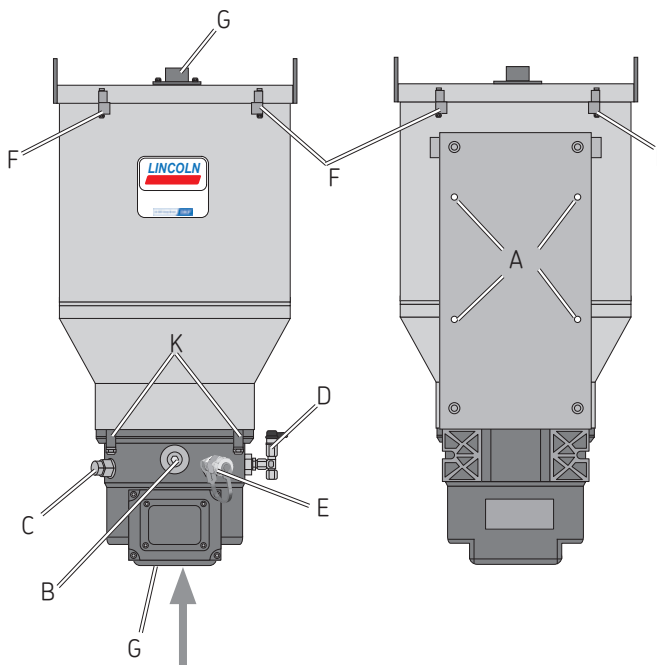
4.8.1 Pumps with plastic reservoir

	Nm	[ft.lb.]
A Install the pump	18 ± 1.0	13.3 ± 0.74
B Pump element in pump housing	40 ± 2.0	29.5 ± 1.5
C Cap screw in valve body	35 ± 2.0	25.8 ± 1.5
D Pressure control valve in pump element	6 / 0.5	4.4 ± 0.37
E Cap screw / adapter with hydraulic lubrication fitting in pump housing	10 ± 1.0	7.4 ± 0.74
F Tie rods of the reservoir	10 ± 1.0	7.4 ± 0.74
G Housing cover (bottom side)	0.75 ± 0.1	0.55 ± 0.07
Options (without figure)		
Filling connection	20 ± 2.0	14.8 ± 1.5
Return line connection	12 ± 1.2	8.9 ± 0.89



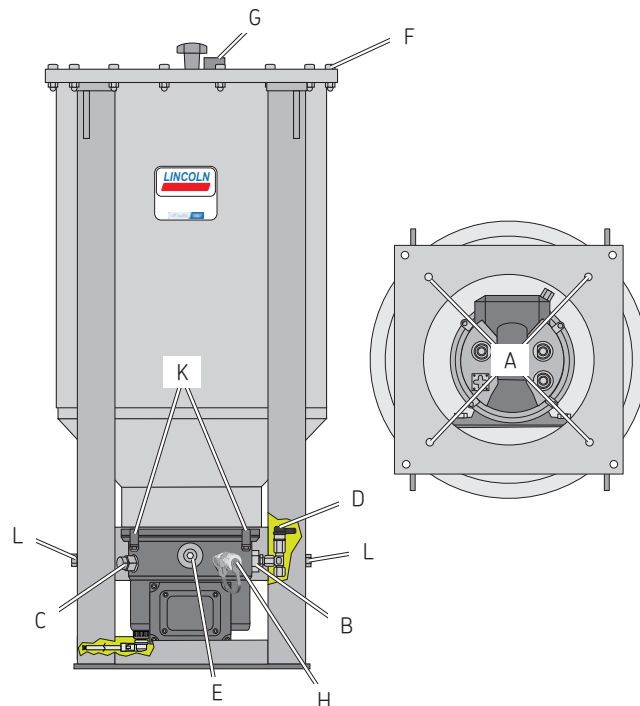
4.8.2 Pumps with 30/40-litre sheet steel reservoir

	Nm	ft.lb.
A Install the pump	20 ± 2.0	14.8 ± 1.5
B Pump element in pump housing	40 ± 2.0	29.5 ± 1.5
C Cap screw in valve body	35 ± 2.0	25.8 ± 1.5
D Pressure control valve in pump element	$6 / 0.5$	4.4 ± 0.37
E Cap screw / adapter with hydraulic lubrication fitting / filling connection in pump housing	10 ± 1.0	7.4 ± 0.74
F 4 x screws on the reservoir lid	5 ± 0.5	3.7 ± 0.37
G Reservoir venting device	0.75 ± 0.1	0.55 ± 0.07
H Filling connection	20 ± 2.0	14.8 ± 1.5
K 4 x screws on reservoir bottom	10 ± 1.0	7.4 ± 0.74
Options (without figure):		
F Return line connection	12 ± 1.2	8.9 ± 0.89



4.8.3 Pumps with 100 L sheet steel reservoir

	Nm	ft.lb.
A Install the pump	40 ± 5.0	29.50 ± 3.7
B Pump element in pump housing	40 ± 2.0	29.50 ± 1.5
C Cap screw in valve body	35 ± 2.0	25.8 ± 1.5
D Pressure control valve in pump element	$6 / 0.5$	4.4 ± 0.37
E Cap screw / adapter with hydraulic lubrication fitting / filling connection in pump housing	10 ± 1.0	7.4 ± 0.74
F 16 x screws on the reservoir lid	2 ± 0.5	1.5 ± 0.37
G Reservoir venting device	1 ± 0.1	0.74 ± 0.07
H Piston detector to adapter	20 ± 2.0	14.8 ± 1.5
K 4 x screws on reservoir bottom	10 ± 1.0	7.4 ± 0.74
L Retaining plate at the pump housing	40 ± 5.0	29.50 ± 3.7
Options (without figure):		
F Return line connection	2 ± 0.5	1.5 ± 0.37



[illegible]

F Reservoir versions ⁹⁾			
N	=	Lubrication grease without low-level indication	
LBO	=	Lubrication grease with intermittent low-level indication	
LF	=	Lubrication grease with follower plate and 1 switch point ^{B)}	
LF1	=	Lubrication grease with follower plate and 1 switch point ^{A)}	
G Pump elements			
1-3	=	Number of pump elements	
K5	=	Piston Ø 5	[0.20 in]
K6	=	Piston Ø 6	[0.24 in]
K7	=	Piston Ø 7	[0.28 in]
Z7	=	Piston Ø 7	[0.28 in] Internally cross-ported output volume
ZT7 ^{E)}	=	Piston Ø 7	[0.28 in] Internally cross-ported output volume
^{E)} gas-nitro carburized; connection thread M22x1.5; outlet G1/4 for track conditioner only			
Output volume of pump elements, see chapter Nominal output volume			

9) From these categories only one feature can be selected at a time.

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

11) applies only to sheet steel reservoirs

Connection options of the low-level indication for pumps with follower plate: A) Square plug

[illegible]

H Connection voltage	
24	= 24 V DC
AC	= 110-240 V AC $\pm 10\%$ 50-60 Hz $\pm 5\%$
K Connection option (observe connection diagrams in this manual)	
DC	
1A 1.01	= Square plug to pump. Delivery with connection socket, w/o cable
1A 5.14	= Bayonet plug 7/4 poles to pump. Delivery with bayonet socket with 10 m [33 ft.] cable (4-core)
2A 1.01	= Square plug to pump: 1 x power supply; 1 x Bayonet socket to pump for low level signal Delivery with connection sockets w/o cable
2B 1.01	= Square plug to pump: 1 x power supply; 1 x Square plug to pump for low level signal Delivery with connection sockets w/o cable
AC	
1A 1.00	= Square plug to pump. Delivery w/o connection socket, w/o cable
1A 1.01	= Square plug to pump. Delivery with connection socket, w/o cable
2A 1.00	= Square plug and bayonet socket to pump. Delivery w/o connection socket for square plug, w/o cable Delivery with bayonet socket and corresponding 10 m [33 ft.] cable
2A 1.01	= Square plug and bayonet socket to pump. Delivery with connection socket for square plug, w/o cable Delivery with bayonet socket and corresponding 10 m [33 ft.] cable
2 B 1.01	= Square plug to pump: 1 x power supply; 1 x Square plug to pump for low level signal Delivery with connection sockets w/o cable

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 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.

5.5 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,

5.5.1 Storage period of up to 6 months

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

5.5.2 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 cycle, 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 device

- 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

5.5.3 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.

5.6 Corrosion protection

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

5.7 Declaration of decontamination

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

6. 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

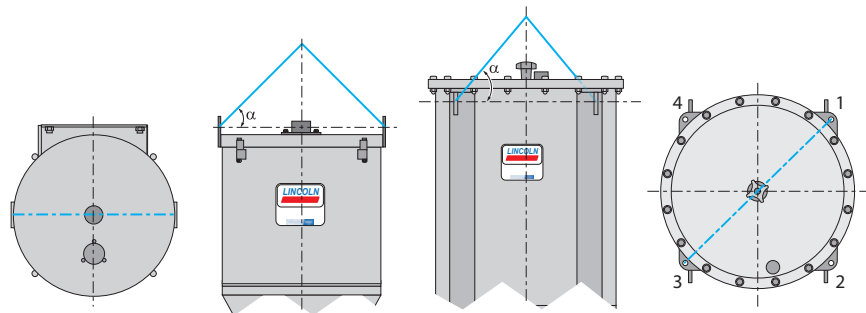
6.2 Transport of the pumps

In filled condition, the pumps stated in these instructions may be transported vertically only, as otherwise lubricant might leak from the reservoir. 30/40-liter reservoirs are to be lifted at both lifting lugs. 100-liter reservoirs are to be lifted at least at 2 of the 4 lifting lugs. When lifting at only 2 lifting lugs, these must be diagonally opposite. Angle α must be between 45° and 90° .

6.3 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.

Fig. 8 Lifting lugs for the lifting/transporting of 30-l and 100-l pumps



6.4 Mechanical connection

6.4.1 Installation bores

NOTICE

Risk of damage to the superior machine and to the pump

Drill the mounting bores on non-load-bearing parts of the superior machine only. Fastening must not be done on two parts moving against one another (e. g. machine bed and machine assembly).

Fastening is done as shown on the following pages by means of:

Pumps with 4- or 8-litre plastic reservoir

2 hexagon screws M8 (8.8)

2 hexagon nuts M8 (8.8)

4 washers 8

Tightening torque = 18 Nm ± 1.0 Nm
[13.27 ft.lb. ± 0.74 ft.lb.]

Pumps with 10-, 15- or 20-litre plastic reservoir

4 hexagon screws M8 (8.8)

4 hexagon nuts M8 (8.8)

8 washers 8

Tightening torque = 18 Nm ± 1.0 Nm
[13.27 ft.lb. ± 0.74 ft.lb.]

Pumps with 30/40-litre sheet steel reservoir

4 hexagon screws M8 (8.8)

4 hexagon nuts M8 (8.8)

8 washers 8

Tightening torque = 20 Nm ± 2.0 Nm
[14.8 ft.lb. ± 1.5 ft.lb.]

Pumps with 100-litre sheet steel reservoir

4 screws M8 (8.8)

4 hexagon nuts M8 (8.8)

8 washers 10

Tightening torque = 40 Nm ± 5.0 Nm
[29.50 ft.lb. ± 3.7 ft.lb.]

6.5 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 [3.94 in.] into each direction in addition to the stated dimensions.

Fig. 9 Minimum installation dimensions 4 L [1.06 gal.] and 8 L [2.11 gal.] Litres plastic reservoir

	Pumps with follower plate				Pumps with stirring paddle			
	4 Litres [1.06 gal.]		8 Litres [2.11 gal.]		4 Litres [1.06 gal.]		8 Litres [2.11 gal.]	
	VDC	VAC	VDC	VAC	VDC	VAC	VDC	VAC
H					415 [16.34]	435 [17.13]	515 [20.28]	535 [21.06]
H1	471 [18.54]	491 [19.33]	571 [22.48]	591 [23.27]				
H2	154.5 [6.08]	174.5 [6.87]	154.5 [6.08]	174.5 [6.87]	154.5 [6.08]	174.5 [6.87]	154.5 [6.08]	174.5 [6.87]
B	240 [9.45]	240 [9.45]	240 [9.45]	240 [9.45]	240 [9.45]	240 [9.45]	240 [9.45]	240 [9.45]
T	235 [9.25]	235 [9.25]	235 [9.25]	235 [9.25]	235 [9.25]	235 [9.25]	235 [9.25]	235 [9.25]

[= indication in inches]

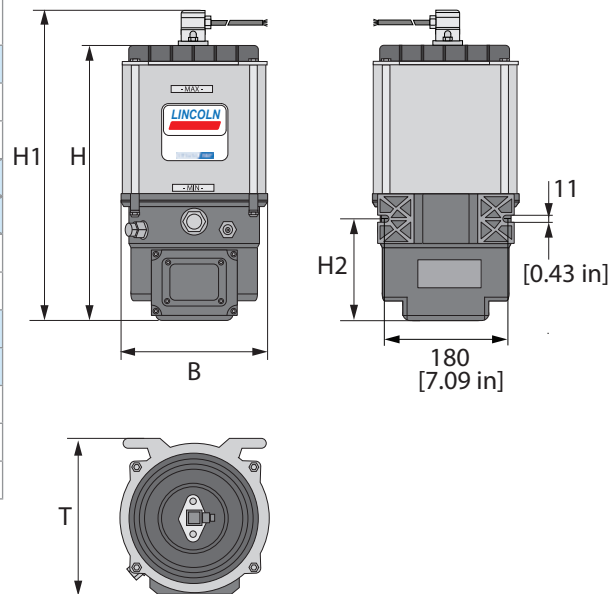


Fig. 10 Minimum installation dimensions 10, 15 and 20 Litres plastic reservoirs

	Pumps with follower plate						Pumps with stirring paddle					
	10 Litres [2.64 gal.]		15 Litres [3.96 gal.]		20 Litres [5.28 gal.]		10 Litres [2.64 gal.]		15 Litres [3.96 gal.]		20 Litres [5.28 gal.]	
	VDC	VAC	VDC	VAC	VDC	VAC	VDC	VAC	VDC	VAC	VDC	VAC
H							577	597	758	778	893	913
							[22.72]	[23.50]	[29.84]	[30.63]	[35.16]	[35.94]
H1	633	653	814	834	949	969						
	[24.92]	[25.71]	[32.05]	[32.83]	[37.36]	[38.15]						
H2	154.5	174.5	154.5	174.5	154.5	174.5	154.5	174.5	154.5	174.5	154.5	174.5
	[6.08]	[6.87]	[6.08]	[6.87]	[6.08]	[6.87]	[6.08]	[6.87]	[6.08]	[6.87]	[6.08]	[6.87]
H3	367.5		550.5		685.5		367.5		550.5		685.5	
	[14.47]		[21.67]		[26.99]		[14.47]		[21.67]		[26.99]	
B	240	240	240	240	240	240	240	240	240	240	240	240
	[9.45]	[9.45]	[9.45]	[9.45]	[9.45]	[9.45]	[9.45]	[9.45]	[9.45]	[9.45]	[9.45]	[9.45]
T	235	235	235	235	235	235	235	235	235	235	235	235
	[9.25]	[9.25]	[9.25]	[9.25]	[9.25]	[9.25]	[9.25]	[9.25]	[9.25]	[9.25]	[9.25]	[9.25]

[= indication in inches]

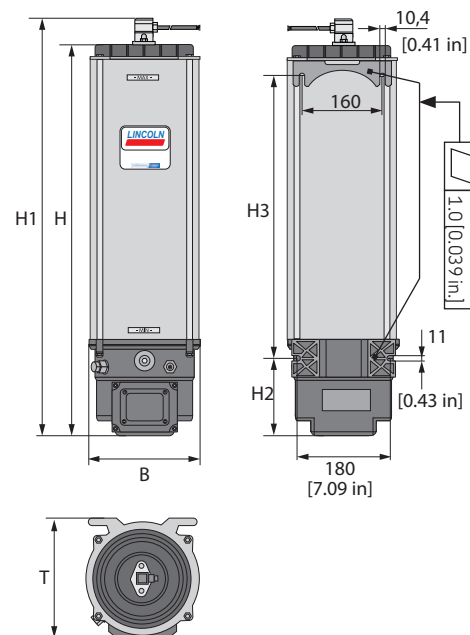


Fig. 11 Minimum installation dimensions 30 Litres sheet steel reservoir

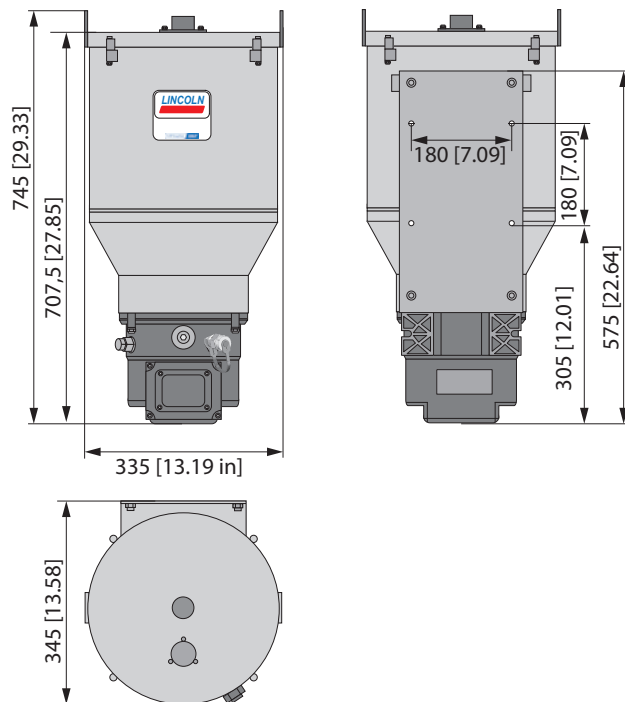


Fig. 12 Minimum installation dimensions 40 Litres sheet steel reservoir

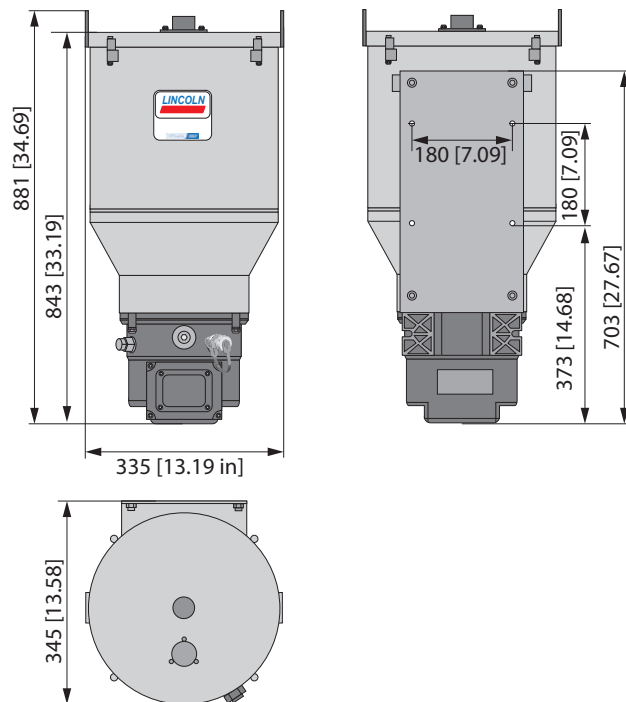
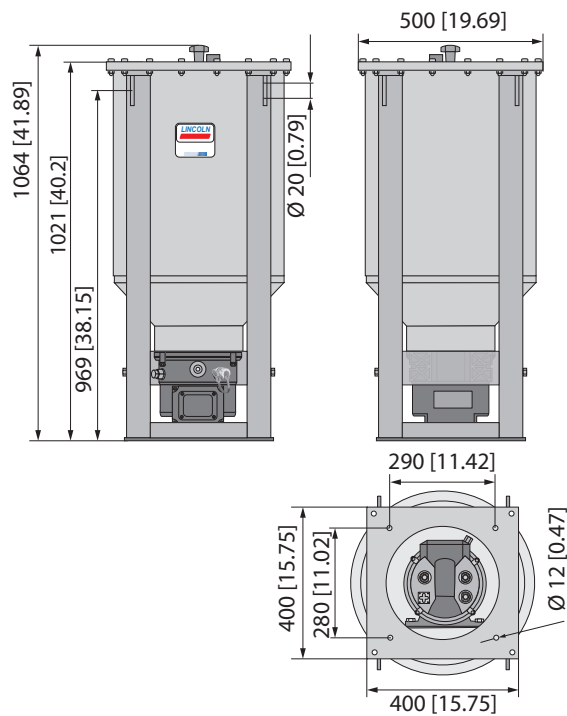


Fig. 13 Minimum installation dimensions 100 Litres sheet steel reservoir



6.6 Electrical connection



WARNING



Electric shock

Make sure to disconnect the product from the power supply before carrying out any works on electrical components.

Carry out the electrical connection according to the connection type of the pump,

- Tailor the plug for the power supply (5.1) and the control line (5.2) according to the respective connection diagram in these instructions
- Insert plug into corresponding socket and mount correctly. Only be doing so the degree of protection can be complied with



Connect the plugs in such way that no mechanical forces are transferred to the product.

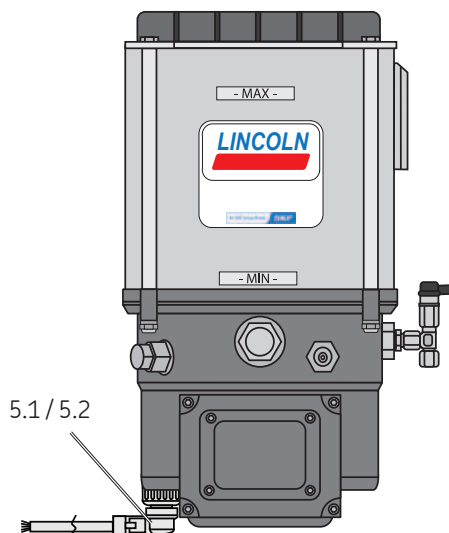


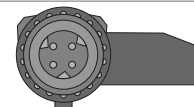
Fig. 14 Electrical connection

Types of connections

Square plug
DIN EN 175301-803-A



Bayonet plug
DIN 72585 / ISO 15170

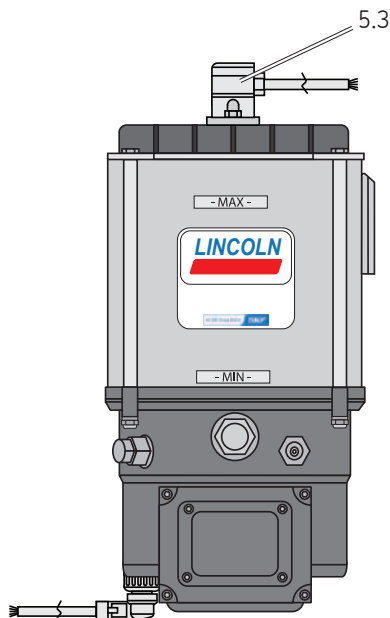


The electrical connection of the low-level indication (5.3) of pumps with follower plate is made according to the pump's connection type. See chapter Connection of the signal line to the reservoir lid.



In case of connection type 1A5. xx the low-level signal is routed from connection 5.3 downward into the pump housing and internally switched to the cable of connection 5.1.

Fig. 15 Electrical connection of the low-level indication for pumps with follower plate



6.7 Installing the pump elements

To carry out the assembly proceed as follows:



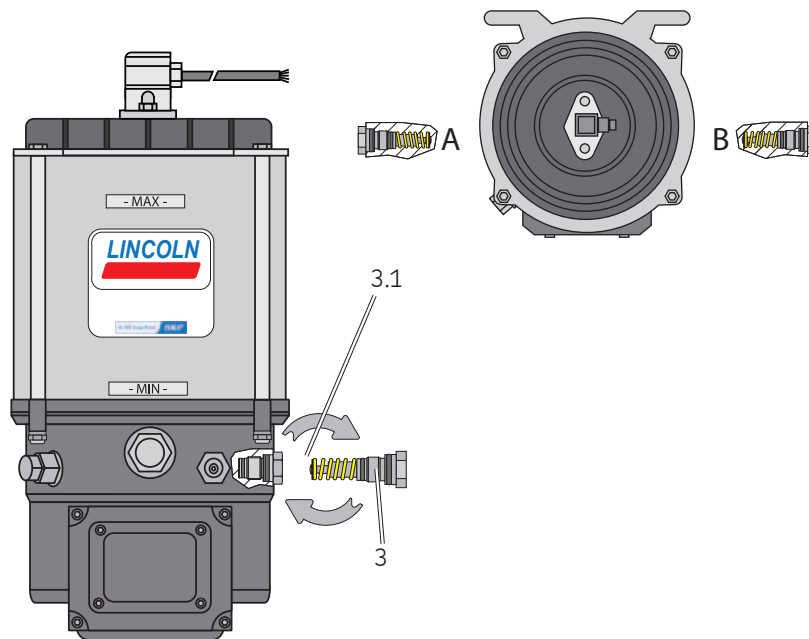
If the pump is operated with 2 pump elements only, these have to be installed at positions A and B. When using one pump element only, any installation position is possible.

- Unscrew blind plug (3.1) from pump housing (3)
- Screw pump element (3) into pump housing

Tightening torque = $40 \text{ Nm} \pm 0.5 \text{ Nm}$
 $[29.50 \text{ ft.lb.} \pm 0.37 \text{ ft.lb.}]$

- Repeat procedure for each pump element

Fig. 16 Installing the pump element



6.8 Mount pressure control valve

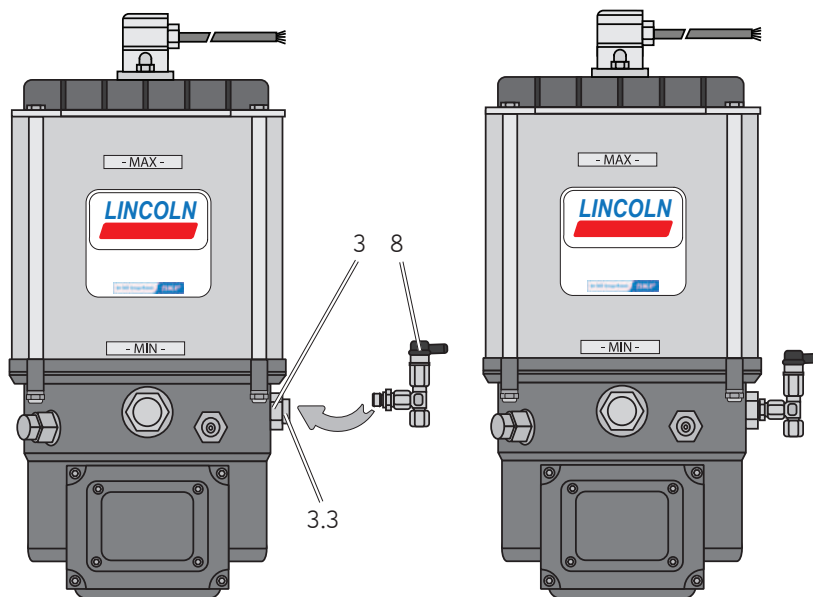
Protect each pump element by means of a pressure control valve suitable for the planned maximum admissible operating pressure of the centralized lubrication system.

To carry out the assembly proceed as follows:

- Remove the cap screw (3.3) from the pump element (3)
- Screw pressure control valve (8) into pump element (3)
- Repeat procedure for each pump element

Tightening torque = 6 Nm -0.5 Nm
[4.43 ft.lb. - 0.07 ft.lb.]

Fig. 17 Mount pressure control valve



6.9 Lubrication line connection

	 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 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

6.10 Filling with lubricant



Only adequate lubricant without contaminations may be filled into the pump. Avoid air bubbles when filling the pump.

6.10.1 Filling via the reservoir lid



WARNING

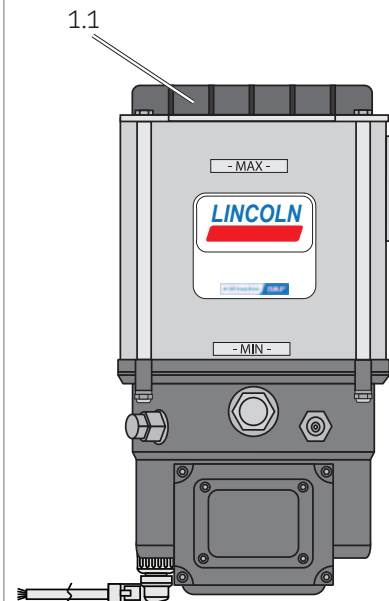


Crushing hazard on the rotating stirring paddle. Filling via the reservoir lid is allowed only after disconnecting the pump from the power supply by removing it from the connection (5.1).

- Unscrew the reservoir lid (1.1) anti-clockwise from the reservoir. Deposit the reservoir lid at a clean place. The inside of the reservoir lid must not be contaminated. Remove possible contaminations

- Fill the reservoir from the top up to the MAX marking. Make sure to fill in the lubricant without air inclusions, if possible
- Reinstall the reservoir lid (1.1) clockwise

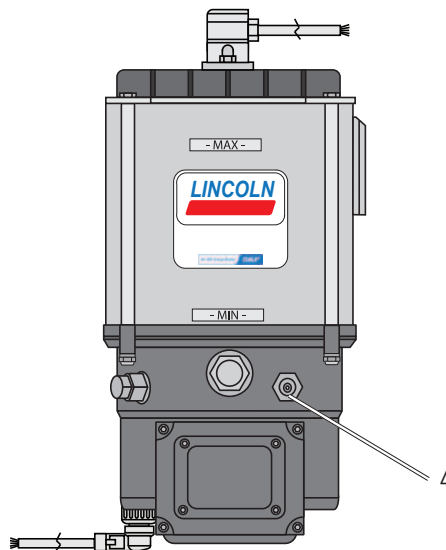
Fig. 18 Filling via the reservoir lid



6.10.2 Filling via filler fitting

- Switch the pump on and let it run during the filling procedure
- Connect filling connection of filler pump with filler fitting (4)
- Switch on filler pump and fill reservoir until shortly below the MAX marking
- Switch filler pump off and remove it from filler fitting (4) of pump
- Switch the pump off.

Fig. 19 Filling via filler fitting



6.10.3 Priming of pumps with follower plate



In case of pumps without grease filling, before commissioning the space below the follower plate must be filled with grease. Any further fillings take place only via the filler fitting (4) or the optional filling connection on the pump



CAUTION

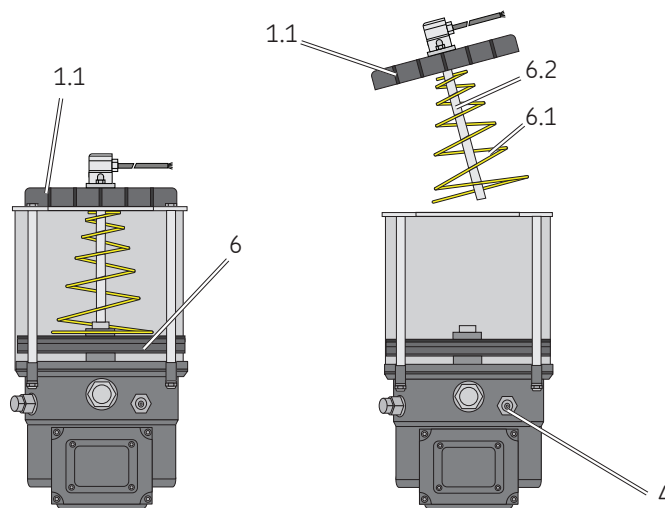


Spring force

Slowly loosen the reservoir lid holding it well. Wear safety goggles.

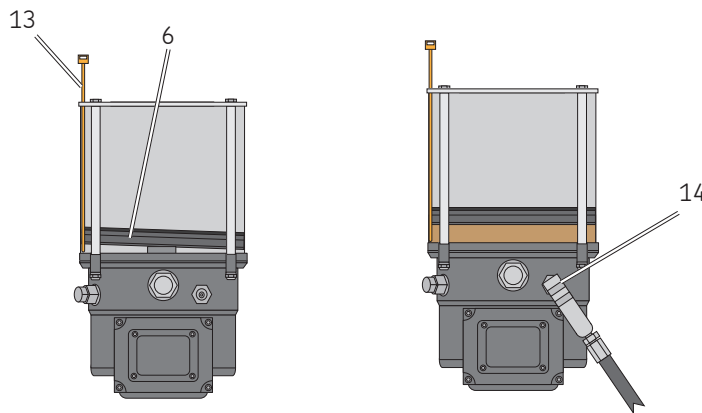
- Unscrew the reservoir lid (1.1) anti-clockwise from the reservoir
- Carefully loosen (6.1) the spring from the fixation at the follower plate (6)
- Carefully pull the contact rod (6.2) out of the follower plate (6)
- Remove the reservoir lid together with the spring and the contact rod

Fig. 20 Filling via filler fitting



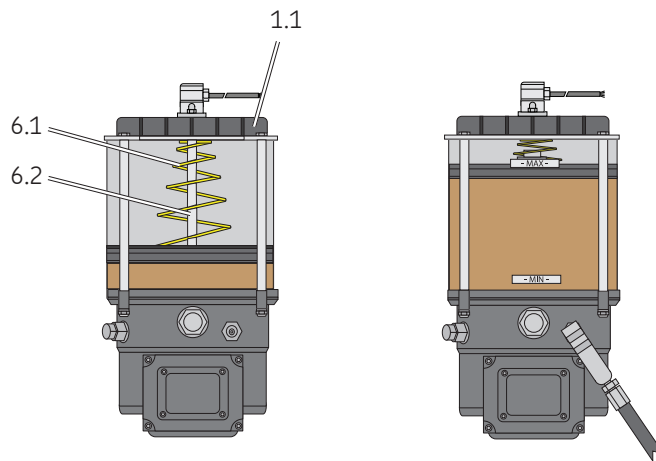
- Lightly oil the reservoir inside and the sealing lip of the follower plate
- Slightly tilt the follower plate (6) in the reservoir so that the side opposite of the filler fitting (4) is at the highest point.
- At this point pass a cable tie (13) into the area below the follower plate as shown
- Position the follower plate (6) horizontally again. Ensure that the cable tie (13) creates an air gap.
- Position the filling connection (14) of the filler pump onto the filler fitting and fill the space below the follower plate with lubricant. Ensure that no air pockets remain below the follower plate and that no lubricant reaches the upper side of the follower plate.

Fig. 21 Filling via filler fitting



- Reinstall the spring (6.1) and the contact rod (6.2).
- Close the reservoir lid (1.1) clockwise
- Fill the pump via the filler fitting up to the MAX marking.

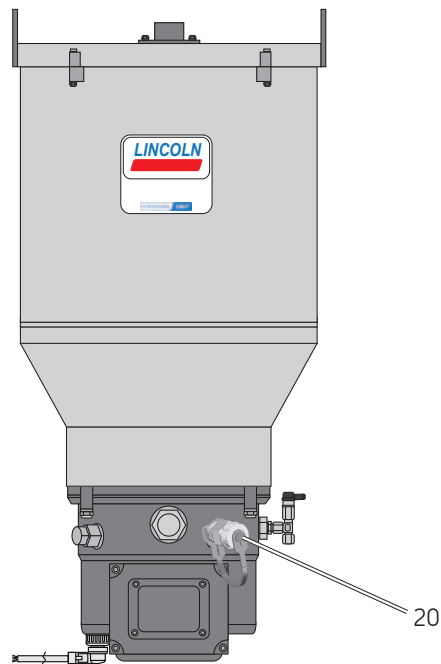
Fig. 22 Filling via filler fitting



6.10.4 Filling of the pumps with 30/40-litre sheet steel reservoir

- Switch the pump on and let it run during the filling procedure
- Unscrew protective cap from filling connection (20) anticlockwise.
- Connect filling connection of filler pump with filler fitting (20).
- Switch on filler pump and fill reservoir.
- Check the filling level through the inspection glass and fill the reservoir up to a maximum of 50 mm below the reservoir lid.
- 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.
- Switch the pump off.

Fig. 23 Filling via filling connection



6.10.5 Installation of the reservoir venting device



The loosely enclosed reservoir venting device must not be installed until the pump has reached its final installation position and is vertical.

NOTICE

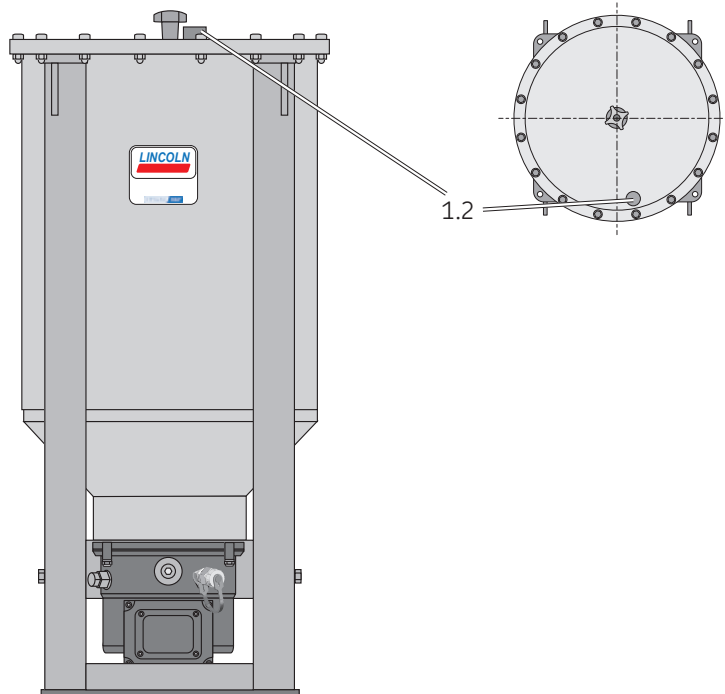
Possible damage to the pump

The pump may be filled only after the reservoir venting device has been installed. Otherwise when filling the reservoir lid may be damaged.

- Remove any contamination in the area of the cap screw. Unscrew the cap screw from the position for the reservoir venting device (1.2).
- Secure the thread of the reservoir venting device e.g. with Loctite 403 against loosening and screw the reservoir venting device (1.2) in.

Tightening torque = 1 Nm $\pm$ 0.1 Nm
[0.74 ft.lb. $\pm$ 0.07 ft.lb.]

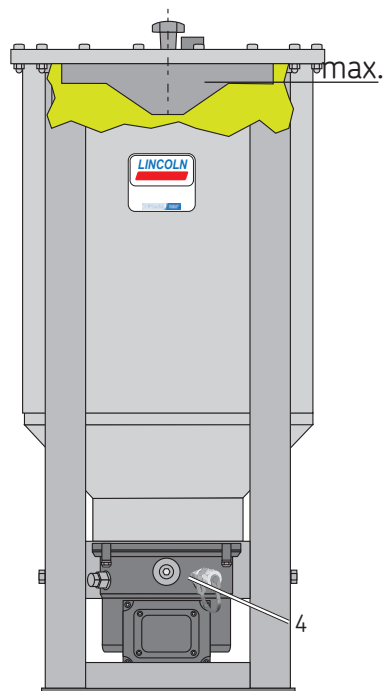
Fig. 24 Installation of the reservoir venting device



6.10.6 Filling of pump with 100-litre sheet steel reservoir

- Switch the pump on and let it run during the filling procedure
- Unscrew protective cap from filling connection (4) anticlockwise.
- Connect filling connection of filler pump with filler fitting (4).
- Switch on filler pump and fill reservoir.
- Check the filling level through the transparent reservoir lid and fill up to the outer lower rim (about 60 mm below the reservoir lid) of the wiper bar (17).
- Switch off filler pump and remove it from filling connection (4) of pump.
- Screw protective cap clockwise onto filling connection (4) of pump again.
- Switch the pump off.

Fig. 25 Filling via filling connection



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.

Fig. 26 Start-up check list

7.1 Inspections prior to initial start-up	YES	NO
Electrical connection carried out correctly	☐	☐
Mechanical connection 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 control 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 (leakages) from connections	☐	☐
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 of pumps without low-level indication and the timely refilling of lubricant.

8.1 Refill lubricant

See chapter Filling with lubricant

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 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.

10. Maintenance

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

Fig. 27 Maintenance check list

Activity to be done	YES	NO
Electrical connection carried out correctly	☐	☐
Mechanical connection 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 control 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 (leakages) from connections	☐	☐
Lubricant is supplied free from bubbles	☐	☐
Bearings and friction points are provided with the planned amount of lubricant	☐	☐

11. Troubleshooting

Fig. 28 Fault table 1

Fault	Possible cause	Remedy
Pump does not run	Power supply to pump interrupted - Superior machine is switched off - Connection cable of pump is loose or defective - External fuse is defective Pump is in the pause time mode Pump motor is defective Power supply board of pump is defective (in case of VAC pumps) 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. If the fault cannot be determined and remedied, please contact our Customer Service.

Fig. 29 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/ under the follower plate Too high lubricant consistency (at low temperatures) Too low lubricant consistency (at high temperatures)	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.
	Wrong configuration of metering device within the centralized lubrication system	

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

- De-pressurize 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 pump element and 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:

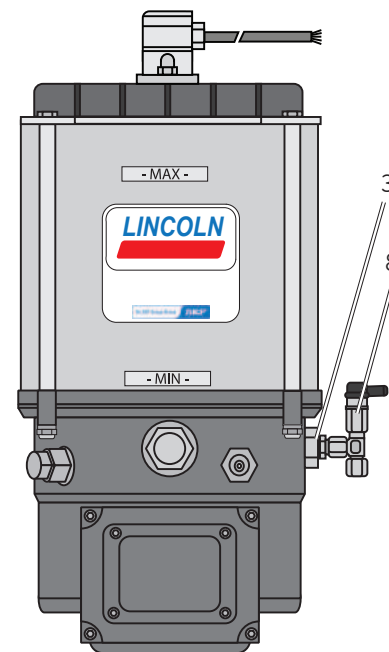
- Unscrew defective pump element (3) at its hexagon out of pump housing together with pressure control valve
- Screw the new pump element (3) into the pump housing together with a new gasket

Tightening torque = 20 Nm $\pm$ 2.0 Nm
[14.75 ft.lb. $\pm$ 1.4 ft.lb.]

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

Tightening torque = 6 Nm $\pm$ 0.5 Nm
[4.43 ft.lb. $\pm$ 0.07 ft.lb.]

Fig. 30 Replace the pump element



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.

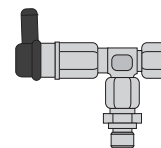
14. Spare parts

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 Pressure relief valves

Designation	Qty.	Part number
SVTS -350-R1/4-D 6	1	624-28894-1
SVTS -350-R1/4-D 6 DN (C5-M-H; duration of protection ≥ 15 years)	1	624-29343-1
SVTSV -350-R1/4-D 6 DN (C5-M-H; duration of protection ≥ 15 years)	1	624-77908-1

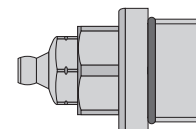
Fig. 33



14.2 Adapter with lubrication fitting

Designation	Qty.	Part number
Adapter with lubrication fitting ST 1/4 NPTF including gasket	1	519-33840-1
Adapter with lubrication fitting A2 AR 1/4 including gasket	1	519-33959-1
Adapter with lubrication fitting STAR 1/4 including gasket	1	519-33955-1

Fig. 31

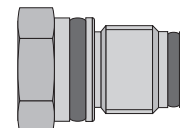


14.3 Blind plug

Designation	Qty.	Part number
Blind plug (C3-H; duration of protection ≥ 15 years)	1	545-33240-1
Blind plug (C5-M-H; term of protection ≥ 15 years)	1	545-60195-1

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

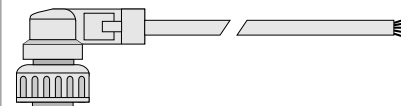
Fig. 32



14.4 Connection sockets and cable

Designation	Qty.	Part number
Connection cable 10 m [33 ft.] with bayonet socket (7/7 poles)	1	664-34428-3
Connection cable 20 m [66 ft.] with bayonet socket (7/7 poles)	1	664-34741-9

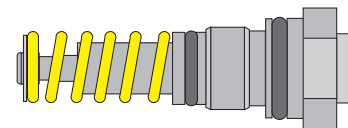
Fig. 34



14.5 Pump elements

Designation	Qty.	Part number C3 version	Part number C5-M version
Pump element Z7	1	645-77196-1	645-77625-1
Pump element ZT7	1	645-77612-1	
Pump element K5	1	645-77787-1	
Pump element K6	1		6450-00000014
Pump element K7	1	645-29873-1	645-77734-1
Delivery including gasket			

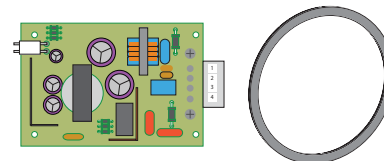
Fig. 35



14.6 Replacement kit of power supply board P603M V AC

Designation	Qty.	Part number
Replacement kit of power supply board P603MVAC	1	545-60459-1

Fig. 36



14.7 Plastic reservoir

Designation	Qty.	Part number
4 l XLF ¹⁾	1	545-33752-1
4 l XLB ²⁾	1	545-33758-1
8 l XLF ¹⁾	1	545-33753-1
8 l XLB ²⁾	1	545-33759-1
15 l XLF ¹⁾	1	545-33756-1
15 l XLB ²⁾	1	545-33754-1
20 l XLF ¹⁾	1	545-33757-1
20 l XLB ²⁾	1	545-33760-1

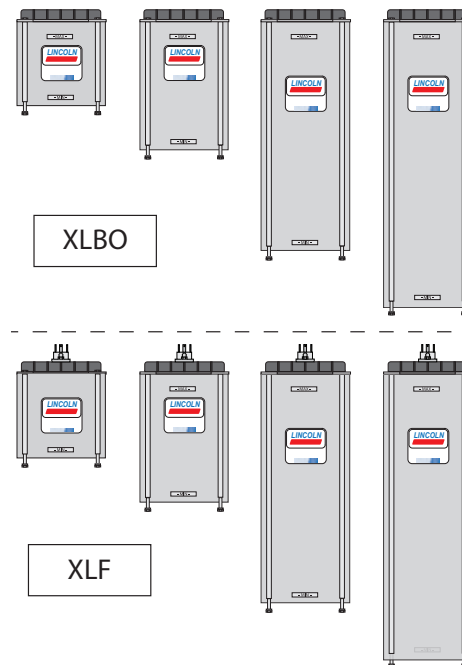
¹⁾ Delivery including: Reservoir lid with connection plug, follower plate assy., tie rods and adhesive label

²⁾ Delivery including: Reservoir lid with fixed paddle, tie rods and adhesive label



Delivery of the plastic reservoirs without stirring paddle

Fig. 37



15. Electrical connections

15.1 Cable colours following IEC 60757

Abbreviation	Colour	Abbreviation	Colour	Abbreviation	Colour	Abbreviation	Colour
BK	black	GN	green	WH	white	PK	pink
BN	brown	YE	yellow	OG	orange	TQ	turquoise
BU	blue	RD	red	VT	violet	-----	-----

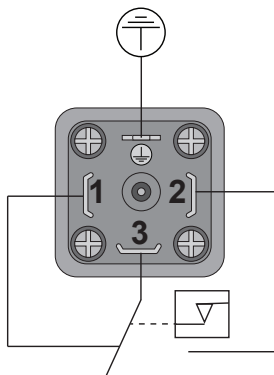


The assignment of the following electrical connection diagrams is done according to the respective referenced type identification code characteristics. For the complete type identification code of the P603 pumps, see instructions, chapter 4 Technical data.

15.2 Connection of signal line to reservoir lid

Fig. 38 Connection schematic of signal line to reservoir lid

Connection diagram (lubrication grease)
Follower plate and contact rod



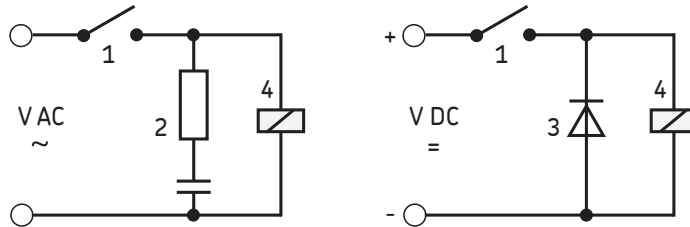
Depiction of unactuated condition

Maximum switching capacity	60 VA
Maximum switching voltage	30 V DC
Maximum switching current	700 mA

15.3 Recommended contact protection measure for switching inductive loads

Fig. 39 Recommended contact protection measure for switching inductive loads

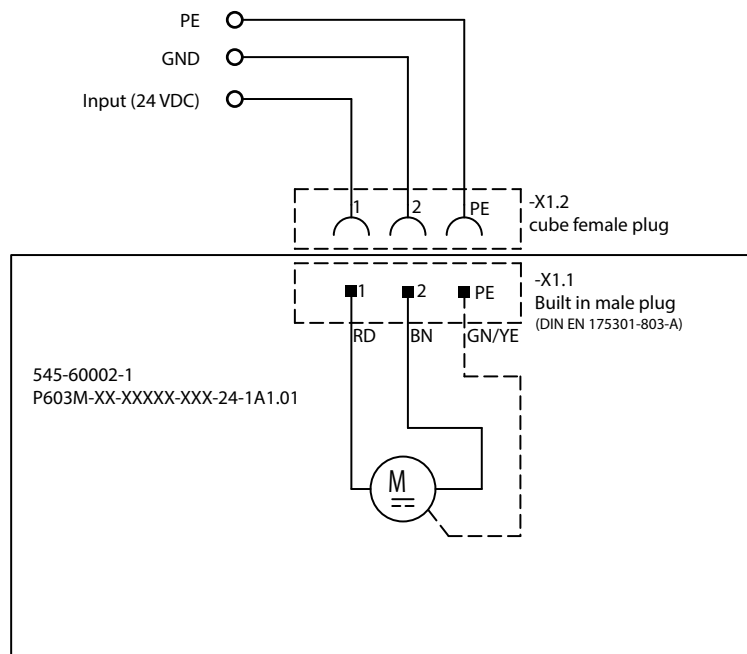
For protection of the relay contacts the following contact protection measure should be carried out by the operator.



- 1 Magnetic switch
- 2 Interference suppression diode
- 3 Diode
- 4 Load

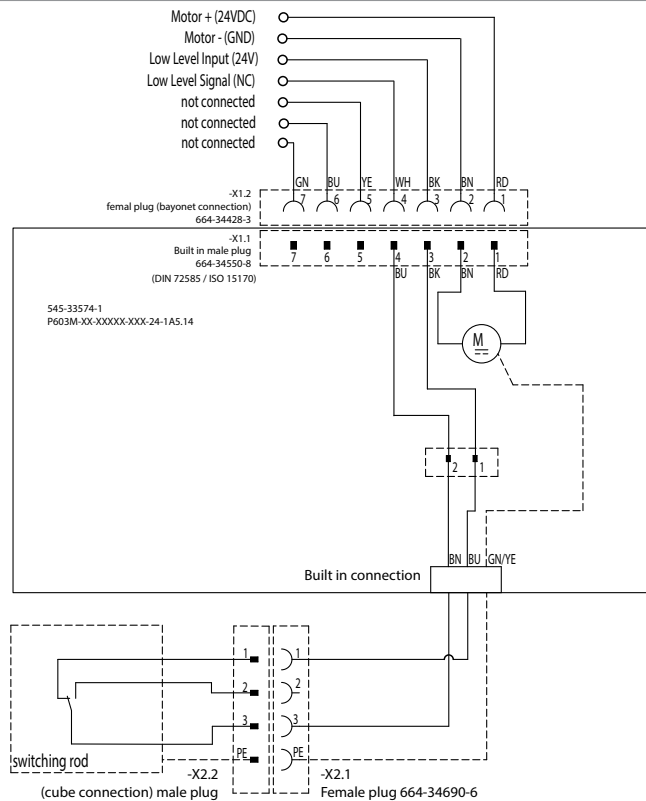
15.4 Connection diagram P603M VDC 1A1.01

Fig. 40 Connection diagram P603M VDC 1A1.01



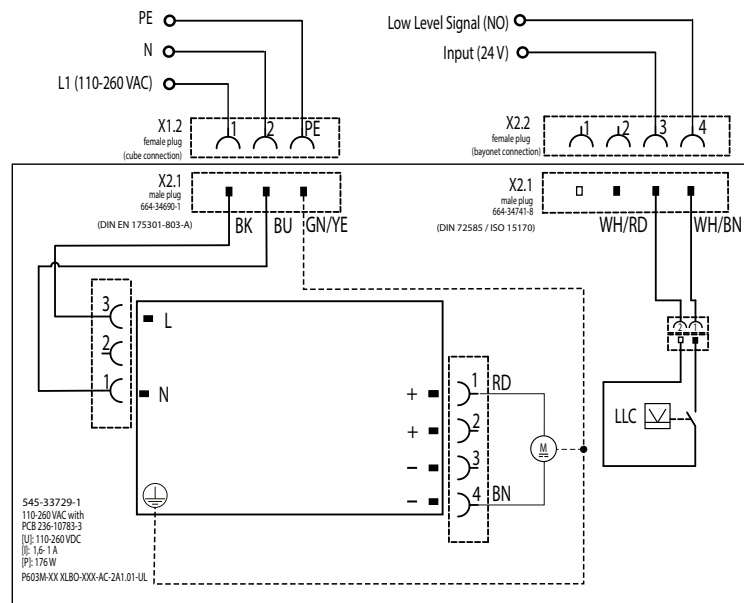
15.5 Connection diagram P603M VDC 1A5.14

Fig. 41 Connection diagram P603M VDC 1A5.14



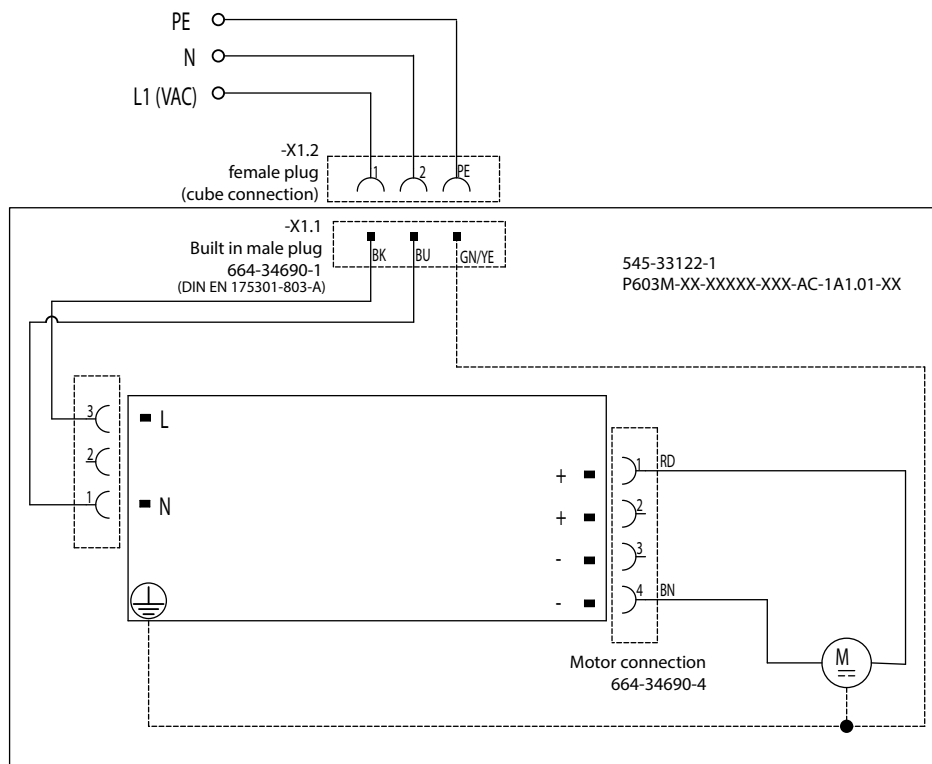
15.6 Connection diagram P603M VAC 2A1.01

Fig. 42 Connection diagram P603M VDC 2A1.01



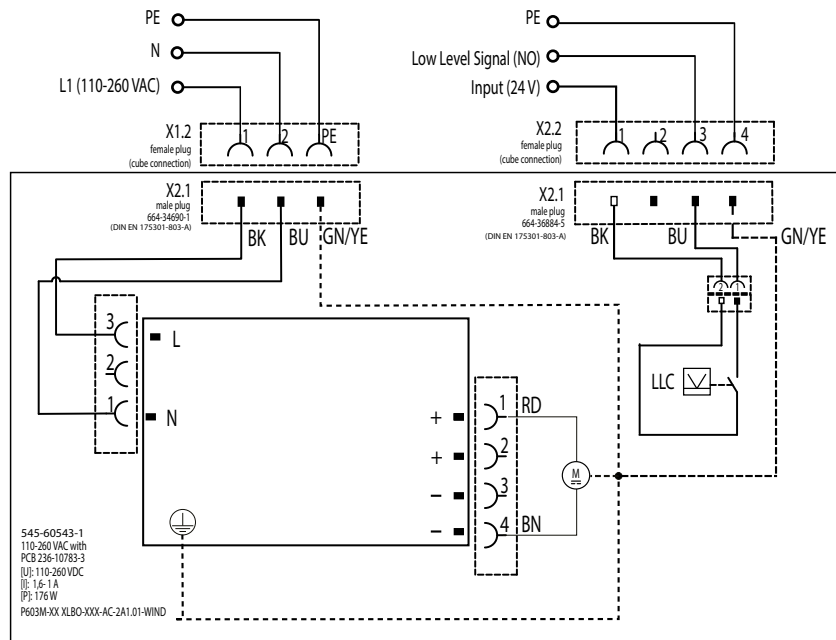
15.7 Connection diagram P603M VAC 1A1.01

Fig. 43 Connection diagram P603M VAC 1A1.01



15.8 Connection diagram P603M VAC 2B1.01

Fig. 44 Connection diagram P603M VDC 2B1.01



16. China RoHS Specification

部件名称 (Part Name)	有毒害物质或元素 (Hazardous substances)					
	铅	汞	镉	六价铬	多溴联苯	多溴二苯醚
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
用钢和黄铜加工的零件 (Components made of machining steel and brass)	X	0	0	0	0	0
本表格依据SJ/T11364的规定编制 (This table is prepared in accordance with the provisions of SJ/T 11364.)						
0 :	表示该有毒有害物质在该部件所有均质材料中的含量均在GB/T 26572 规定的限量要求以下。 (Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.)					
X :	表示该有毒有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572标准规定的限量要求。 (Indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.)					

A full-page view of a blank sheet of graph paper. The grid consists of thin, light gray horizontal and vertical lines forming small squares across the entire page. There are no margins, text, or other markings on the paper.

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